

International Ocean Discovery Program
JOIDES Resolution Science Operator
Texas A&M University

FY24 Annual Program Plan to NSF

for the time period
1 October 2023–30 September 2024

Amount proposed FY24: \$70,421,986

Respectfully submitted to:
National Science Foundation



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26 July 2023

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1. Executive summary

Texas A&M University (TAMU) acts as manager and science operator of the research vessel (R/V) *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 TAMU Sponsored Research Services (SRS).

1.1. Annual Program Plan overview

The IODP JRSO FY24 Annual Program Plan to the National Science Foundation (NSF) defines the JRSO scope of work for FY24 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 JRSO by NSF, (2) the JRSO operations schedule approved by the *JOIDES Resolution* Facility Board (JRFB) in May 2023, and (3) the decision by NSF to demobilize the ship by the end of the fiscal year. The scope and budget justification of the activities described in the Annual Program Plan are derived from NSF guidance to JRSO.

The IODP JRSO FY24 Annual Program Plan includes discussion of JRSO goals, responsibilities, and deliverables, the operational schedule, descriptions of planned expeditions, and the organizational structure for science operations and platform operations activities. Section 1 provides budget definitions, assumptions, and directives used to construct the Annual Program Plan. Section 2 describes scheduled FY24 expedition operations. Section 3 covers organizational structure, personnel summary, and Management and Administration tasks. Section 4 provides an overview of subcontracts. Sections 5 through 9 address JRSO goals, deliverables, and budgets by department. Section 10 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 JRSO to protect contractual research and education activities. “Appendix II: recommended IODP JRSO program of insurance” provides information on risk management services provided to JRSO, including insurance policy monitoring, ongoing risk assessments, marine insurance negotiations, and claims settlement.

1.2. JRSO FY24 scope of work

As science operator of the *JOIDES Resolution* research facility, JRSO will provide wireline coring and logging services and technical, science, and engineering support for *JOIDES Resolution* expeditions (Sections 5 and 6); provide IT support, develop data applications, and manage digital databases (Section 7); curate core materials (Section 8); and publish pre- and postexpedition reports and research results (Section 9). These Program activities will be conducted in accordance with direction provided by the Program advisory panels and the JRFB and as outlined in the approved Annual Program Plan.

JRSO activities and deliverables associated with planning and preparation for *JOIDES Resolution* expeditions include providing all necessary environmental assessments and clearance permits, and documenting operational challenges and risks. JRSO postexpedition activities, deliverables, and ongoing operational tasks include expedition reporting, facilitating expedition research, producing technical documentation, and continuing legacy work.

On behalf of JRSO and as outlined in this Annual Program Plan, TAMRF has contracted with ODL AS for the services of the *JOIDES Resolution* and with Schlumberger Technology Corporation (Schlumberger) for the provision of downhole logging equipment and engineering support (Section 4).

1.3. FY24 budget development

NSF guidance

NSF's FY24 mission forecast for JRSO includes guidance to conduct three expeditions and demobilize the *JOIDES Resolution* in FY24.

FY24 budget assumptions

The total budget request of \$70,421,986 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 demobilization of the vessel during the last two months of the fiscal year.

Assumptions about the operations schedule are outlined in Section 2. This plan provides JRSO's best-effort estimate of FY24 costs. Fuel price volatility and inflation are major risk factors for completion of the scheduled operations within the stated budget. In addition, demobilization planning is ongoing at the time of budget assembly. Assumptions were made using the best available data to determine a prudent estimate for FY24 fuel, inflation, and demobilization costs; however, market conditions are subject to fluctuations that may result in a need for supplemental funding during the period of operations.

JOIDES Resolution demobilization

JRSO began planning for demobilization of the *JOIDES Resolution* in March after notification by NSF that operations would not be extended and demobilization had to occur before the end of the current award. Planning for such a significant task will be an ongoing process leading up to the end of operations. This budget estimate is based on the assumption that the awardee-titled property will be conveyed to TAMU when final disposition instructions are received from NSF. The general approach in assessing property disposition is based on determining if the property/equipment can be repurposed at TAMU. These items will be removed, packed, and shipped to TAMU. In a separate closeout proposal, we will propose installing *JOIDES Resolution* analytical instrumentation and related support equipment at the GCR. Disposition of items that cannot be repurposed will be completed in port rather than expending funds to ship items. Options for port disposition include selling, scrapping, abandoning in place on the *JOIDES Resolution*, or properly disposing, as appropriate.

