Meeting Minutes
UNOLS DEep Submergence Science Committee (DESSC)
Annual Community Meeting
Sunday, December 14, 2008

San Francisco Marriott
Yerba Buena Salons 10 and 11, 55 Fourth Street, San Francisco, CA 94103

Executive Summary – The Deep Submergence Science Committee (DESSC) met on December 14, 2008 at the San Francisco Marriott in California. The meeting was chaired by Deborah Kelley. Federal agency representatives provided budget information as well as agency priorities. A variety of reports were made by the National Deep Submergence Facility (NDSF) operator to summarize facility operations, planned activities, and system upgrades. Principal Investigators who used submergence vehicles in 2008 provided cruise highlights and assessments. The afternoon session focused on the status of the Replacement Human Occupied Vehicle (RHOV) project. Andrew Barrs (WHOI RHOV Project Manager) and Anthony Tarantino (RHOV Project Assistant) presented information on the new titanium sphere, *Alvin* upgrade plans, and timelines.

Actions from December 2008 meeting:

1) NDSF Image and Film archives:
- Request that WHOI evaluate the technology for converting old NDSF film/images to a digital format for modern storage capability.
- DESSC will assist WHOI by prioritizing the film/image materials to be converted for modern storage.

2) WHOI Underwater Optical Communicators – DESSC will invite Maurice Tivey to the spring DESSC meeting to report on the development of the low and high power underwater optical communicator systems. He will be asked to address how the community can access these systems.

3) Cruise Mobilization/Demobilization - There is continuing dissatisfaction from science parties about not being allowed to sleep on board ships prior to sailing. This constraint is imposed by the ship operator, not NDSF, and policies vary amongst the operators. DESSC will prepare a recommendation regarding standardized Fleet policies regarding access to accommodations during the cruise mobilization period. The recommendation will be sent to the UNOLS Council.

4) NDSF Vehicle Turnaround Times – The NDSF policy regarding standard turnaround times between vehicle lowerings is available at http://www.whoi.edu/page.do?pid=11256. DESSC has requested a better understanding of the turnaround requirements and constraints in order to determine if improvements can be implemented.

5) Compile Inventory of Homer Beacon IDs - DESSC will compile a master list of Sonadyne 'Homer' beacon IDs so that the various deep submergence operators as well as PIs know what is in use and where. Determine if there are other sensors/beacons on the seafloor that should be inventoried.

6) Hawaii Mapping Research Group (HMRG) Future – Margo Edwards is stepping down as HMRG Director. The future of the HMRG program and mapping systems <http://www.soest.hawaii.edu/HMRG/index.php> beyond 2009 is uncertain. DESSC/community input is needed on the future operation, support, and access of the mapping systems.

7) Replacement Human Occupied Vehicle (RHOV) Project – DESSC encourages the Navy and NSF to formally consider options for the next certification survey of *Alvin*. The options include:

- Obtain ABS certification of *Alvin* prior to 2010, recognizing that this option might require the transfer of *Alvin* from the Navy to NSF prior to the installation of the new titanium sphere.
- Determine if the Navy would allow a time extension for the next required *Alvin* overhaul/certification in 2010.

Deb Kelley will contact NSF and ONR with this request.

8) DESSC Membership – Deb, Bill, Craig, and Wiebke will contact candidates for DESSC membership to inquire about their willingness to serve on DESSC. Candidate statements of interest and CVs are requested by the end of 2008.

9) Safety Standards for HOVs – DESSC has been asked to review the HOV Safety Standards and provide feedback by the first week of January. If endorsed, the document will be forwarded to the UNOLS Council.

10) DESSC Winter Meeting – Efforts should be made to encourage increased participation by students at the winter meeting. Annette will try to obtain student email addresses. Announcements about the meeting should be made early. The next winter meeting will be in conjunction with The Ocean Sciences meeting in February 2010 in Portland, OR.

11) Education/Outreach – Encourage students to create u-tube videos about the NDSF vehicles. Assign a student on an NDSF cruise to create a blog. Deb volunteered to pursue this on a 2009 *Sentry* cruise and Bill Chadwick volunteered for a Marianas cruise.

