International Ocean Discovery Program
JOIDES Resolution Science Operator

Texas A&M University

FY17 Annual Program Plan to NSF

for the time period
1 October 2016–30 September 2017

Amount proposed FY17: $62,266,074

Respectfully submitted to:
National Science Foundation

JOIDES Resolution
Science Operator

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1. Executive summary

1.1. Introduction

Texas A&M University (TAMU) acts as manager and science operator of the research vessel *JOIDES Resolution* as a research facility for the International Ocean Discovery Program (IODP). Administrative services in support of *JOIDES Resolution* Science Operator (JRSO) activities are provided by the Texas A&M Research Foundation (TAMRF) through the TAMU Sponsored Research Services (SRS).

1.2. Annual Program Plan overview

The complex nature of IODP operations will require Annual Program Plans spanning operational years to establish priorities and to allow the procurement of long–lead time equipment and services. The IODP JRSO FY17 Annual Program Plan to the National Science Foundation (NSF) defines the *JOIDES Resolution* Science Operator (JRSO) scope of work for FY17 IODP activities and deliverables that are specifically covered under NSF Cooperative Agreement OCE-1326927. This Annual Program Plan is based on (1) the current mission forecast provided for the JRSO by NSF and (2) the JRSO operations schedule that was approved by the *JOIDES Resolution* Facility Board (JRFB) in May 2016. The scope and budget justification of the activities described in the Annual Program Plan were derived from NSF guidance to the JRSO.

The IODP JRSO FY17 Annual Program Plan includes a discussion of the goals of the JRSO, responsibilities and deliverables, the operational schedule, descriptions of expeditions, and the JRSO organizational structure for science operations and platform operations activities. This section (Section 1) provides budget definitions, assumptions, and directives used to construct the Annual Program Plans. Section 2 describes scheduled FY17 expedition operations; Section 3 describes the organizational structure, provides a personnel summary, and addresses Management and Administration tasks; Section 4 provides an overview of subcontracts; and Sections 5 through 8 address JRSO tasks and budgets by department. Section 9 provides a summary of costs by expense category, a cumulative budget request detail by department, a detailed budget justification, and a table showing cost savings should any of the planned expeditions be canceled.

“Appendix I: JRSO IT Security Summary” provides information requested by NSF regarding information technology (IT) security policies, procedures, and practices employed by the JRSO to protect contractual research and education activities. “Appendix II: Recommended IODP JRSO Program of Insurance” provides information on risk management services provided to the JRSO, including insurance policy monitoring, ongoing risk assessments, marine insurance negotiations, and claims settlement.

1.3. Summary of FY17 scope of work

As the science operator of the *JOIDES Resolution* research facility, the JRSO will provide wireline coring and logging services and will provide technical, science, engineering, and IT support; curate core materials; develop data applications and manage digital databases; and publish pre-expedition and postexpedition reports and results. All of these Program activities will be conducted in accordance with direction provided by the Program’s advisory panels and the JRFB and as outlined in approved Annual Program Plans.

The scope of activities associated with initial planning and preparation of IODP expeditions is similar to early Integrated Ocean Drilling Program activities in terms of deliverables, challenges, and risks. In addition, the

JRSO will carry out postexpedition activities related to IODP expeditions and ongoing operational tasks (e.g., completing reports and technical documentation), completing legacy work (e.g., producing scientific publications), conducting long-lead planning work in preparation for expeditions scheduled for future fiscal years, and providing all necessary environmental assessments for IODP expeditions conducted by the JRSO.

On behalf of the JRSO and as outlined in this Annual Program Plan, TAMRF has contracted with Overseas Drilling Limited (ODL) for the services of the RV *JOIDES Resolution* and with Schlumberger Technology Corporation (Schlumberger) for the provision of downhole logging equipment and engineering support.

1.4. FY17 budget development

1.4.1. NSF guidance

NSF provided guidance to the JRSO that outlined the FY17 mission forecast for the JRSO. The original mission forecast from NSF included guidance to conduct four expeditions in FY17 and a budget upper limit of $62,500,000. The guidance was subsequently revised to include five expeditions using JRSO carry forward funds to cover the cost of implementing the fifth expedition. This Annual Program Plan reflects the NSF guidance to conduct five expeditions and their associated costs.

1.4.2. FY17 budget assumptions

The total budget request of $62,266,074 includes costs to support JRSO facility operations; science operations at sea and all costs in support of these operations such as planning, logistics, engineering science support, and so forth; core curation tasks at the Gulf Coast Repository (GCR); publications tasks; shore-based data management tasks; and other costs in support of maintaining US capability for continued scientific ocean drilling in IODP.

Assumptions about the operations schedule are outlined in the “Expedition Operations” section (Section 2). The JRSO has provided a best-effort estimate of FY17 costs in this plan. If additional funds are identified or expected costs can be avoided during the fiscal year, the JRSO may, upon consultation with NSF, use them to purchase data management system equipment, drilling or science supplies, or high-priority capital replacement items in support of JRSO deliverables.

Fuel price volatility is a major risk factor for completion of the scheduled operations. Assumptions were made using the best available data to determine a prudent estimate for FY17 fuel costs; however, market conditions are subject to fluctuations that may result in a need for supplemental funding during the period of operations.

1.4.3. FY17 budget request

The FY17 JRSO budget summary below shows the overall budget request by department. The line-item total requested for each department includes only direct costs. Subcontracts to ODL and Schlumberger are budgeted in Management and Administration. The cumulative JRSO costs are separated into total direct costs and indirect costs that add up to the “grand total” budget.

Department	Cost
Management and Administration	39,579,826
Science Operations	9,927,553
Technical and Analytical Services	5,866,999
Development, IT, and Databases	1,810,966
Publication Services	1,561,874
JRSO total direct costs	**58,747,218**
JRSO modified total direct costs	20,832,670
JRSO indirect costs	5,416,494
Total JRSO FY17 budget	**$64,163,712**
Less carryforward	–1,897,638
Grand total JRSO FY17 budget request	**$62,266,074**

