

Project Instructions for:
2003 TITANIC EXPEDITION
NOAA Office of Ocean Exploration Component

Cruise Dates: June 22, 2003 through July 2, 2003

Operating Area: North Atlantic

Sea days: 11

Allocated operation days: 2

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I. Cruise Overview

A. Summary of Objectives:

As the leading ocean agency, and as per the *Guidelines for Research, Exploration and Salvage of RMS Titanic*¹, issued under the authority of the RMS *Titanic* Maritime Act of 1986, the National Oceanic and Atmospheric Agency (NOAA) has a vested interest in the appropriate treatment and preservation of the *Titanic* wreck site.

NOAA supports continual scientific research of the wreck for the sake of advancing knowledge of *in situ* preservation and degradation rate. Throughout its endeavors with *Titanic*, NOAA intends to promote full participation with other federal agencies, and academic and research institutions with respect to exploration and research of the wreck site.

An eleven-day cruise to the *Titanic* wreck site will be conducted aboard the Russian science vessel R/V *Akademik Mstislav Keldysh* in conjunction with Deep Ocean Expeditions (DOE). A majority of the cruise time will be allocated to Jim Cameron's staff for filming purposes. However, NOAA Office of Ocean Exploration (OE) has acquired two days of operation time with use of the vessel's MIR submersibles.

The goals for these two days are to assess the wreck site in its current condition and provide an opportunity to conduct scientific observations supporting on-going research. Various members of the maritime archaeology and science communities have been asked to participate in order to lend their expertise and knowledge to this short expedition.

B. Operating Area:

North Atlantic, approximately 320 nautical miles south-southeast of Newfoundland.

C. Participating Institutions:

National Oceanic and Atmospheric Administration (NOAA)
National Park Service (NPS), Submerged Resources Center
Droycon Bioconcepts, Inc. (DBI)

D. Personnel:

Jeremy Weirich, principal investigator, NOAA/OE
Craig McLean, program director, NOAA/OE
Roy Cullimore, microbiologist, DBI
Lori Johnston, microbiologist, DBI

¹ Docket No. 000526158-1016-02, Federal Register, Vol. 66, No. 71

Larry Murphy, archaeologist, NPS
Jeff Johnston, historian, NOAA/NMSP
Laura Rear, data manager, NOAA/OE

E. Administrative:

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II. Operations

A. Data to be acquired:

Four types of data will be acquired: digital video images, still photographs, water analysis (*in situ*), and water samples (shipboard analysis).

B. Staging Plan:

Keldysh is scheduled to arrive in St. John's Newfoundland, Canada on the morning of June 14, 2003. The science party will plan to meet the ship and load any gear on or about June 21st in preparation for an evening departure on June 22nd.

C. Cruise Plan:

With only two days of operational time, this mission is limited in scope. However, a limited call was sent out to selective scientists to highlight on-going science conducted on this site. A prioritized list of objectives is provided, although more work has been allocated than can be completed. The goal is to maximize use of the two submersibles in order to accomplish as many objectives as possible.

1. Primary Objectives:

- a) Using digital video data, catalog any anthropogenic activities currently impacting the wreck site, or evidence of such activity since its discovery in 1985. This includes submersible landing areas, distributed "memorials", on-going scientific experiments and discarded equipment.
- b) Using digital video data, acquire images of various areas of the wreck that have been observed throughout the years to contribute to the on-going scientific research regarding the ship's degradation. These areas include: the bow (anchors and seafloor around the front), forecastle deck rail to the well deck, port and starboard upper promenade, starboard forward expansion joint boat deck, the mast, starboard side breaks below well deck, and the full length of the stem.
- c) Acquire video data of four steel platforms containing experimental metal samples. These platforms are located near the bow, the bridge, the engine and

the stern. If possible, retrieve one of the platforms during the first day of dives, and return it the second day with new samples.

- d) Using digital still images, acquire an overhead plane view of the wreck for use in creating a site map and photomosaic.
- e) Using *in situ* hydrographic probes, measure dissolved oxygen, pH, salinity, and temperature at various locations surrounding the wreck. To maintain consistency, samples should be taken where the steel test platforms reside. Water samples will also be acquired at these locations for chemical analysis on board the vessel, which include: total phosphorous, total suspended solids, total dissolved solids, nitrate/nitrite, and sulfide. Shipboard experiments will also examine the amount of bacterial activity in seawater samples using the Biological Activity Reaction Test (BART™) reader systems.

2. Secondary Objectives:

- a) Conduct an improved bacterial aquanaut experiment where selected strains of bacteria (not known to be pathogenic in any way) are sent down to be exposed to the conditions at the Titanic. The last trial showed all five strains survived with an approximate one order of magnitude loss in population.
- b) Using the submersible's manipulator, install BART™ testers and etchings on the boat deck for a short period of time to determine the current level of microbial activity.
- c) Using digital video data, catalog the different varieties of sea snow, of which there are at least seven types. This would be irrespective of any wreck images, and should be conducted separately.