12) DESSC Chair – A call for nominations will be sent out in early 2009.

Continuing Action Items:

13) AUV *Sentry* Status – Deb Kelley will send WHOI the link with the criteria for incorporating new assets into the NDSF <http://www.unols.org/committees/dessc/CRITERIADOCUMENT_062206.PDF>. The criteria states that the operator should be prepared to provide DESSC with information on: "Is the asset proven to be robust and beyond a developmental stage? Documentation of successful missions/deployments should be included with records of reliability, durations of deployments, and life expectancy." Upon receipt if this information from WHOI, DESSC can consider the replacement of *ABE* with *Sentry*. The DESSC review can be conducted by email and phone meetings. WHOI will also be reminded that the criteria require a review of operations after a year in service. *ABE* has been in service for a year.

14) DESSC Letter to NSF Regarding Uniform Funding – Deb will draft a letter to NSF requesting that they adopt a uniform policy for requesting and funding the use of the National Deep Submergence Facility assets within their agency.

15) Pilot Retention and Career Advancement –DESSC recommends that WHOI prepare a document that articulates the institution's strategies for pilot retention as well as procedures for implementing exit interviews for those pilots who resign. DESSC recommends that WHOI management promote learning opportunities and career advancement opportunities for pilots.

16) Mode of Operation for *Jason* Watches – DESSC recommends that WHOI explore options for staggering the start and end times for *Jason* watches with the goal of achieving better continuity through a dive cycle.

17). Science Outfitting Survey for the Replacement HOV – At the appropriate time, develop a community on-line survey and circulate it to the community.

18. Science Training Opportunities for Pilots - DESSC will formulate suggestions on workshop/training science sessions for pilots. The session(s) should demonstrate how the data from the vehicles are used for different research disciplines. We will make an outline for different disciplines (e.g. geology, biology, chemistry) on what elements of these programs would be beneficial to the pilots and work towards putting these documents together.

19. R2K Lectureship program – DESSC recommends that the R2K Lectureship program include an *Alvin* or ROV pilot as a distinguished lecturer. (Kelley)

Appendices

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XV	Replacement Human Occupied Vehicle (RHOV) Project Status

Meeting Report:

Introductory Remarks, Meeting Logistics, Introductions - Deb Kelley, DESSC Chair, opened the meeting and introduced the DESSC members. The meeting agenda is included as ***Appendix I*** and the meeting participant list is included as ***Appendix II***.

Agency Reports:

National Science Foundation (NSF) - Brian Midson provided the NSF report. He reviewed some of the recent personnel changes in OCE.

- Jim Holik has replaced Sandy Shor as the Program Manager for Technical Support
- Matt Hawkins has been hired to help oversee the ship acquisition efforts.
- Dolly Dieter was the acting section head for IPS. Bob Houtman has now been hired as the IPS Section Head.
- Brian is now the Program Manager for Deep Submergence.

NSF is operating under a continuing resolution with level funding. They will hopefully see some budget growth.

The article on the Replacement Human Occupied Vehicle (RHOV) in the *New York Times* got a lot of attention. There will likely be a rigorous review of the program. The RHOC Preliminary Design Review (PDR) will probably take place in mid- year.

Office of Naval Research (ONR) - Tim Schnoor has replaced Bob Houtman as the Research Facilities program officer at ONR.

UNOLS Report – Annette DeSilva provided the UNOLS report and reviewed some of the 2008 highlight. R/V *Marcus G. Langseth* began science operations as a UNOLS Vessel in February 2008. The first UNOLS 3-D seismic cruise took place this summer 2008 and users seem very happy with the data.

UNOLS Ship Scheduling and Operation Issues were reported:

- Fleet Operations in 2009 –In late summer/early fall the estimated cost of 2009 ship operations for NSF and ONR was about $19M (combined) over the budget.
- Escalating Ship Operation Costs - The estimated total fleet ship operating costs are almost $1M more than they were in 2008 (1% increase) but the number of days supported is reduced by just over 13% dropping from around 4,400 operating days to just over 3,800.