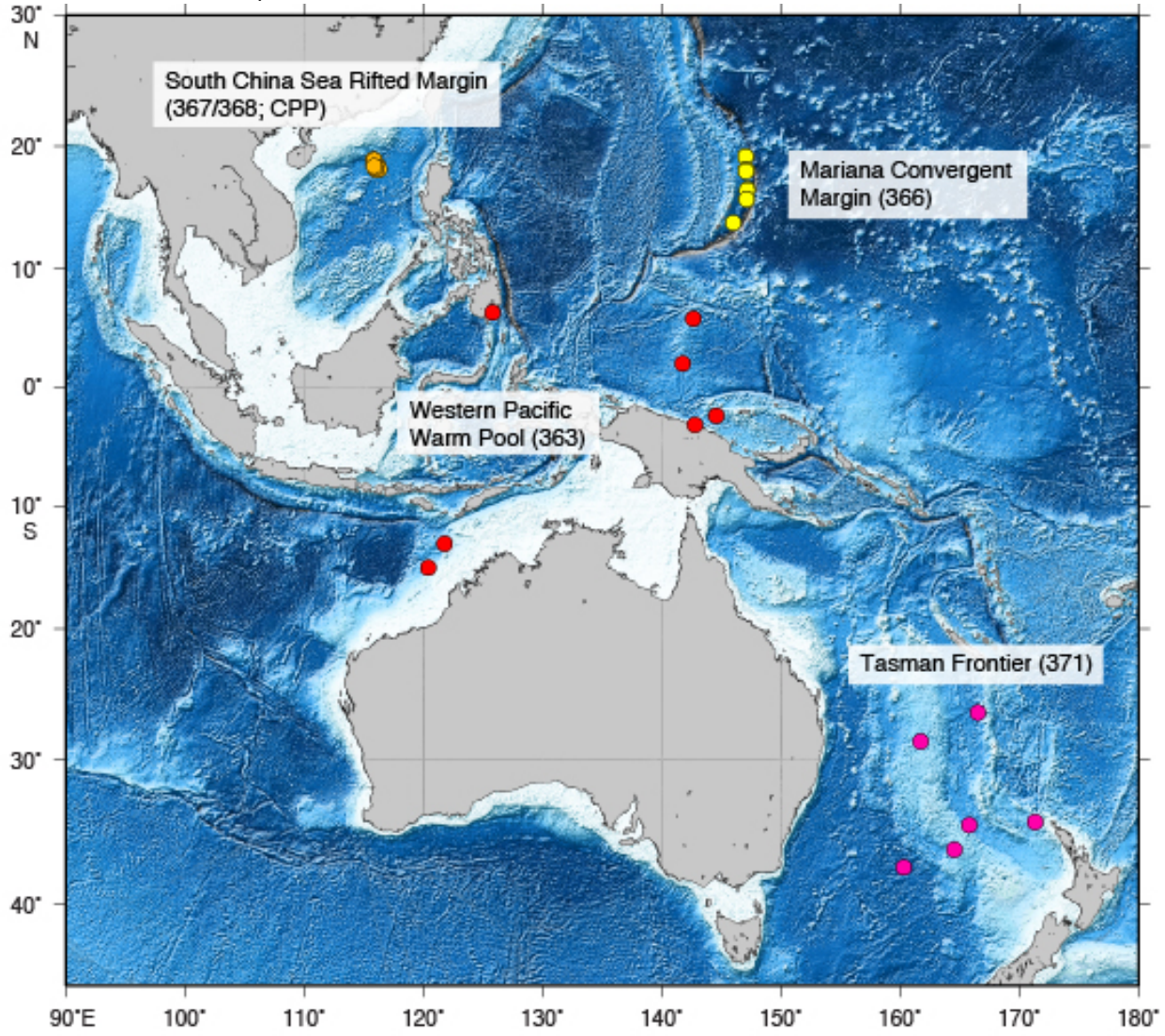
2. Expedition operations

2.1. FY17 operations schedule

This Annual Program Plan is based on the following operations schedule published 23 July 2014, including a tie-up period.

6 October–8 December 2016	Expedition 363: Western Pacific Warm Pool
8 December 2016–7 February 2017	Expedition 366: Mariana Convergent Margin
7 February–9 April 2017	Expedition 367: South China Sea Rifted Margin
9 April–9 June 2017	Expedition 368: South China Sea Rifted Margin
9 June–27 July 2017	Tie-up period
27 July–26 September 2017	Expedition 371: Tasman Frontier Subduction and Climate

2.2. FY17 site map



2.3. Expedition overview

2.3.1. Expedition 363: Western Pacific Warm Pool

Proposed Operations

Expedition 363 seeks to document the regional expression of climate variability (e.g., temperature, precipitation, and productivity) in the Western Pacific Warm Pool (WPWP) as it relates to global and regional climate change from the middle Miocene to Late Pleistocene on millennial, orbital, and secular timescales. The WPWP is the largest reservoir of warm surface water on Earth and thus is a major source of heat and moisture to the atmosphere. Variations in sea-surface temperature and the extent of the WPWP influence the location and strength of convection and thus impact oceanic and atmospheric circulation, heat transport, and tropical hydrology. Given its documented importance for modern climatology, changes in the WPWP are assumed to have also played a key role in the past. The proposed drill sites are strategically located at the heart of the WPWP (northern Papua New Guinea and south of Guam) and around its western edge (western margin of Australia to the south and southern Philippine Islands to the north) to capture the most salient features of the WPWP. Combining marginal and open ocean sites will allow us to study these time intervals at different temporal resolutions. The coring program prioritizes seven primary sites and nine alternate sites in 880–3,427 m water depth. This depth range will allow the reconstruction of intermediate and deepwater properties through time.

Logistics

Operations for Expedition 363 are budgeted based on an estimated 63 days (5 in port, 7 in transit, and 49 in operations).

2.3.2. Expedition 366: Mariana Convergent Margin

Proposed Operations

Expedition 366 has two primary science objectives. The first objective is devoted to coring a series of sites at the summit and flanks of three large (up to 50 km diameter and 2 km high) serpentinite mud volcanoes in the Mariana forearc (within 100 km west of the Mariana Trench). This objective addresses the broad scientific aim of examining processes of mass transport within the subduction zone of a nonaccretionary convergent margin. In detail, the plan is to recover mudflow materials to (1) examine processes of mass transport and geochemical cycling within the forearc of a nonaccretionary convergent margin; (2) ascertain the spatial variability of slab-related fluids within the forearc environment as a means of tracing dehydration, decarbonation, and water-rock reactions in subduction and suprasubduction zone environments; (3) study the metamorphic and tectonic history of this nonaccretionary forearc region; (4) investigate the physical properties of the subduction zone in relation to dehydration reactions and seismicity; (5) document microbial activity associated with subduction zone material from great depth; and (6) explore linkages among these subduction-related processes, including seismicity, while placing the effects of these processes within a historical context.

The second objective establishes long-term seafloor observatory sites by emplacing cased boreholes at summit (conduit) holes in three mud volcanoes (at Expedition 366 proposed Sites MAF-11A, MAF-9B, and MAF-15A) and removing the CORK body from Ocean Drilling Program (ODP) Hole 1200C. These activities set the foundation for future deployments of sensors and samplers with the possibility of deploying a CORK-Lite

structure within the boreholes. CORK-Lites provide a framework for conducting temporal observations that will allow one to "take the pulse of subduction" in an active nonaccretionary convergent plate margin and establish a platform for in situ experimentation.

Logistics

Operations for Expedition 366 are budgeted based on an estimated 61 days (5 in port, 8 in transit, and 48 in operations).

2.3.3. Expeditions 367 and 368: South China Sea Rifted Margin

Proposed Operations

Expeditions 367 and 368 will address the mechanisms of lithosphere extension during continental breakup. State-of-the-art deep reflection seismic data show that the northern South China Sea (SCS) margin offers excellent drilling opportunities that can address the process of plate rupture at a nonvolcanic rifted margin. The SCS margin shows similarities to the hyperextended Iberia-Newfoundland margins, possibly including exhumed and serpentinized mantle within the continent–ocean transition (COT). However, recent modeling studies suggest that mechanisms of plate weakening other than serpentinization of the subcontinental lithospheric mantle exist. Two competing models for plate rupture (in the absence of excessively hot asthenospheric mantle) have widely different predictions for (1) the crustal structure across the COT, (2) the time lag between breakup and formation of igneous ocean crust, (3) the rates of extension, and (4) the subsidence and thermal history. Proposed drilling will core through thick sedimentary sections and into the underlying basement to firmly discriminate between these models. We plan to occupy four sites across a 150–200 km wide zone of highly extended seaward-thinning crust with a well-imaged COT zone. Three sites will determine the nature of critical crustal entities within the COT and constrain postbreakup crustal subsidence. These three sites will also help constrain how soon after breakup igneous crust started to form. A fourth site on the continental margin landward of the COT will constrain the timing of rifting, rate of extension, and crustal subsidence. If serpentinized mantle is found within the COT, this will lend support to the notion that the Iberia-type margin is not unique, and hence that weakening of the lithosphere by introducing water into the mantle may be a common process during continental breakup. If serpentinite is not found, and alternatively, scientific drilling results for the first time are gained in support of an alternative model, this would be an equally important accomplishment. Constraints on SCS formation and stratigraphy, including industry drilling, ODP Leg 184 and IODP Expedition 349 drilling, the young (Paleogene) rifting of the margin, and absence of excessively thick postrift sediment allow us to effectively address these key topics by drilling within a well-constrained setting. An initial spreading rate of ~ 2 cm/y half-rate reduces the potential complexity of magma-starved, slow-spreading crust forming after breakup. Drilling, coring, and logging to address these SCS rifted margin science objectives will be undertaken during Expeditions 367 and 368, which will be implemented as a single science program.