The NSF-owned cores will remain at the GCR. The aforementioned closeout proposal will cover support for their archiving and storage in more detail.

FY24 budget request

The FY24 JRSO budget summary in Table 1.1 shows the overall budget request by department. The line-item total requested for each department includes only direct costs. Subcontracts to ODL AS and Schlumberger are budgeted in Management and Administration. Cumulative JRSO costs are separated into total direct costs and indirect costs that make up the "grand total" budget.

Table 1.1. JRSO FY24 budget request by department.

Department	Cost
Management and Administration	50,939,197
Science Operations	6,061,091
Technical and Analytical Services	4,899,278
Technology Services	2,373,573
Publication Services	1,721,598
JRSO total direct cost	65,994,737
JRSO modified total direct costs	17,027,882
JRSO indirect costs	4,427,249
Grand total JRSO FY24 budget request	\$70,421,986

2. Expedition operations

This Annual Program Plan is based on the following operations schedule published 16 March 2023 and includes three tie-up periods.

13 October–10 December 2023	Transit and Tie Up (dry dock)
10 December 2023–9 February 2024	Expedition 401: Mediterranean-Atlantic Gateway Exchange
9 February–8 April 2024	Expedition 402: Tyrrhenian Continent-Ocean Transition
8 April–4 June 2024	Transit and Tie Up (maintenance)
4 June–2 August 2024	Expedition 403: Eastern Fram Strait Paleo-archive
2 August–30 September 2024	Tie Up (demobilization)

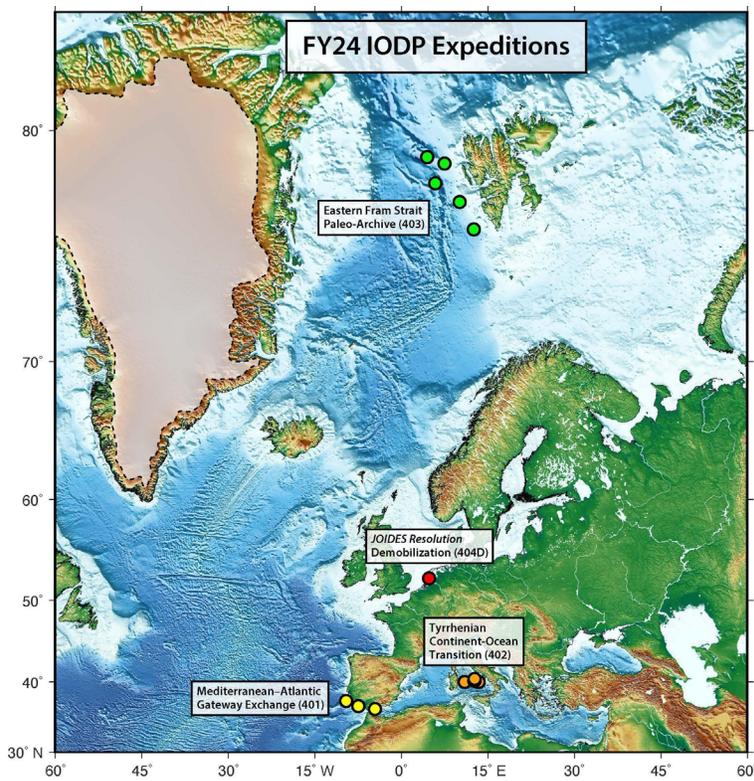


Figure 2.1. FY24 JRSO expedition site map.

2.1. FY24 expeditions

Expedition 401: Mediterranean-Atlantic Gateway Exchange

Proposed operations

Marine gateways play a critical role in the exchange of water, heat, salt, and nutrients between oceans and seas. The advection of dense waters helps drive global thermohaline circulation and, since the ocean is the largest of the rapidly exchanging CO₂ reservoirs, this advection also affects atmospheric carbon concentration. Changes in gateway geometry can therefore significantly alter both the pattern of global ocean circulation and associated heat transport and climate, as well as have a profound local impact.