Some of the reasons for the big change in cost and the reduction in days include:

- Lack of work from "Other" and NOAA in 2009 compared to 2008, creates higher day rates for other NSF and Navy and the potential need to lay up ships.
- Higher percentage of 2009 cruises on large vessels compared to 2008 increases the average cost per day of the fleet.
- Higher fuel costs, which impact large vessels more (50¢/gal change = $1,250 per day change in day rate for Global Ships)

- Other inflationary costs for personnel, maintenance, regulatory compliance, etc.

Agency recommendations regarding 2009 Fleet Operations included:
- Lay up one NSF Intermediate Class ship on the east coast and fund only a partial schedule for Seward Johnson.
- Plan partial lay up for the *New Horizon*.
- NSF ship operations would fund approximately $6M of 2009 operations from FY2010 funds.
- NSF would attempt to find an additional $6M to $7M.
- ONR would attempt to find an additional $6M.
- Ship Operators would continue to find ways to reduce costs.
- Operators of Global and Ocean class vessels would work to effectively schedule and support work from other funding sources.
- Intermediate, Regional and Local vessels operators would seek appropriate opportunities to support research and education programs supported by other funding sources.

In response to the agency recommendations, UNOLS***:***
- Formed Ad hoc committee to review agency recommendations: Mary Jane Perry (Chair), Vernon Asper, and John Morrison
- Circulated agency recommendations and invited member feedback
- Ad hoc committee is conducting review in accordance with "Criteria and Process for Recommending Non-Operational Periods of Ships in the UNOLS Fleet http://www.unols.org/publications/reports/budget_impacts/NonOp_Process_Recmd.pdf

The UNOLS recommendations included:
- Lay up *Oceanus* this year.
- *Seward Johnson* - with the exception of one cruise, all other operations are supported from a private source.
- The schedules continue to be refined – and are at a level that the agencies can find funds to meet the budget.

A lot of attention is being spent on coordinating ship activities – UNOLS and non-UNOLS ships to avoid operational conflicts. – JdF is a busy area.

In other UNOLS activities:
- UNOLS has formed an Ad-Hoc Data Committee chaired by Steve Miller and Bob Arko to establish best practices on Data Management.
- The UNOLS Fleet Improvement Committee has been busy and their activities include:
  - SMR Project – FIC is establishing target and threshold values for Science Mission Requirements. Community Ocean Class SMR survey was conducted – great response (165)
  - Fleet Improvement Plan is drafted. The Findings and Recommendations were presented at the UNOLS Annual meeting. The document will begin the review cycle very soon.
    - Finding: By 2025 there will be fewer ships in the UNOLS Fleet
    - Ship day capacity will shrink below current demand
    - By 2016 the fleet's ship day capacity will fall below the 2007 day usage.
    - Meeting demands during peak periods in spring and summer will be difficult.
    - We will lose flexibility that allows for multi-ship operations and remote expeditions.

- Transportation Workers Identification Credentials (TWIC) - UNOLS recommends that scientists who use secure vessels/facilities obtain TWIC cards. Information for the UNOLS Community is posted: http://www.unols.org/info/UNOLS_TWIC_INFO_051408.pdf
- RVOC/RVTEC – the two groups are jointly addressing an important topic – Crew and marine technician retention and hiring.
- AICC – At their recent meeting, the USCG presented Mike Prince with their Distinguished Public Service Award for his outstanding support to the Coast Guard and the scientific community as the Executive Secretary of the University-National Oceanographic Laboratory System.
- UNOLS Office Transition – The current grant to host the UNOLS Office by MLML expires on 30 April 2009. There was a solicitation for host inst in early 2008. Three institutions submitted proposals. UNOLS recommended URI as the next UNOLS Office host with Jon Alberts as the Ex Sec. Jon was the ship scheduler at WHOI for quite a few years.