Logistics

Operations for Expeditions 367 and 368 are each budgeted based on an estimated 61 days (5 in port, 2 in transit, and 54 in operations).

2.3.4 Expedition 371: Tasman Frontier Subduction Initiation and Paleogene Climate

Proposed operations

The most profound subduction initiation (SI) event and global plate-motion change since 80 Ma occurred in the Eocene, when Tonga-Kermadec (TK) and Izu-Bonin-Mariana (IBM) SI was synchronous with a change in direction of the Pacific plate (Emperor-Hawaii bend) at ~50 Ma. The primary goal of Expedition 371 is to precisely date and quantify deformation and uplift/subsidence associated with TK SI to test predictions of alternate geodynamic models. Paleogene sediment cores from strategic locations will be collected that constrain seismic stratigraphic interpretations and will allow reconstruction of the paleogeography and climate history of the region for the Cenozoic, with implications for both tectonics and climate research. Tectonic change occurred at the same time in the early Paleogene as Earth reached a Cenozoic pinnacle in "greenhouse" climate. Paleoclimate proxy data from this time period show that the greatest global discrepancy with climate model simulations occurs in the southwest Pacific. Hence, a secondary goal is to determine if paleogeographic changes caused by SI may have led to anomalous regional warmth by altering ocean circulation. Late Paleogene and Neogene sediment cores will complement earlier drilling to investigate tropical and polar climatic teleconnections within the mid-latitude transition zone. Four prominent bathymetric features in the Tasman Frontier region, the Norfolk Ridge (NFR), New Caledonia Trough (NCT), Lord Howe Rise (LHR), and Tasman Basin (TAS), are known from seismic reflection profiles to contain appropriate sediment archives. However, only three drill sites with limited core recovery have penetrated the middle Eocene and older sequence (Deep Sea Drilling Project [DSDP] Sites 206, 207, and 208). Information from these sites in conjunction with seismic-stratigraphic analysis of a large recently compiled data set reveals that (1) Cretaceous-Eocene strata are locally deformed, and (2) the LHR and NFR were uplifted, possibly to sea level, during the Eocene and/or Oligocene. Folding of lower Eocene and older strata in the southwest Pacific, and subsequent uplift of the LHR, are hypothesized to be broad-scale consequences of TK SI. Precisely dating deformation, vertical motions, and volcanism will allow confirmation of the magnitude of uplift subsidence, testing of geodynamic model predictions, and establishment of the order and hence causality in relation to regional and global tectonic events.

Logistics

Operations for Expedition 371 are budgeted based on an estimated 61 days (3 in port, 7 in transit, and 51 in operations).

2.4. Expedition outreach

Berths will be made available for Onboard Education Officers during each expedition, and JRSO personnel will facilitate the activities of teachers at sea, give port call tours, and work with the US Science Support Program, the IODP Science Office, the IODP Forum, and the TAMU College of Geosciences on diversity and education issues and to further advance the Program through outreach.

3. Management and administration

3.1. Organizational structure

The JRSO's existing organizational structure directly reflects the responsibilities specified by NSF for the technical and scientific management, administration, and operation of the *JOIDES Resolution*, including planning, coordinating, overseeing, reviewing, and reporting activities. The TAMU portion of the organization consists of four departments: Science Operations (SciOps); Technical and Analytical Services (TAS); Development, Information Technology, and Databases (DITD); and Publication Services (Pubs). Managers of these departments report to the JRSO Director, who is responsible for the Program's overall management and performance. The Human Resources group resides within the Director's Office.

On-site administrative staff members dedicated to JRSO support are overseen by a General Manager who reports to the Executive Director of the TAMU SRS. This separate reporting chain ensures that the administrative unit retains the independence to ensure regulatory compliance while working directly with the JRSO staff to efficiently implement the Program. The Director's Office and the Administrative Services group combined comprise the Management and Administration portion of this Annual Program Plan.

On behalf of the JRSO, and as outlined in this Annual Program Plan, TAMRF has contracted with ODL for the services of the *JOIDES Resolution* for use as the JRSO riserless drilling vessel and with Schlumberger for the provision of wireline logging equipment and engineering support.

3.2. Personnel summary

The personnel summary table presents an accounting of the cumulative estimated effort within the departments to which positions are assigned. The table reflects actual senior personnel and departmental staffing as of 8 June 2016 plus projected staffing for FY17. Additional staff have been added to the Technical and Analytical group (2) and to the Curation group (1) in anticipation of supporting five expeditions per year instead of four. Staffing levels may change annually due to unanticipated changes in the operations schedule and/or scope of work. The table does not show student workers or the dedicated Administrative Services, IT, and application developer positions that are supported through indirect costs.

3.2.1. FY17 personnel summary

Department/ senior personnel	Position title	Personnel (#)
Management and Administration		**3**
Brad Clement	Director of Science Services	1
	Administrative Assistant	1
Michele Lacey	General Manager, JRSO Administrative Services	1
Science Operations		**25**
Mitch Malone	Manager of Science Operations and Assistant Director of Science Services	1
	Business Coordinator	1
	Supervisor of Engineering Services and Logistics Support	1
	Staff Engineers	2
	Designers	3
	Staff Researcher	1
	Marine Logistics Coordinator	2
	Materials Technician	1
	Shipping and Receiving Coordinator	1
	Supervisor of Operations	1
	Operations Superintendent	1
	Operations Engineer	1
	Materials Specialist	1
	Supervisor of Science Support	1
	Staff Scientists	8
Technical and Analytical Services		**39**
Jay Miller	Manager of Technical and Analytical Services	1
	Business Coordinator	1
	Supervisor of Analytical Systems	1
	Imaging Specialists	2
	Supervisor of Technical Support	1
	Laboratory Officers	2
	Assistant Laboratory Officers	4
	Marine Laboratory Specialists (Res. Asst./Res. Spec.)	18
	Marine Instrumentation Specialists	4
	Curator	1
	Superintendent of the Gulf Coast Repository	1
	Curatorial Specialists	3
Development, IT, and Databases		**4**
Jim Rosser	Manager of Development, IT, and Databases	1
	Supervisor of Databases/Archives	1
	Senior Software Applications Developer	1
	Data Analyst	1
Publication Services		**18**
Angie Miller	Manager of Publication Services	1
	Publications Coordinator	1
	Supervisor of Editing	1
	Editors	4
	Supervisor of Production and Graphics	1
	Production Editors	4
	Distribution Specialist	1
	Graphics Specialists	5
Total FY17 JRSO personnel		**89**

3.3. Management and Administration goals

Management and Administration goals include planning, coordinating (with other IODP-related entities), overseeing, reviewing, and reporting on IODP activities.