Today, the volume of dense water supplied by Atlantic-Mediterranean exchange through the Gibraltar Strait is among the largest in the global ocean. For the past five million years this overflow has generated a saline plume at intermediate depths in the Atlantic that deposits distinctive contouritic sediments in the Gulf of Cadiz and contributes to the formation of North Atlantic Deep Water. This single gateway configuration only developed in the early Pliocene, however. During the Miocene, a wide, open seaway linking the Mediterranean and Atlantic evolved into two narrow corridors: one in northern Morocco, the other in southern Spain. Formation of these corridors permitted Mediterranean salinity to rise and a new, distinct, dense water mass to form and overspill into the Atlantic for the first time. Further restriction and closure of these connections resulted in extreme salinity fluctuations in the Mediterranean, leading to the formation of the Messinian Salinity Crisis salt giant.

IMMAGE is a land-to-sea drilling proposal designed to recover a complete record of Atlantic-Mediterranean exchange from its Late Miocene inception to its current configuration. This will be achieved by targeting Miocene offshore sediments on either side of the Gibraltar Strait during this IODP expedition and recovering Miocene core from the two precursor connections now exposed on land with future International Continental Scientific Drilling Program (ICDP) campaigns. The scientific aims of IMMAGE are to constrain quantitatively the consequences for ocean circulation and global climate of the inception of Atlantic-Mediterranean exchange, to explore the mechanisms for high-amplitude environmental change in marginal marine systems, and to test physical oceanographic hypotheses for extreme high-density overflow dynamics that do not exist in the world today on this scale.

IODP Expedition 401 will core two primary sites west of the Gibraltar Strait and one primary site east of the Strait. Several alternate sites are available in case operations need to be reevaluated at sea.

Logistics

Operations for Expedition 401 are budgeted based on an estimated 61 days (3 in port, 10 in transit, and 48 on site). This expedition will take place within the Portuguese and Spanish Exclusive Economic Zones (EEZs); the clearance application was submitted in the third FY23 quarter. An environmental assessment needed for vertical seismic profile (VSP) operations was approved in the third FY23 quarter. Shipboard personnel will likely include observers from Portugal, Spain, and Morocco.

Expedition 402: Tyrrhenian Continent-Ocean Transition

Proposed operations

A tenet of plate tectonics is that divergent plates cause the asthenospheric mantle to ascend, decompress, and melt, thereby producing new magmatic crust. However, drilling west of Iberia in the 1980s discovered a continent-ocean transition (COT) made of exposed mantle, revising models of lithospheric

thinning and melt generation and defining magma-poor margins. A long-standing argument about mantle in COTs concerns its nature as either sub-continental or being exhumed during ultraslow sea-floor spreading. Additionally, two models attribute the apparent lack of melts either to slow extension resulting in low ascent rates with enhanced asthenospheric cooling and reduced melt production or to upwelling mantle originally too depleted to produce a significant melt fraction. The debate on COT models is limited by the scarce evidence obtained in ultra-deep-water drilling, restricted to a few basement highs. Thus, 30 years after its discovery, the nature and genesis of COTs is still controversial. The comparatively shallow water depth and thin sediment cover of the Tyrrhenian Sea provide an optimal location to test COT formation models by drilling. The Tyrrhenian Sea is the only example where extensive modern geophysical data have accurately mapped basement domains of a conjugate pair of COTs. They can be characterized with unprecedented detail in a single drilling expedition to study the time and space evolution of COT processes. Expedition 402 will drill two perpendicular transects. An east-west transect will target the progression from magmatic crust to exhumed mantle; a north-south transect will map the fault zone that exhumed the mantle. Drilling will sample the complete sediment section including Messinian deposits, the sediment/basement interface, the mantle, the associated magmas, and the products of syntectonic, and possibly ongoing, fluid-rock interactions to evaluate the hydrosphere-lithosphere geochemical exchange and potential related ecosystems.

IODP Expedition 402 will core six primary sites in the Tyrrhenian Sea. Several alternate sites are available in case operations need to be reevaluated at sea.

Logistics

Operations for Expedition 402 are budgeted based on an estimated 59 days (5 in port, 2 in transit, and 52 on site). This expedition will take place within the Italian EEZ; the clearance application was submitted in the third FY23 quarter. Shipboard personnel may include an observer from Italy.