National Facility Operators Report (WHOI):

Personnel Changes in NDSF - Susan Humphris reported on personnel changes at WHOI and NDSF. Her slides are included as ***Appendix III*****.** Bob Detrick has been hired at NSF and has left WHOI. Susan has stepped in as an interim Vice President of Facilities. There will be advertisements in EOS to replace Bob. Peter Wiebe will chair the selection committee. Susan Avery is re-organizing the position.

Andy Barrs is now the Program Manager for the RHOC project.

Summary of Upgrades to NDSF - Andy Bowen reported on the NDSF upgrades. His slides are included as ***Appendix IV*****.**

Andy's presentation included information about the HDTV upgrade. The design Goals for HDTV Upgrade are to develop an imaging system upgrade that improves the overall quality of motion and still-based imagery on *Jason* and *Alvin* without impacting the day rate. The upgrade was endorsed by DESSC in December 2007 and approved for funding by NSF, spring 2008. There is a phased implementation:

- Camera Head Completion, Early 2009
- System Integration, Fall 2009

HD Upgrade Project status:

- Optical and Sensor Path - Finalized
- Electronics for *Jason* Camera - Finalized
- Electronics & Storage for *Alvin* - In Development
- Pressure Housings - Finalized being fabricated
- Camera Control Software - Field Testing
- *Alvin* Storage Bottle - In Development
- Final Camera Hardware Integration - March 2009

Andy summarized Navigation upgrades**:**

- Benthos 455 retired

- Effectively supporting ROV and submarine LBL requirements with new supported hardware and software
- "new" capabilities added (synchronous nav)
- Effective, modern baseline for future developments in software and hardware

Navigation: USBL Procurement Status:
- Sonardyne system successfully tested off Hawaii – Successful testing at 4700m
- *Jason, Medea,* elevators
- Ixsea GAPS tested on Oceanus – Ship noise an issue, lost *Sentry* tracking at 2400m

Data Activities - Scott McCue has made 6 *Alvin* and *Jason* cruises in 2008

Infrastructure Improvements include:
- Added 2 x 8 TB RAID 6 (highly reliable!) storage to the server installed earlier in 2008. Recent cruises being placed on it directly.
- Update to web documents to better present NDSF data-bearing archives and separate pre-cruise documentation from these archives.
- http://www.whoi.edu/page.do?pid=8475

Updates and plans for data management for each vehicle are summarized in the slides.

Future Upgrades Based upon Science User requests include:
- "CHIRP" system portable between *Alvin, Jason and Sentry*
- Reson 7125 Multi-beam for *Jason*, to match *Alvin* and *Sentry*
- Implementation of sidescan sonar capability on *Sentry* (joint with HMRG)

Discussion:
- Deb – Is there a mechanism for archiving the old images and films. Andy will talk about this later.
- Dan Fornari – One thing that they did some years ago was go through the old films and frame-grabbed them. It was a lengthy process and very big task. We need to decide what to do next.
- Deb – Maybe a prioritization of what to archive is needed. Perhaps focus should be on areas that are not frequently visited.
- Brian – he knows of one instance where someone who included effort in their science proposal to convert old footage/images. He encourages this as a means for getting more archived.
- Dan – There are better ways of converting medium that have been developed in the last 6 years.
- Action Item –
    - WHOI will look at the technology for converting old medium to modern
    - There will be an effort to prioritize the material to be converted.
- Dan – There is a parallel effort in R2K and we want to make sure that we are not duplicating the effort. Andy – This is important and NDSF needs help identifying the areas of interest. Deb – DESSC can help with this.

- Andy - One area that is important is to make sure that the data is gathered in the proper way in the first place. WHOI is developing the "How-to" guides for imaging mosaicing, multi-beam surveys, etc.
- Bill Chadwick – Will the guides be on the web? Andy – This is good, but it is difficult to standardize the procedures. It needs to be addressed in the pre-cruise planning.
- Bill Chadwick – On the new transponder system, how many frequencies will it have? Andy – There are a dozen frequencies, but users will have access to 3 or 4.
- John Smith – asked for more details on HD. Andy – There are no plans to collect continuous HD data. It is cost prohibitive. If you bring your own tapes, they will record.