3.4. M&A deliverables in FY17

- Program planning: Develop and ensure implementation of Annual Program Plans.
- Progress reporting: Provide content for and submit quarterly and annual reporting deliverables, including financial reports.
- Reporting and liaison activities: Report to and liaise with funding agencies and with IODP-related agencies (e.g., the JRFB, JRFB advisory panels, Program Member Offices, and other national organizations and facility boards). Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Project portfolio management: Manage large cross-departmental tasks and projects through teams using a formal project portfolio management approach to identify, categorize, review, evaluate, select, and prioritize proposed projects.
- Compliance support: Ensure compliance with university, state, and US federal statutes and rules governing research, including US export control regulations for all materials shipped to the *JOIDES Resolution*, including third-party instruments, and all scientific personnel sailing during a JRSO expedition.
- Contract services: Provide contract services for IODP-related activities, including negotiation, management, and contractual oversight of subcontracts.
- Other administrative services: Manage payroll, travel, invoicing, financial and subcontract reporting, equipment inventory, and risk management services for the Program.
- Human resources management: Assist with management and supervision of JRSO staff to ensure adherence to TAMU's policies and procedures for maintaining a well-trained and productive workforce and safe work environment.
- Legacy documentation: Routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP.

On 8 March 2016, NSF provided the following guidance (items A–D) to the JRSO resulting from the JRSO Site Visit Panel Report. The JRSO's response follows each item.

A) Propose additional staffing within either a FY16 Annual Program Plan Addendum or in the FY17 Annual Program Plan to (1) ensure the ability to quickly address unexpected complications in obtaining clearance; (2) ensure that backup is in place for the loss of a JRSO employee without compromise of facility operations; and (3) add staff sufficient to meet the needs of 10 months of facility operation per year.

- The JRSO is currently reviewing possible additions to the staffing model to provide assistance in the Science Operations Department with the episodic requirements of research clearance and

environmental assessments as well as providing some degree of redundancy in the management structure. The JRSO is not ready to define a new position at this point but intends to create a new position during FY17 once the requirements become well defined. In preparing for implementing five expeditions per year, the JRSO has already added one curatorial representative and two marine technical specialists to the roster of positions supported by the cooperative agreement.

B) Propose adoption of increased satellite communication bandwidth aboard the *JOIDES Resolution* in either a FY16 Annual Program Plan Addendum or in the FY17 or FY18 Annual Program Plans.

- The JRSO has negotiated an increase in service with RigNet that will result in an increase in downlink bandwidth to 2 Mbps (up from 1 Mbps). The total annual budget for ship operations communications increased to $804,313.

C) Increase community participation in the Laboratory Working Groups (LWGs) and the visibility of LWG activities to the broader science community. These tasks should be implemented in FY16.

- The JRSO will work to increase community participation in the LWGs. Funds are requested within this APP to support external members of two LWGs to visit the *JOIDES Resolution* during port call during FY17 to assess the laboratories, protocols, and documentation.

D) Engage in discussion with NSF as to the advisability and cost for providing JRSO personnel support for conducting ship tours by appropriate local/regional/national groups during port calls and tie-up periods. Budgetary support for this added activity will require modification to the existing Cooperative Agreement.

- The JRSO will work with NSF to revise the Cooperative Agreement to reflect efforts by JRSO staff to support outreach at port calls of the *JOIDES Resolution*.

The JRSO is also pursuing the following items addressed by the JRSO Site Visit Panel:

- The JRSO is continuing to evaluate nondestructive elemental scanning of individual core samples by both portable XRF and new laser methods. A portable handheld XRF will be deployed on Expedition 366. At this time, the laser-induced breakdown spectroscopy (LIBS) method does not appear to be mature enough for shipboard deployment.

- Data discoverability: The JSRO is committed to collaborating with a group of Principal Investigators (Doug Fils, Kerstin Lenhert, and Anders Noreen) to develop Open Core Data (OCD), a project that will define a graph-based data model for Scientific Ocean Drilling data as well as Continental Scientific Drilling data. The result will provide a repository for data that is persistent and machine discoverable.

4. Subcontractors

4.1. Introduction

The Administrative Services department manages subcontracts by implementing established policies and procedures that ensure compliance with the applicable laws, regulations, provisions, and obligations of the NSF cooperative agreement with the JRSO. Establishment of subcontracts involves development of a detailed scope of work that outlines operational responsibilities of the subcontractor, a review of the subcontractors' policies and agreements to ensure that applicable flow-down regulations are incorporated into any subagreements (e.g., shipboard catering), and monitoring of the subcontractors' adherence to the established scope of work through direct supervision, periodic meetings, and review of progress reports. Administrative Services staff review subcontractor invoices prior to payment and conduct periodic audits of the subcontractors' financial records to ensure financial compliance with cost allowability and other contractual requirements.

4.2. Overseas Drilling Limited

ODL is responsible for safely conducting drilling and coring operations to meet the scientific goals outlined in the Annual Program Plan. This responsibility includes providing the marine crew, the drilling crew, and complete logistical requirements (i.e., ship supplies, drilling supplies, spare parts, and port call–related activities) in accordance with the approved Operations Plan. The JRSO Operations Superintendent monitors ODL adherence to their scope of work on board the *JOIDES Resolution*. In addition, JRSO Science Operations staff review the required daily operations report that details logistical, scientific, and operational data. Expedition planning and crossover meetings held with ODL also ensure that the subcontractor adheres to the scope of work and scientific objectives. Review of ODL policies and agreements related to catering, travel, and purchasing ensure that applicable flow-down regulations are incorporated. Thorough review of invoices submitted prior to payment and periodic audit of ODL financial records ensure financial compliance with cost allowability and other contractual requirements.

4.3. Schlumberger Technology Corporation

Schlumberger provides services associated with the design, installation, and operation of logging infrastructure on board the *JOIDES Resolution* to meet the scientific goals outlined in the Annual Program Plan. Two logging technicians sail on a rotating basis, interfacing directly with JRSO staff throughout the expedition as well as assisting with logging projects on shore. This integration embeds the logging operations into the Science Operations department's approach to planning. This ensures the Program's goals are met in accordance with the approved operations plan and subcontract agreement. Detailed review of invoices submitted prior to payment ensures financial compliance.

5. Science Operations

5.1. Science Operations goals

The Science Operations (SciOps) department is responsible for providing scientific and operational planning and implementation for *JOIDES Resolution* drilling expeditions in response to the IODP science planning structure. SciOps goals include leading the scoping, planning, and implementation of science expeditions; interacting with and providing oversight to the drilling and logging subcontractors; conducting long-range operational planning for out-year JRSO expeditions; and utilizing IODP resources to oversee engineering development projects.

5.2. SciOps deliverables in FY17

- Drilling proposal evaluation: Scope proposals and conduct risk assessment for proposed expeditions.
- Risk management: Engage a panel of experts (the TAMU Safety Panel) to participate in site reviews with the Environmental Protection and Safety Panel (EPSP) to provide independent recommendations to the JRSO on drilling safety and environmental protection.
- Expedition planning and implementation: Provide scientific, engineering, operational, and logistical planning and execution for each scheduled expedition; interact with and provide oversight to the drilling subcontractor (ODL) and wireline logging subcontractor (Schlumberger); manage rig instrumentation; perform/oversee drilling, logging, and coring operations; plan and implement large projects; and conduct long-range operational and science planning for out-year expeditions.
- Expedition staffing: Provide selection and support for scientific staffing and Co-Chief Scientist selection for each scheduled JRSO expedition.
- Logistics support: Provide for expedition and shore-based activities including procurement, shipping, and inventory of equipment and supplies.
- Clearance/Environmental assessment: Obtain permits and clearances to drill in US waters, as well as the Exclusive Economic Zones (EEZs), Extended Continental Shelves (ECSs), and territorial waters of potentially any coastal country; provide for environmental assessment services for marine mammal permitting associated with seismic operations; and ensure environmental protection and safety.
- Engineering support: Provide engineering support for maintaining and developing shipboard and shore-based drilling, coring, logging, and downhole systems, including third-party developments and long–lead time borehole installation projects, for each scheduled JRSO expedition.
- Scientific leadership: Provide scientific leadership within the JRSO for expeditions, projects, and Laboratory Working Groups and provide scientific leadership on board the *JOIDES Resolution* during expeditions.
- Progress reporting: Provide expedition-related reports and content for expedition publications (e.g., *Scientific Prospectus, Preliminary Report,* etc.). Provide content for shipboard and shore-based

reporting deliverables (e.g., daily and weekly ship reports, site summaries, and JRSO quarterly and annual reports).