Expedition 403: Eastern Fram Strait Paleo-archive

Proposed operations

The North Atlantic and Arctic Oceans are unquestionably major players in the climatic evolution of the Northern Hemisphere and in the history of the meridional overturning circulation of the Atlantic Ocean. The establishment of the modern North Atlantic Water (NAW) transporting heat, salt, and moisture to the Northern Hemisphere has been indicated as one of the main forcing mechanisms for the onset of the North Hemisphere glaciation. NAW controls the extent and dynamics of circum-Arctic and circum-North Atlantic ice sheets and sea ice in addition to deep water and brine production. How the ocean system and cryosphere worked during past warmer intervals of high insolation and/or high atmospheric CO₂ content is still unknown and debated. The required information can only be attained by offshore scientific drilling in high-resolution, continuous, and undisturbed sedimentary sequences identified on the western continental margin of Svalbard (eastern side of the Fram Strait) along the main pathway and northern penetration of the North Atlantic Waters flowing into the Arctic Ocean. The area around Svalbard is very sensitive to climatic variability, and it can be considered as a “sentinel of climate change.” Further, the reconstruction of the dynamic history of the marine-based paleo-Svalbard-Barents Sea Ice Sheet is important because it is considered the best available analogue to the modern, marine-based West Antarctic Ice Sheet, whose loss of stability is presently the major uncertainty in projecting future global sea level in response to the present global climate warming.

IODP Expedition 403 will core six primary sites west of the Svalbard archipelago. Several alternate sites are available in case operations need to be reevaluated at sea.

Logistics

Operations for Expedition 403 are budgeted based on an estimated 59 days (5 in port, 12 in transit, and 42 on site). This expedition will take place within the Norwegian EEZ; the clearance application will be submitted in early FY24. An environmental assessment will be produced for vertical seismic profile (VSP) operations. Shipboard personnel will include two ice observers in addition to a potential observer from Norway. Expedition 403 will end in Amsterdam, where the demobilization of the *JOIDES Resolution* is expected to take place.

2.2. Expedition outreach

Berths will be made available for Onboard Outreach Officers during each expedition. JRSO personnel will facilitate their activities and work with the US Science Support Program (USSSP), the IODP Science Office, the IODP Forum, and interested TAMU staff and faculty on education issues and to further advance the Program through outreach.

3. Management and Administration

3.1. Organizational structure

JRSO's organizational structure directly reflects the responsibilities specified by NSF for technical and scientific management, administration, and operation of the *JOIDES Resolution*, including planning, coordinating, overseeing, reviewing, and reporting activities. The JRSO organization consists of five departments: Science Operations (SciOps), Technical and Analytical Services (TAS), Publication Services (Pubs), Technology Services (TS), and Sponsored Research Services (SRS). Managers of SciOps, TAS, and Pubs report to the JRSO Director, who is responsible for the Program's overall management and performance. The Curation group is part of the Director's Office. Technology Services and Human Resources at Texas A&M University have been transformed into consolidated services units, respectively. Dedicated, embedded staff remain within IODP but with dotted line reporting to the Director. On-site sponsored program staff members dedicated to JRSO support are overseen by a General Manager who reports to the Executive Director of TAMU SRS. This separate reporting chain ensures that the sponsored programs unit retains the independence to ensure regulatory compliance while working directly with JRSO staff to efficiently implement the Program. The Director's Office and the SRS Administrative Services group combined make up the Management and Administration portion of this Annual Program Plan.

On behalf of JRSO, and as outlined in this Annual Program Plan, TAMRF has contracted with ODL AS 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 (Section 4).

3.2. Personnel summary

The personnel summary table below presents an accounting of the cumulative estimated effort within each department. The table reflects actual senior personnel and departmental staffing as of 30 April 2023 plus projected staffing for FY24. 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 SRS employees, IT, and Human Resource positions that are supported through indirect costs.

Table 3.1. FY24 personnel summary

Department/ senior personnel	Position titles	Personnel (#)
Management and Administration		8
Mitch Malone	Director	1
	Administrative Coordinator	1
	Curator	1
	Superintendent of Gulf Coast Repository	1
	Curatorial Specialists	2
	XRF Laboratory Manager	1
Marcia Walker	General Manager, JSRO Administrative Services	1
Science Operations		22
Katerina Petronotis	Manager of Science Operations	1
	Administrative Coordinator	1
	Clearance and Permitting Specialist	1
	Supervisor of Engineering and Logistics Support	1
	Staff Engineers	3
	Designer	1
	Marine Logistics Coordinator	1
	Shipping and Receiving Specialists	2
	IODP Materials Technician	1
	Supervisor of Operational Support	1
	Operations Engineer	1
	Materials Specialist	1
	Supervisor of Science Support	1
	Expedition Project Manager/Staff Scientist	6
Technical and Analytical Services		35
Gary Acton	Assistant Director and Manager of Technical and Analytical Services	1
	Business Coordinator	1
	Supervisor of Analytical Systems	1
	Supervisor of Technical Support	1
	Laboratory Officers	3
	Assistant Laboratory Officers	5
	Marine Laboratory Specialists (Research Associates/Research Specialists)	18
	Marine Instrumentation Specialists	4
	Data Analyst	1
Technology Services		10
Algie Morgan	Associate Director, Information Technology	1
	Cybersecurity Policy Analyst	1
	Supervisor of Applications Development	1
	Software Application Developers	7