Deep Submergence Scheduling: 2009 and Beyond - Chris German provided the NDSF scheduling report. His slides are included as *Appendix V*. *Jason* had a busy year in 2008 with work in a lot of places in the world. Maps showing the planned operations for 2009 are included in Chris' slides.

1030 - Break

NOAA report - Karen Kohanowich provided the NOAA report via speaker phone. Her slides are included as ***Appendix VI***. Her report included information about:
- Ocean Exploration and Research (OER) Budgets in FY2008
- NOAA NDSF and NDSF- Related Funding
- NOAA and Deep Submergence operations in 2008 and plans for 2009

John Smith continued the report with information on HURL activities for 2008-2009 and plans for the out years. His slides are included in Appendix VI.

Karen continued the report with an OER Headquarters update. They have been converting the NURP centers to Cooperative Institutes (CIs). They are planning for a Cooperative Institute for U.S. Eastern Continental Shelf Frontier Exploration, Research and Technology Development.

Okeanos Explorer was commissioned on August 13, 2008.

PI Reports:

NDSF Vehicle Operations Summary - Chris German provided NDSF 2008 operations summary. His slides are included as ***Appendix VII***. In 2008 *Alvin* already completed eight cruises and one is upcoming. There was a three month layup from January to April. Five dives were lost to weather and two to medical emergency.

Jason has completed five cruises with one remaining in 2008. There have been 56 lowerings so far. Chris reviewed the highlights (see slides).

Lastly, Chris reviewed the *ABE/Sentry* Operations in 2008 (see his slides for details). *ABE* conducted its first dives in the Southern Ocean. There was a discovery of new hydrothermal sites at 2°S, EPR.

Alvin PIs – PIs who used the *Alvin* in 2008 provided slides in advanced of the meeting that include highlights from their cruises. PIs who were in attendance presented their slides. The slides are contained in ***Appendix VIII*** and include reports from:

- Kang Ding - *AT 15-28 Alvin Cruise EPR*
- Luther/Nooner East Pacific Rise 2008 with Alvin (June 3rd - 19th 2008)
- Ray Lee and Peter Girguis PI's (July 5-21, 2007) Juan de Fuca Ridge
- Holden, Di Iorio (UGA), Butterfield (NOAA) at Endeavour Segment & Axial Volcano (August 18 – September 7, 2008)
- Chris German reported on WHOI's Underwater Optical communication tests. Field tests were conducted during *Alvin's* dive program on July 28 – Aug 13 2008.

Deb – What is the business model? Chris – A DESSC recommendation would be good. Andy – the low power unit is a no-brainer. High power is more cruise-specific.

Jason* PIs –** PIs who used *Jason* in 2008 provided slides in advanced of the meeting that include highlights from their cruises. PIs who were in attendance presented their slides. The slides are contained in ***Appendix IX and include reports from:

- MAR '08 KNOX18RR - 07/9-08/13, R/V *Roger Revelle*, ROV *Jason II* – Bill Seyfried presented for Anna-Louise Reysenbach.
- September 22- October 10, R/V *Thompson* / *Jason* - Katrina Edwards was the PI. FeMO: An Iron Microbial Observatory at the Loihi Seamount.

ABE/Sentry –PIs who used *ABE/Sentry* in 2008 provided slides in advanced of the meeting that include highlights from their cruises. PIs who were in attendance presented their slides. The slides are contained in ***Appendix X*** and include reports from:

- Delaney and Kelley - RSN Node Mapping Cruise, July 22, August 5 2008 - Hydrate Ridge & Axial Seamount, Insite08 – Delaney and Kelley - This was a student cruise.
- ABE cruise on R/V DayangYihao - August-September 2008 (25 days). Chief Scientist: Chuanhui Tao (2nd Inst. Oceanogr). This might prove to be *Abe's* last dive.