- Liaison activities: Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Education/Outreach support: Facilitate activities of teachers at sea, give port call tours, and participate in efforts to further advance the Program through outreach.
- Legacy documentation: Routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP, including expedition science and operations reports.

6. Technical and Analytical Services

6.1. Technical and Analytical Services goals

The Technical and Analytical Services (TAS) department's major responsibilities are to facilitate core flow and oversee laboratories. TAS stocks, maintains, upgrades, and staffs the shipboard and shore-based laboratories and instrumentation and oversees the GCR staff who curate, archive, and manage cores and samples collected by the Program.

6.1.1. Technical support and analytical systems

TAS goals include managing the complex supply chain for stocking the shipboard laboratories; operating scientific measurement equipment and providing support to shipboard scientists in the fulfilling of their responsibilities and expectations; providing a supervisory and reporting structure for seagoing JRSO personnel; educating customers regarding laboratory-specific and general shipboard safety requirements; maintenance, repair, and development of scientific equipment and laboratories while at sea to enable expedition staff to meet scientific objectives; providing support for downhole tools and measurements; working to ensure proper quality assurance (QA)/quality control (QC) of measurements made in the shipboard laboratories; and support of shore-based laboratories.

6.1.2. Core curation

Core Curation goals include providing services in support of IODP core sampling and curation of the core collection archived at the GCR and interacting with and providing technical expertise to the Kochi Institute for Core Sample Research (KOCHI), Japan Agency for Marine-Earth Science (JAMSTEC), in support of core material obtained from NSF-funded scientific ocean drilling and housed at the Kochi Core Center (KCC).

6.2. TAS deliverables in FY17

- Analytical systems: Support and maintain shipboard and shore-based analytical facilities, tools, instruments, and associated QA/QC protocols.
- Laboratory working groups: Provide oversight, research direction, and advice on corrective actions and potential developments for laboratories and QA for the methods, procedures, and analytical systems both on the *JOIDES Resolution* and on shore through regular review of cruise evaluations, expedition technical reports, issues management communications, and interactions with members of the science community.
- Shipboard laboratory support: Ensure shipboard laboratory safety; handle core; oversee and assist in shipboard analytical measurements; manage and troubleshoot issues in the shipboard laboratories; ensure effective capture and transfer of expedition to database systems; manage supply chain for shipboard consumables; and support Science Parties in achieving scientific objectives;
- Scientific leadership: Provide scientific leadership within the JRSO for project management and in Laboratory Working Groups.

- Sampling and curation policy and procedures: Work with other IODP facilities and the IODP advisory panel to review and revise the IODP Sample, Data, and Obligations Policy, as needed, and implement a policy for IODP core curation. Work closely with staff to coordinate, standardize, and document curatorial procedures for IODP cores and samples.
- Sample and curation strategies: Plan sample and curation strategies for upcoming JRSO expeditions and review all shipboard and moratorium-related requests in coordination with the other members of the Sample Allocation Committee for each expedition.
- Core sampling: Provide curator specialist on board the drillship to supervise core sampling during ship operations.
- Core curation and sample requests: Conduct all responsibilities associated with curation of core collections at the GCR and provide services in support of core sampling, analysis, and education; fulfill postmoratorium sample requests from the scientific community; analyze geological core in shore-based laboratories; and provide technical expertise in interactions with the KCC and Bremen Core Repository (BCR) in support of sampling and curation of core material obtained from NSF-funded scientific ocean drilling and housed at the KCC and BCR.
- Use of core collection: Promote outreach use of the core collection in collaboration with IO education/outreach personnel and other science partners by providing materials for display at meetings or museums, as well as conducting tours and supporting other JRSO outreach activities.
- Progress reporting: Provide content for reporting deliverables (e.g., JRSO quarterly and annual reports).
- Liaison activities: Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate. Participate in annual IODP curatorial staff meeting.
- Education/outreach support: Facilitate activities of teachers at sea, give port call tours, and participate in efforts to further advance the Program through outreach.
- Legacy documentation: Routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP.

7. Development, IT, and Databases

7.1. Development, IT, and Databases goals

The Development, IT, and Databases (DITD) department oversees JRSO data collection/storage, management, and archiving; maintains IT infrastructure on ship and shore; develops and maintains instrument-specific software for data acquisition; and manages the Programs' extensive databases.

DITD goals include management of data supporting IODP activities, management of expedition and postexpedition data, providing long-term archival access to data, and supporting IT services.

7.2. DITD deliverables in FY17

- Expedition data services: Maintain and manage databases supporting expedition planning and data collected during expeditions; operate and maintain data management and harvesting systems (including QA/QC for storage and archival of expedition and postexpedition data, including core and sample tracking); ensure data integrity; respond to data requests from the scientific community; process downhole log data as needed; and plan data handling for special/third-party science equipment.
- Program-wide data query services: Provide JRSO customers with access to expedition databases and data using web-based services.
- Operation and maintenance: Operate and maintain computer and network systems both on ship and shore; maintain IT infrastructure, including satellite communications, personal computers, and network instrumentation hosts; and maintain congruency between ship and shore system architectures.
- IT service support: Provide help desk services and support IT needs of visiting scientists.
- Security services: Monitor and protect JRSO network and server resources to ensure safe, reliable operation and security for IODP data and IT resources.
- Software development: Provide software development services as needed, maintain software, and provide training support for shipboard scientists as necessary.
- Project Portfolio Management: Administer the JRSO project portfolio management program.
- Reporting: Provide content for reporting deliverables (e.g., JRSO quarterly and annual reports). Act as a liaison to IODP advisory and other panels, task forces, and workshops as appropriate.
- Expedition outreach: Facilitate activities of teachers at sea and enable ship-to-shore videoconferencing with classrooms, museums, and meetings.
- Legacy documentation: Routinely archive electronic copies of documents and reports produced by the JRSO on behalf of IODP, including documentation of all IT architecture and corresponding services configurations.

8. Publication Services

8.1. Publication Services goals

The Publication Services (Pubs) department is responsible for producing IODP scientific publications, from pre-expedition planning documents (i.e., *Scientific Prospectuses*) to postexpedition *Proceedings* volumes, along with technical documentation and Program reporting deliverables. Integrated presentation of IODP Program publications will be managed through a combination of NSF funding and IO contracts for expeditions taking place from FY15 forward.

Pubs goals include providing publications support services for JRSO drilling expeditions and editing, production, and graphics services for all required reports and scientific publications as defined in the JRSO cooperative agreement with NSF. IODP publications for FY17 will include quarterly and annual reports for the JRSO; a *Scientific Prospectus, Preliminary Report,* and *Proceedings of the International Ocean Discovery Program* volume for each JRSO and CDEX expedition; and *Proceedings of the Integrated Ocean Drilling Program* volumes for USIO, CDEX, and ESO expeditions that concluded by the end of FY14.