Department/ senior personnel	Position titles	Personnel (#)
Publication Services		18
Lorri Peters	Manager of Publication Services	1
	Supervisor of Editing	1
	Editors	4
	DAM Administrator	1
	Supervisor of Production	1
	Production Editors	4
	Supervisor of Graphics	1
	Graphics Specialists	5
Total FY24 JRSO personnel		94

3.3. Management and Administration goals

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

3.4. Management and Administration deliverables in FY24

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 [PMOs], 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, procurement, invoicing, cash management, 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 JRSO on behalf of IODP.

4. Subcontractors

The SRS section 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 JRSO. Establishment of subcontracts involves developing a detailed scope of work that outlines the operational responsibilities of the subcontractor, reviewing subcontractors' policies and agreements to ensure that applicable flow-down regulations are incorporated into any subagreements (e.g., shipboard catering), and monitoring subcontractors' adherence to the established scope of work through direct supervision, periodic meetings, and review of progress reports. SRS staff review subcontractor invoices prior to payment and conduct periodic audits of subcontractors' financial records to ensure financial compliance with cost allowability and other contractual requirements.

4.1. Overseas Drilling Limited AS

ODL AS is responsible for safely conducting drilling and coring operations to meet the scientific goals outlined in the Annual Program Plan. These responsibilities include providing the marine crew, the drilling crew, and complete logistical requirements (i.e., ship supplies, spare parts, and port call-related activities) in accordance with the approved Operations Plan. The JRSO Operations Superintendent monitors ODL AS adherence to their scope of work on board the *JOIDES Resolution*. In addition, JRSO SciOps staff review the required daily operations report that details logistical, scientific, and operational data. Expedition planning and crossover meetings held with ODL AS also ensure that the subcontractor adheres to the scope of work and scientific objectives. Review of ODL AS 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 AS financial records ensure financial compliance with cost allowability and other contractual requirements.

4.2. Schlumberger Technology Corporation

Schlumberger provides wireline logging 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 engineers sail on a rotating basis, working directly with JRSO staff throughout the expedition and assisting with logging projects on shore. This integration embeds logging operations in the SciOps department's approach to planning, ensuring 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.

4.3. Rutgers-IODP Core Repository

The Rutgers-IODP Core Repository archives cores obtained during Ocean Drilling Program (ODP) Legs 150X and 174AX. These cores are currently being used to answer questions pertaining to the Paleocene/Eocene Thermal Maximum, Cretaceous/Paleogene mass extinction, Cenozoic sea level change, and Holocene sea level rise. The Rutgers-IODP Core Repository maintains the cores, fills sampling requests, hosts visitors, maintains and improves databases related to these cores, and uses these cores in outreach to undergraduates, graduate students, and other geologists.

5. Science Operations

5.1. Science Operations goals

The SciOps department provides scientific, operational, engineering, and logistical planning and implementation for *JOIDES Resolution* drilling expeditions in response to IODP science planning guidance and recommendations. 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 science planning with IODP partners; and utilizing IODP resources to oversee engineering development projects.

5.2. Science Operations deliverables in FY24

Drilling proposal evaluation

Provide operational and technical guidance to community requests, as required.

Engage a panel of experts (TAMU Safety Panel) to participate in site reviews with the Environmental Protection and Safety Panel (EPSP) to provide independent recommendations to JRSO regarding 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 AS) and wireline logging subcontractor (Schlumberger); manage rig instrumentation; perform and oversee drilling, logging, and coring operations; and conduct long-range science planning with IODP partners.

Expedition staffing

Coordinate scientific staffing in accordance with existing Memoranda of Understanding, PMO recommendations, and NSF directives for each JRSO expedition.

Logistics support

Provide support for expedition and shore-based activities including procurement, shipping, and inventory of equipment, supplies, and core samples.