NDSF Vehicle Debrief Interviews

- Summary of issues identified in all debrief interviews (Deb Kelley, Bill Chadwick, and Mike Tryon)

Alvin* Debrief Interviews** – Mike Tryon summarized the *Alvin* debriefs. Details are inlcued in ***Appendix XI.

As an overview:

- All the PIs were very satisfied with their *Alvin* experience and felt that their scientific goals were all met or exceeded. For the most part these were repeat users of the facility and many noted significant improvements from previous years.
- All personnel from Captain to deck crew, Expedition Leader, pilots, and engineers were at various times singled out for praise. The *Alvin* team was universally praised for its professionalism.

Issues that were identified include:

- Science parties are recommended to show up early as possible for their cruises. There is continuing dissatisfaction, for financial reasons, with not being allowed to sleep on board prior to the night before sailing (this is a ship operator's constraint, not NDSF).
  - Dan Fornari – It would be very good if there were a standardized process regarding accommodations. There are cost issues and burdens on crews.
  - Mike Prince – This topic comes up every year at RVOC, but no progress has been made on fleet standardization.
  - Action Item – DESSC recommends that the RVOC standardized policies across the fleet regarding pre-cruise berthing.
- One of the manipulator arms fell off early in a dive. This was handled very calmly and professionally but nonetheless that entire dive was lost in terms of science and so was another dive which had to be dedicated to retrieving the manipulator from the seafloor. The fault was diagnosed to be due to new Frangibolts that had been installed to replace the explosive bolts. New larger/stronger bolts have since been installed.
- Navigation continues to be an intermittent problem for some PIs. For two programs both DVL and LBL were problematic with DVL frequently inoperable and sometimes neither operational. Another had good LBL but DVL did not function on a number of dives. Use of ship-board USBL while *Alvin* remained stationary at the seafloor could not always resolve which of two or more close sites *Alvin* was on.
- The only other problems reported were a broken suction sampler on one cruise and the focus controls for the starboard manipulator 3-Chip camera inoperable on one cruise.
- There were some issues with DVD copying – not clear if this was hardware (e.g. Alvin Group DVD copier) or different batch of blank DVDs. There may be a longer-term problem with the status of the DVD copier.
  - Deb – As long as she can remember navigation has been an issue. One thing that we should think about is short courses on navigation.

Jason **Debrief Interviews** – Bill Chadwick summarized the *Jason* debriefs four the four previous cruises. His slides are included in **Appendix XII**. This debrief process is working and has been effective. WHOI has been very responsive to the feedback.

The users are very appreciative of the improvements that have been made.

- New control vans "vastly improved"
- DSC camera on pan & tilt with science video
- More turn-around time flexibility -
- Improved pre-cruise planning
- Testing of USBL navigation system

Some areas and issues that were identified include:

- Kraft arm (sometimes lost delicate settings, hydraulic leaks, sometimes "twitchy")
- There needs to be better follow-through at sea with previously planned operations
- Non-optimal results from SM2000 and photo-mosaicing surveys were on occasion experienced.
- Turn-around time between dives – Some users would like more options for science users who need short-turn around for time-sensitive sampling, or to visit many different sites. Matt Heinz indicated that the crew can be helpful in providing shorter turnarounds. It works on the UW and WHOI ships. DESSC and NDSF will explore this further.

***Sentry* Debrief** – Deb Kelley summarized the *Sentry* debrief. Details are included as ***Appendix XIII*.**

Summary of WHOI's Response to debriefs - Andy Bowen summarized WHOI's response to the issues and problems identified in the user debriefs. His slides are included as ***Appendix XIV***.

WHOI provided responses to the following items:
- Doppler-Based Navigation
- LBL Navigation
- Frangi-Bolt Failure
- Alvin general improvements and issues
- Alvin Operations Crew
- Kraft manipulator reliability issues
- Mosaic and SM2K results
- Vehicle Turnaround Time
- Jason general improvements and issues
- Sentry problems.

Andy reported that Bruce just completed his first full year as an expedition leader.