8.2. Pubs deliverables in FY17

- Shipboard publications support: Provide a Publications Specialist for publications support and report coordination during each FY17 JRSO expedition.
- Postexpedition editorial meetings: Provide editorial, graphics, and production support during 4 JRSO and 2 CDEX postexpedition editorial meetings.
- IODP scientific publishing: Produce scientific and expedition reports, including approximately 10 JRSO and 2 CDEX scientific reports (*Scientific Prospectuses* and *Preliminary Reports*) and expedition reports from 9 JRSO and 2 CDEX expeditions that will either be published or in production during FY17, as well as postexpedition data reports and synthesis papers from 7 Integrated Ocean Drilling Program expeditions and 11 IODP expeditions.
- Publications management: Manage peer-review process for Integrated Ocean Drilling Program and JRSO *Proceedings* volumes (~40 data reports or synthesis papers) and provide centralized recordkeeping of IODP postexpedition research submissions.
- Bibliography and citation management: Manage postexpedition publication citations, maintain cumulative Program and expedition-related bibliographies, prepare annual report of Program-related citation statistics, and respond to special requests for Program-related citation data.
- Progress reporting: Edit and produce the JRSO FY16 fourth quarterly report, 3 JRSO FY17 quarterly reports, the JRSO FY16 Annual Report, and the JRSO FY18 Annual Program Plan, including original versions and all revisions required by NSF.
- Expedition outreach: Facilitate activities of teachers at sea during JRSO expeditions.
- Legacy and technical documentation: Routinely archive electronic copies of all documents, reports, technical documentation, and scientific publications produced by the JRSO on behalf of IODP.

- Integrated Ocean Drilling Program closeout activities: Complete and archive expedition publications (e.g., publish data reports and synthesis papers in the *Proceedings of the Integrated Ocean Drilling Program* and update expedition-related citation lists associated with legacy program expeditions).

9. JRSO FY17 budget

9.1. Overview

The budget summary and detailed departmental budgets in this section describe the overall JRSO FY17 budget requests to provide a framework for interpreting fiscal data in quarterly reports delivered to NSF by the JRSO.

Section 9.2 provides the cumulative total for each major expense category in the JRSO FY17 budget, Section 9.3 shows the detailed budget request for each department, and Section 9.4 outlines the potential cost savings by expedition that would result from elimination of a scheduled expedition. The budget explanation for each expense category is provided in Section 9.5.

9.2. FY17 expense category summary

FY17 JRSO budget by expense category	
Expense category	**Cost**
Salaries and fringes	9,917,133
Equipment	627,400
Travel	1,197,884
Materials and supplies	4,759,525
Consultant/professional services	1,058,988
Computer services	17,000
Subcontracts	37,270,148
Other direct costs	3,899,140
Shipping	*1,231,300*
Communication	*893,744*
Business conferences	*52,900*
Training	*276,316*
Insurance	*622,761*
Maintenance and repair	*416,019*
Other	*406,100*
JRSO total direct costs	**58,747,218**
JRSO total modified total direct costs	20,832,670
JRSO indirect costs	5,416,494
Total JRSO FY17 budget	**$64,163,712**
Less carryforward	–1,897,638
Grand total JRSO FY17 budget request	**$62,266,074**

9.3. FY17 JRSO budget detail

FY17 JRSO budget by department	
Department/expense category	**Cost**
Management and Administration	
Salaries and fringes	526,704
Equipment	0
Travel	113,000
Materials and supplies	14,500
Consultant/professional services	52,900
Computer Services	17,000
Subcontracts	37,270,148
Overseas Drilling Limited	***33,767,770***
Day rate	*26,742,822*
Fuel and lubricants	*3,391,820*
Per diem	*644,074*
Port calls	*1,261,000*
Travel—ODL	*709,000*
Insurance—*JOIDES Resolution*	*760,242*
Other	*258,812*
Schlumberger Technology Corporation	***3,502,378***
Day rate	*3,231,378*
Supplies	*10,000*
Shipping	*50,000*
Consultant/professional services	*5,000*
Travel	*44,000*
Equipment rental	*30,000*
Maintenance and repair	*132,000*
Other direct costs	1,585,574
Shipping	*2,800*
Communication	*880,063*
Business conferences	*52,900*
Training	*24,750*
Insurance	*612,761*
Maintenance and repair	*3,800*
Other	*8,500*
Total Management and Administration direct costs	**$39,579,826**

Note: Continued on next two pages.

FY17 JRSO budget by department	
Expense category by department	**Cost**
Science Operations	
Salaries and fringes	3,061,370
Equipment	389,400
Travel	333,534
Materials and supplies	3,703,875
Consultant/professional services	827,374
Computer Services	0
Subcontracts	0
Other direct costs	1,612,000
Shipping	*1,175,800*
Communication	*3,500*
Training	*45,500*
Insurance	*10,000*
Maintenance and repair	*10,500*
Other	*366,700*
Total Science Operations direct costs	**$9,927,553**
Technical and Analytical Services	
Salaries and fringes	4,362,499
Equipment	100,000
Travel	536,000
Materials and supplies	558,200
Consultant/professional services	12,000
Computer Services	0
Subcontracts	0
Other direct costs	298,300
Shipping	*52,000*
Communication	*2,000*
Training	*124,000*
Maintenance and repair	*91,800*
Other	*28,500*
Total Technical and Analytical Services direct costs	**$5,866,999**

Note: Continued on next page

FY17 JRSO budget by department	
Expense category by department	**Cost**
Development, IT, and Databases	
Salaries and fringes	465,236
Equipment	138,000
Travel	179,100
Materials and supplies	472,000
Consultant/professional services	162,364
Computer Services	0
Subcontracts	0
Other direct costs	394,266
Shipping	*500*
Communication	*8,181*
Training	*80,816*
Maintenance and repair	*302,869*
Other	*1,900*
Total Development, IT, and Databases total direct costs	**$1,810,966**
Publication Services	
Salaries and fringes	1,501,324
Equipment	0
Travel	36,250
Materials and supplies	10,950
Consultant/professional services	4,350
Computer Services	0
Subcontracts	0
Other direct costs	9,000
Shipping	*200*
Communication	*0*
Training	*1,250*
Maintenance and repair	*7,050*
Other	*500*
Total Publication Services direct costs	**$1,561,874**
JRSO total direct costs	**58,747,218**
JRSO total modified total direct costs	20,832,670
JRSO indirect costs	5,416,494
Total JRSO FY17 budget	**$64,163,712**
Less carryforward	–1,897,638
Grand total JRSO FY17 budget request	**$62,266,074**

9.4. Expense category definitions

Salaries and fringe benefits. Salaries, fringe benefits, and sea pay, including an anticipated cost-of-living allowance for staff supporting the Program (see Section 3.2). Fringe rates are calculated based on a University-established percentage of 17.8% plus insurance premiums.

Equipment. Procurement, upgrading, or fabrication of operational equipment, including tools and equipment in support of logging operations, with an acquisition cost of more than $5,000; computer and network equipment to replace aged network models, workstations, and plotters, and new workstations for new staff. Costs associated directly with equipment (computer, scientific, and drilling) intended solely for use on the ship over a period of time greater than one expedition, equipment purchased for a specific expedition, and the pro-rata cost of shore-based equipment used partially to support expedition activities. Operational equipment replacement and acquisition of parts and spare units for downhole tools. Acquisition of new analytical systems and capital replacement or upgrades of failed or obsolete laboratory equipment. Estimated equipment costs are projected based on potential for loss during operations as well as on the need for replacement and are calculated using current quotes on file.

Travel. Transportation, per diem, lodging, and other associated costs.

Domestic. Travel to IODP meetings and workshops, pre- and postexpedition planning meetings; subcontractor, insurance, and vendor meetings; and professional conferences. Travel costs to bring off-site JRSO staff to participate in on-site meetings. Costs are estimated at $2,000 per domestic trip based on the current published government per diem rates.