Clearance/Environmental assessment

Obtain permits and clearances to drill in US waters as well as the EEZs, Extended Continental Shelves, and territorial waters of coastal countries as needed; obtain environmental assessments for protected

species permitting associated with seismic logging operations; and ensure environmental protection and safety.

Engineering support

Provide shipboard and shore-based engineering support for maintaining and developing drilling, coring, and downhole systems, including third-party tool developments, for each JRSO expedition.

Scientific leadership

Provide scientific leadership within JRSO for expedition planning, projects, and Laboratory Working Groups; provide scientific leadership on board the *JOIDES Resolution* during expeditions; and assist with postexpedition research and publication activities.

Progress reporting

Provide expedition-related reports and content for expedition publications (e.g., *Preliminary Reports* and *Proceedings*) and 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 panels (e.g., JRFB, Science Evaluation Panel, IODP Forum), task forces, and workshops as appropriate.

Education/Outreach support

Facilitate activities of Onboard Outreach Officers, coordinate related outreach activities, and participate in efforts to further advance the Program through outreach.

Legacy documentation

Routinely archive electronic copies of documents and reports produced by JRSO on behalf of IODP, including expedition science and operations reports.

6. Technical and Analytical Services

6.1. Technical and Analytical Services goals

The TAS department oversees the laboratories and facilitates core curation, handling, and shipping. TAS stocks, maintains, upgrades, and staffs the shipboard and shore-based laboratories. TAS goals include managing the complex supply chain for stocking the shipboard laboratories; operating scientific instruments and providing support to shipboard scientists in making scientific measurements; educating scientists about laboratory-specific and general shipboard safety requirements; maintaining, repairing, and developing scientific equipment and laboratories while at sea to enable expedition staff to meet scientific objectives; providing support for downhole tools and measurements; establishing quality assurance/quality control (QA/QC) for measurements made in the laboratories; archiving shipboard data and ensuring they are made available in an open-access repository; responding to data requests from the scientific community; and supporting shore-based laboratories.

6.2. Technical and Analytical Services deliverables in FY24

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 data to database systems, manage supply chain for shipboard consumables, and support Science Parties in achieving scientific objectives.

Expedition data services

Ensure the accuracy and completeness of data collected for each expedition, submit data to national data repositories and an open-access repository, and respond to data requests from the scientific community.

Scientific leadership

Provide scientific leadership within JRSO for project management and in Laboratory Working Groups.

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.

Education/Outreach support

Facilitate activities of Onboard Outreach Officers and participate in efforts to further advance the Program through outreach.

Legacy documentation

Routinely archive electronic copies of documents and reports produced by JRSO on behalf of IODP.

7. Technology Services

7.1. Technology Services goals

The TS 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 dissemination; and manages the Programs' extensive databases.

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

7.2. Technology Services deliverables in FY24

Expedition data services

Maintain and manage databases that support 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, such as core and sample tracking), ensure data integrity, 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 on shore; maintain IT infrastructure, including wide area network components, personal computers, and network instrumentation hosts; and, to the extent possible, maintain congruence 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

Support outreach activities at sea by providing access to internet collaboration services such as ship-to-shore web conferencing.

Documentation

Maintain electronic copies of all IT architecture and corresponding services configurations.

8. Core Curation

8.1. Core Curation goals

The Core Curation unit's major responsibilities are to curate, archive, and manage cores and samples collected by the Program. Core Curation goals include providing pre-expedition and shipboard curatorial services; postexpedition services including Sample Allocation Committee (SAC) support, sample parties, and post moratorium sampling; X-ray fluorescence (XRF) scanning services including programmatic and personal measurements and digital imaging; core storage and preservation; and educational use of the core collection including tours and use of the repository for classes and workshops.

8.2. Core Curation deliverables in FY24

Sample 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. Work with TS, TAS, and SciOps to develop new software solutions designed to replace the curation software application SampleMaster and to replace the IODP Sample and Data Request webpage.

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 SAC for each expedition. Coordinate with the SAC and plan and execute shore-based sample parties for cores ultimately stored at the GCR and the Kochi Core Center (KCC). Assist with preparation for Bremen Core Repository (BCR) sample parties.

Core sampling

Provide a curatorial specialist on board the *JOIDES Resolution* to develop, coordinate, and execute site-sampling plans and supervise core sampling during ship operations.