D. Personnel Responsibilities

1. Jeremy Weirich: As principle investigator, he will organize the science operations, be the lead point of contact with the ship and DOE, work with the science party to manage data, conduct inorganic chemistry work, provide ancillary archaeology support
2. Craig McLean:
3. Roy Cullimore and Lori Johnstone: Both individuals will lead the microbiological and rusticle activities of the projects, provide guidance for appropriate videography coverage of the wreck, and manage all work regarding the steel test platforms.
4. Larry Murphy: With his metallic shipwreck expertise, he will provide archaeology support to the projects, and, as a member of the NPS, will lend interagency guidance pertaining to the future preservation of the wreck.
5. Jeff Johnston: As the NMPS representative, he will offer another NOAA perspective as well as provide some historical context.

6. Laura Rear: She will provide metadata support, manage the video library, produce data back-ups, and create copies of all data prior to the end of the cruise.

E. De-staging Plan:

The science team and gear are expected to be offloaded in St. Pierre, Ile Saint-Pierre on the afternoon of July 2, 2003.

III. Facilities and Responsibilities

A. Equipment and Capabilities Provided by Ship (including submersibles):

1. Underwater digital video cameras for submersibles
2. Underwater still video cameras mounted under the submersibles (TBD)
3. Remote sensors for submersibles including: dissolved oxygen, pH, salinity, and temperature. Including an agreed upon output source for data (i.e., serial output or log to file)
4. Slurp gun for acquiring water samples
5. Operational manipulator arm
6. Scoop bucket or tray for holding small test samples (TBD)
7. Lab space for conducting inorganic chemistry and biochemistry tests (TBD)
8. Laboratory equipment and chemical reagents for chemical analysis of total phosphorous, total suspended solids, total dissolved solids, nitrate/nitrite, sulfide of water sample (TBD)
9. An appropriate and agreed upon source of navigation for the subs, and means of recording that data (TBD)

B. Equipment and Capabilities Provided by Scientists:

1. BETA videocassettes for recording digital video images (NOAA)
2. Video deck equipment for duping tapes to mini-DV format (NOAA)
3. Metal coupons for re-sampling steel test platforms (DBI)
4. BART™ testing kits and associated materials, including bacteria (DBI)

IV. Disposition of Data and Reports

A. Data Responsibilities:

1. Once the imagery data have been acquired, it will be the responsibility of OE to copy and archive the data.
2. Any chemical analysis (excluding biochemical) data will be archived and managed by OE.
3. Any biochemical data will be archived and managed by DBI.
4. All metadata will archived by OE.
5. Copies of data or results from chemical analysis will be shared by all science parties.

6. A copy of video imagery will be given to DBI for use in comparing with digital imagery data from prior cruises.

B. Pre-and Post-cruise Meetings:

As needed.

C. Ship Operation Evaluation Report:

As mandated by NOAA or *Keldysh*

D. Final Cruise Reports and Data Dissemination:

It is the responsibility of OE to provide a detailed cruise report within 90 days of the completion of the project. OE will look to all science staff to support this document by providing any appropriate information. The following is a list of required content:

- Project title
- Expedition dates
- Vessel identification
- Geographic area of operation
- Project goals and objectives
- Anticipated benefits
- Brief description of methodology (inc. equipment used)
- Summary of operations
- Unique observations
- Milestones achieved (miles surveyed, length of dives, etc.)
- Participants (name, contact info, role during cruise)
- Inventory of data files collected (date, file name, file type, physical storage location)
- Post-cruise activities

OE is currently in the process of developing metadata guidelines and standards for all ocean exploration missions. For this cruise, all geospatially-referenced data is documented using the Content Standard for Digital Geospatial Metadata (CSDGM) developed by the Federal Geographic Data Committee (FGDC).

V. Hazardous Materials:

A. Policy/compliance:

None.

B. Inventory:

None.

C. MSDS:

None.

D. Radioactive Isotopes:

None

VII. Miscellaneous

A. Scientific Berthing:

Eight scientific berths are needed for the OE portion of the expedition. Berthing plan, including gender of science crew will be provided by the Chief Scientist.

B. Medical Forms and Emergency Contacts:

Members of scientific party will be instructed by the Chief Scientist to complete any medical forms and provide personnel information to DOE prior to the cruise. A detailed list of requirements will be provided soon.

C. Shipboard Safety:

Compliance with ship protocol.

VIII. Appendices

A. Equipment Inventory:

Not applicable at this time.

B. Hazmat Inventory:

Not applicable at this time.