International. Travel for personnel attending international Program meetings and workshops and for personnel who will work at port calls, sail during expeditions, and/or work on the ship during transits or tie-up periods. Costs are estimated at $5,000 for regular meetings and $4,000 for port calls/expeditions based on the expedition schedule, the current published government per diem rates, and estimated air travel costs specific to the port call location.

Materials and supplies. Operational, laboratory, logistical, and shipping supplies for shipboard and shore-based analytical and engineering laboratory and test facilities and expeditions, including long-lead hardware for FY18 expeditions. Cost estimates for drill bits, core liner, hardware, bulk materials, and coring supplies are calculated based on expedition-specific requirements such as estimated penetration, core recovery, lithology, and potential hole instability. Standard reference material; shipboard laboratory consumables and safety supplies; specialized supplies for core sampling and curation tasks; expendables and small hardware for continued operation and maintenance of IT resources; digital photographic supplies (e.g., drum scanner supplies, CDs, DVDs, and tapes) for processing images on shore; general operational and office supplies including printer and copier supplies and paper; non-inventory equipment costing less than $5,000; software purchases and upgrades, software subscriptions, volume licensing agreements, concurrent usage software agreements, electronic media, and other computer supplies; costs of office furniture, including replacing broken or aging office furniture; and general safety and cleaning supplies.

Consultant/professional services. Costs for expert assistance, including annual physical examinations for seagoing personnel, external printing and copier services, vehicle and warehouse equipment repair, testing and calibration of laboratory instruments and equipment, machine shop services, inspection and

refurbishment of drill pipe, environmental evaluations, facilities repair, lease of off-premises records storage facility, visitor parking permits, back-up services, IT expert assistance services, TAMU Physical Plant services, temporary labor, tuition for Graduate Assistant non-Teaching (GANT) positions, transfer fees, and weather reports. Consultant and contract services, including services in support of network and videoconferencing equipment, engineering evaluation services as needed, and liaisons to selected panels as needed. American Geosciences Institute (AGI) Ocean Drilling Citation Database fee for inclusion of new citations, CrossRef annual membership and administrative costs, digital object identifier (DOI) registration charges, and CrossMark registration charges.

Computing services. Use of TAMU's financial and management information system (FAMIS), including the Program's share of costs based on the number of entry lines.

Subcontracts. Consultant and contract services.

Overseas Drilling Limited (ODL). Subcontract for operations of the research vessel *JOIDES Resolution.* Costs related to this subcontract include

Day rate: Vessel staffing for the subcontractor's sailing crew and drilling personnel, not including the cost of the USIO personnel or scientists aboard the ship. The day rate varies according to the mode of the ship, which is operating (drilling or cruising) or standing by (in port). Although it is a fixed rate per day, the day rate is adjusted for changes in the Consumer Price Index-Urban (CPI-U) and Employment Cost Index (ECI). The amount is based on 365 days, which includes all or part of the tie-up period, and the budget allows for one CPI-U adjustment of 2.25% and one ECI adjustment of 2.25%, each based on an average of the last three actual percentage increases. The anticipated operating/transiting and standby day rates, respectively, are $73,170.74 and $70,769.07 through 31 December 2016, adjusting to $73,515.74 and $71,103.45 through 31 July 2017, and then adjusting to $75,574.36 and $72,127.34 for the remainder of the fiscal year.

Fuel and lubricants: Fuel to be purchased for the riserless vessel estimated at a total of 7,838 metric tons: 1,173 metric tons in Singapore; 1,226 metric tons in Guam; 1,191 and 1,083 metric tons in Hong Kong (2 refuelings); 1,998 metric tons in Subic Bay, Philippines; and 1,168 metric tons in Melbourne, Australia. Price per metric ton is based on prices quoted by Ship and Bunker for those locations as of 22 February 2016.

Per diem: Shipboard catering costs associated with meals and berthing on the vessel and cleaning of the laboratory stack. The estimate is based on a shipboard party of 60 participants at $31.88/day/person for all nontransit and nonmaintenance periods. The number of personnel on board for transit and non-IODP periods was estimated based on previous staffing schedules in like circumstances. This category does not include per diem for the ship subcontractor's sailing crew and drilling personnel, as they are accounted for in the day rate unless charged as a reimbursable (see "Day Rate" above).

Port call costs: Vessel agent's expenses, subcontractor freight, and meals and lodging costs incurred during subcontractor's crew rotations for port calls scheduled for Guam (5 days); Hong Kong (2 port calls at 5 days each, 1 port call at 3 days); Subic Bay, Philippines (29 day tie-up period); Townsville, Australia (3 days); and Melbourne, Australia (5 days).

Insurance—JOIDES Resolution. Annual insurance premiums for subcontractor and TAMRF, including subcontractor's premium costs for All Risks Marine Hull and Machinery (H&M) and Removal of Wreck (ROW) insurance and TAMRF premium costs for General and Automobile Liability, Workers Compensation, Cargo, Third Party Property (Equipment), Excess Liability, Control of Well and Seepage and Pollution Liability, Charterers Legal Liability, and Contractor's Pollution Liability–Gradual coverage for the vessel. All premium amounts are based on 365 days of coverage, and the premiums for Sections 1 and 2 of the Hull & Machinery coverage are discounted 50% during the non-IODP periods, which total 97 days in FY17.

Travel—ODL: Subcontractor transportation, including airfare for ship subcontractor's crews to/from 7 scheduled crew changes—Singapore (Expedition 363); Guam (Expedition 366); Hong Kong (Expeditions 367 and 368); Subic Bay, Philippines (non-IODP period); Townsville, Australia (Expedition 371); and Melbourne, Australia (Expedition 369). The estimate is based on a crew of 60 personnel with various domestic and international origin fly points arriving and departing each port call.

Schlumberger. Subcontract for the provision of a standard suite of tools, engineer services, software support, mobilization services, and specialty tools as needed; support for a dedicated engineer on the ship for each cruise and support from the base of operations; and the services of a district engineer, staff engineer, electronics technician, and special services engineer on an as-needed basis. Costs (including shipping charges) related to leasing equipment needed for wireline fishing, back-off and severing services, day rate and travel expenses for the Schlumberger engineer, and the day rate for tool insurance for the deployment of downhole logging tools.

Other direct costs. Costs not covered in other categories.

Shipping. Postage, express mail, and freight, including general postage and express mail/courier services for regular correspondence, scientific reports, small packages, and data and photo requests; shipping of materials, equipment, and supplies to and from expeditions; regular-sized sample shipments to scientists; and costs for special shipments of deep-frozen microbiological samples, U-channels, and so on. Estimated costs are based on historical averages of similar shipments for standard items sent to the ship for each expedition as well as expedition-specific items.

Communication. Standard telephone line, long distance, and fax charges; cellular phone charges; satellite; and cost of web and video conferencing as needed. Cost for very small aperture terminal (VSAT) communication and Marisat communication to and from the *JOIDES Resolution.*

Business conferences. Catering, supply, and incidental costs associated with hosting pre- and postexpedition meetings, core sampling events, educational workshops, on-site training events, and visits to the GCR. The cost per meeting is based on the past 3 years' expense data for these meetings. IODP-TAMU hosts approximately 21 meetings per year.

Training. Registration, transportation, per diem, and lodging expenses related to professional courses and meetings and online training courses.

Insurance. Annual insurance premiums for JRSO vehicles.

Maintenance and repair. Equipment service agreements and noncontracted maintenance and repair of equipment in warehouse, forklift, overhead cranes and other loading dock equipment, deep freezers, shrink-wrap and bagging machinery, office equipment, copiers, postage meter, imaging equipment such as cameras, vehicle fleet, IT computer hardware and software; and drilling, coring, logging operations, laboratory, repository, and safety equipment.

Equipment rental. Rental of equipment when it is more economical to rent than purchase, including conference equipment, mud motors, and water cooler rental.