Discussion on turnaround time:
- Andy – this is a compel issue. A clear set of guidelines is needed. The crew needs to get the proper amount of rest. There are safety considerations.
- Bill Chadwick – He uses ROPOS and they have 12-hour watches. He would like to know whay this won't work for NDSF.
- Chris German – The ICES ROV does not use a cage for launch and recovery (LAR). It is less sophisticated.

Homer Beacons:
- Deb – Will there be an inventory of Homers? This will become an issue as observatories get installed. Andy – We need a traffic list – not just sensors, but also need them for sensors that are on the sea floor at JdF. Homer's in particular.
- Sandy Shor – Margo Edwards is stepping down as director HMCI. Hiring freeze and cannot hire replacement. Margo might stay on. Will look beyond 2009 to determine if the program should continue. Right now there are no requests in NSF and ONR. If you want to use mapping sensors send in a request. They would like to determine what they should do with the systems. Need Community input.

Storage capabilities:
- Deb - Will there be fewer cameras? As many views as possible. Andy – We are not reducing the number of cameras. Chris German – On *Jason* there are the video and digital on two different cameras. These will be combined into one camera. On *Alvin*, this will be a new capability. Andy – these cameras have improved a lot. He doesn't see a problem.
- Deb – Are there any lighting issues. Dan – The lighting and cameras are inter-related and should be considered as a package.

- Dan – in terms of collecting HD, is it part of the plan to have a terribyte storage capacity in place to hold data.

Adjourn the morning session.

Afternoon DESSC Meeting **-** The DESSC met in the afternoon at 2:00 pm to discuss committee activities and issues. The major topic of discussion was the status of the Replacement Human Occupied Vehicle (RHOV) project. Andrew Barrs (WHOI RHOV Project Manager) and Anthony Tarantino (RHOV Project Assistant) presented information on the new titanium sphere, *Alvin* upgrade plans, and timelines.

The Alvin Upgrade Project report is included as ***Appendix XV***.

The slides include a:
- History of the RHOV Project
- Project's Original Goals
- Specific Capabilities
- Science Outfitting Plans
- Changes to Mode of Operation
- Risk Mitigation
- Impact to Alvin Operations and Overhaul Schedule
- Project Timeline
- Personnel Sphere Status

The project is divided into two phases. At the end of Phase 1 the vehicle will have a 4,500 m capabilities and at the end of Phase 2 the vehicle will have a 6,500 m capability.

Some of the improvements under Phase 1 include:
- Titanium sphere
  - improved field of view
  - increased internal volume
  - improved ergonomics
- Lithium-ion battery system
- State-of-the-art command and control system
- Improved lighting
- Hi-definition camera & video systems

Andy Barrs reviewed the organizational structure as well as the RHOV goals to be met.
- Brian – what enables improved mid-water capability. Andy – the Li batteries – added power.
- Jennifer Reynolds – If the working day is going to stay the same length, how will you achieve longer bottom time? Andy - Faster asset and descent times for the vehicle.
- Marsh –How will there be enhanced mid water? Anthony – More thrusters on the vehicle.
- Will there be a change in the day rate? Anthony – There are similar consumables.
- Dan Fornari – Many of the capabilities are tied to the batteries. However there are risks because the batteries don't exist yet. Will they explore the technology used by the French and MIRs? We need a viable fallback. WHOI needs to define the fallback. Need a set of

options/criteria for what we would like to achieve. How many of the goals can be achieved by using lead acid batteries? Andy – This will be part of the risk mitigation plan.

- Sphere delivery is scheduled for June 2010.
- Battery development must proceed as quickly as possible. May 1, 2011 is end of Alvin's 5-year certification period. Overhaul must start before then.
- Brian –WHOI must follow the intent of the large facilities guidelines (although this is not a MREFC program).
- Dolly – What happens if you cannot meet the overhaul schedule? Andy – They could do the regular overhaul, and then do the conversion.

DESSC Executive Session with WHOI followed the public session. Any action items that were tasked are included in the Action Item list at the beginning of these minutes.