Recruiting and relocation. Employee recruitment costs, including local, internet, and science and trade journal advertisements as well as other costs related to filling/replacing positions and recruiting professional staff. Relocation costs for new employees.

Library. Technical books, journals, and other resources, including subscriptions to professional publications and documentation materials required for reference.

Indirect costs. The TAMU off-campus indirect cost rate of 26% modified total direct cost (MTDC) is applied to this cooperative agreement. MTDC is calculated as total direct costs minus costs in exempt categories (e.g., equipment and subcontract costs over $25,000).

Appendix I: IT security summary

Policies and procedures

Extensive Standard Administrative Procedures provided by Texas A&M University are available at http://rules-saps.tamu.edu/TAMURulesAndSAPs.aspx.

The JRSO policy for communications to and from the RV *JOIDES Resolution* is available at http://iodp.tamu.edu/participants/policies/IODP_Comm_Policy.pdf. IT-specific policies for IODP are available on IODP's intranet site (not open to the public).

All employees must take yearly security awareness training as required by Texas A&M University. As part of this training, all users are required to acknowledge that they have read, understand, and will comply with university requirements regarding computer security policies and procedures.

Risk assessment

The JRSO completes an annual Information Security Assessment, Awareness, and Compliance (ISAAC) report as required by TAMU. The results are electronically reviewed by the Supervisor of Information Technology & Support, department manager, and Director, and then filed with the Texas A&M University Risk Management Office.

Roles and responsibilities

System Administrator, Marine Computer Specialist, and Service Desk Specialist (departmental IT personnel) responsibilities include

- Applying platform technical safeguards.
- Supplying the first-level response (i.e., restoration services) to any security breach.
- Immediately reporting any security breach to the Supervisor of Information Technology & Support.

Supervisor of Information Technology & Support responsibilities include

- Assuring that best practices are followed in the administration of systems.
- Reporting criminal activity under applicable state code concerning computer or telecommunications crimes to the department manager, Director, College of Geosciences Dean, and Texas A&M University's Chief Information Security Officer or designee.
- Determining if a violation rises to the standard of fraud or fraudulent action and reporting it to the department manager, Director, and College of Geosciences Dean.
- Determining the physical and electronic evidence to be gathered as part of incident investigation such as initiating, completing, and documenting the incident investigation.

Technical safeguards

- Departmental IT personnel shall test security patches prior to implementation where practical. Departmental IT personnel are encouraged to have hardware resources available for testing security patches in the case of special applications.
- Departmental IT personnel shall ensure that vendor-supplied patches are routinely acquired, systematically tested, and installed promptly based on risk-management decisions.
- Departmental IT personnel shall enable security features included in vendor-supplied systems in accordance with best practices, including but not limited to firewalls, virus scanning and malicious code protections, and other file protections, where possible. Audit logging shall also be enabled. User privileges shall be set utilizing the “least privileges” concept of providing the minimum amount of access required to perform job functions. Privileges may be added as need is demonstrated by the user. The use of passwords shall be enabled in accordance with Texas A&M University policies referenced below.
- Departmental IT personnel shall disable or change the password of default accounts.
- Departmental IT personnel or their designee shall test servers, especially, for known vulnerabilities periodically or when new vulnerabilities are announced.
- Departmental IT personnel shall seek and implement best practices for securing their particular system platform(s).

Physical safeguards

After business hours, JRSO building entry is allowed via identification (ID)/keycard. Information is logged and available for retrieval at a later date. An access list is maintained by the Building Proctor. Entry into the main computer room is granted only to authorized personnel whose job responsibilities require access to the facility, and to vendors, when necessary. Doors are secured using push-button locks for which codes are changed periodically and whenever there is personnel change, regardless of the employee’s status upon termination. Access codes are not to be shared with others.

Power to the computer room is provided via 50 kVA uninterruptible power supply (UPS) and matching power distribution unit (PDU). In case of power outage, power is supplied to UPS and backup heating, ventilation, and air-conditioning (HVAC) by a diesel generator. The computer room is protected from fire by a halon fire suppression system.

Incremental backups are completed on a daily basis and full backups are completed weekly. One full backup copy is kept locally and another is removed to off-site storage.

Cybersecurity breach notification procedures

In the event of a cybersecurity breach:

1. Departmental IT personnel have information security roles and responsibilities that can take priority over normal duties.
2. Departmental IT personnel are responsible for notifying the Supervisor of Information Technology & Support and department manager and initiating the appropriate action, including restoration. The department manager will notify the Director and Texas A&M University's Chief Information Security Officer or designee.
3. Departmental IT personnel are responsible for determining the physical and electronic evidence to be gathered as part of the incident investigation, such as initiating, completing, and documenting the incident investigation.
4. Departmental IT personnel shall report security incidents that may involve criminal activity under their respective state's penal code concerning computer or telecommunications crimes to the Director or department manager and Texas A&M University's Chief Information Security Officer or designee.
5. If fraud or theft is suspected as part of security incident detection, the person detecting the incident shall follow their respective system policies concerning the control of fraud and fraudulent actions.
6. If there is a substantial likelihood that security incidents could be propagated to other systems beyond departmental control, Departmental IT shall report/escalate such incidents as soon as an incident is identified.
7. The Supervisor of Information Technology & Support shall file an after-action report to the Texas A&M University Information Technology Risk Management (ITRM) office by e-mail to security@tamu.edu.

Security measures for nonemployees

All subcontractors, researchers, and others who will have access to the systems employed in support of this contract are required to follow all Texas A&M University and JRSO security policies.

Appendix II: Recommended program of insurance

TAMRF will utilize the risk management services of TAMU. These services will include insurance policy monitoring, ongoing risk assessments, marine insurance negotiations, and claims settlement. TAMRF's established relationship with the London insurance market coupled with the Program's safety history have enabled TAMU staff to obtain cost-effective premiums. TAMU staff have used market relationships, attention to detail, and clear communication to educate insurance brokers and underwriters to the specific risks involved in deep-ocean coring and to foster an understanding of risk mitigation along with differentiation from the common risks incurred during energy-related drilling.

Premium negotiations include documentation and explanation of specific exposures, estimated payroll costs, estimated operational time, confirmation of valuation, and operational history. As a result of proactive risk management, communication, and education, the Program's premiums have historically averaged less than the energy market, and terms and conditions for insurance coverage have been more favorable than the norm in the energy sector. The premiums in the table below are preliminary estimates subject to underwriter confirmation in FY14.

The FY17 proposed program of insurance for mitigation of drilling risks and marine/employer's liability is depicted in the following table. In addition, TAMU, on behalf of the JRSO, will assess specialty risks and procure insurance if warranted.

JRSO FY17 program of insurance details			
Program of insurance with government indemnification	Coverage limits	Deductible	Estimated annual premiums
Hull & Machinery and Removal of Wreck[1]	190,000,000	250,000	792,313
Control of Well	25,000,000	50,000	109,470
Seepage & Pollution Liability[2]	1,000,000	50,000	0
Cargo	5,000,000	25,000	47,595
Third Party Property/Equipment	10,000,000	25,000	30,104
Charterer's Legal Liability	1,000,000	10,000	14,153
Contractor's Pollution Liability—Gradual	10,000,000	1,000,000	27,405
Umbrella	200,000,000	Per underlying limits	314,232
Worker's Compensation & Maritime Employer's Liability	1,000,000	None	93,708
Comprehensive General & Automobile Liability	1,000,000	None	31,452
Total estimated annual premiums			**$1,460,432**

[1] Carried by ship subcontractor (ODL) and reimbursed by TAMRF.

[2] Included in Control of Well Policy and covered under the Umbrella.