Core curation and sample requests

Conduct all responsibilities associated with curating core collections at the GCR and supporting core sampling, analysis, and education; fulfill postmoratorium sample requests from the scientific community; and provide technical expertise in interactions with KCC and BCR in support of sampling and curating core material obtained from NSF-funded scientific ocean drilling and housed at the KCC and BCR.

Use of core collection and education and outreach support

Promote outreach use of the core collection in collaboration with Institute for Marine-Earth Exploration and Engineering (MarE3) (previously known as Center for Deep Earth Exploration [CDEX]) and European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO) education/outreach personnel and other science partners by providing materials for display at meetings or museums, conducting tours, and supporting other JRSO outreach activities.

Onshore XRF scanning

Provide support and oversight of the XRF scanning laboratory at the GCR. Train users in the basic operation of the equipment. Develop models for optimizing data interpretation; provide pre- and postanalysis support. Support high-resolution digital imaging.

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 the annual IODP curatorial staff meeting.

Core storage and preservation

Maintain and, where possible, improve the core storage facility. Receive, sort, and store core and residue shipments from the *JOIDES Resolution*, including temporary storage of KCC and BCR cores (shipped from the *JOIDES Resolution* for XRF scanning). Coordinate core shipments to the KCC and BCR. Shrink-wrap and maintain the collection.

Legacy documentation

Routinely archive electronic copies of documents and reports produced by JRSO on behalf of IODP.

9. Publication Services

9.1. Publication Services goals

The Pubs department is responsible for producing IODP scientific publications including postexpedition *Proceedings* volumes, technical documentation (policies and procedures), and Program reporting deliverables, along with bibliographic and citation management.

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 FY24 will include an annual program plan, quarterly and annual reports for JRSO, and a *Preliminary Report* and *Proceedings of the International Ocean Discovery Program* expedition report (ER) volume and data reports (expedition research results; ERR) for all IODP JRSO, ESO, and MarE3 expeditions.

9.2. Publication Services deliverables in FY24

Shipboard publications support

Provide a Publications Specialist for core description and publications support and report coordination during each FY24 JRSO expedition and ESO onshore science party (OSP).

Postexpedition editorial meetings

Provide editorial, graphics, and production support during JRSO, ESO, and MarE3 postexpedition editorial meetings.

IODP scientific publishing

Produce scientific reports for JRSO, ESO, and MarE3 (Preliminary Reports) and expedition reports *Proceedings* volumes for JRSO, ESO, and MarE3 expeditions that will be either published or in production during FY24.

Publications coordination

Manage the peer-review process for Integrated Ocean Drilling Program and IODP *Proceedings* data reports and synthesis papers through TAMU's Open Journal Systems (OJS) subscription, provide centralized record-keeping of Integrated Ocean Drilling Program and IODP postexpedition research submissions and publications in outside literature, and monitor science party publication obligations and reviewer activities.

Website maintenance

Maintain and manage the ship and shore websites (<http://iodp.tamu.edu>, <http://publications.iodp.org>, and <http://ship.iodp.tamu.edu/>) and legacy websites (<http://www.odplegacy.org>, <http://www-odp.tamu.edu/publications>, and <http://www.deepseadrilling.org>).

Bibliography and citation management

Manage postexpedition publication citation records for the Deep Sea Drilling Project (DSDP), ODP, Integrated Ocean Drilling Program, and IODP through the Scientific Ocean Drilling Bibliographic Database (SODBD) hosted by the American Geosciences Institute (AGI), maintain cumulative Program and expedition-related bibliographies and provide volume and expedition-related bibliographies in downloadable markup format (RIS) files, prepare annual report of Program-related citation statistics as reported in the SODBD, and respond to special requests for Program-related citation data.

Discovery and accessibility

Maintain and update IODP publications and expedition-related research collections at ScienceOpen researcher portal, TAMU Elements database (Altmetrics), and EBSCO information services and register extended CrossMark metadata (including persistent author identifiers (ORCID), licensing information (CC), funding sources (FundRef), publication updates, text mining URLs, organizational identifiers (ROR), open references, and citation information) at CrossRef.

Publication archiving

Maintain the digitized print archive of DSDP and ODP publications at HathiTrust; the digital archive of DSDP, ODP, Integrated Ocean Drilling Program, and IODP publications through Expedition 396 at the Internet Archive; and hard-copy archives (microfiche, microfilm, books, CDs, and DVDs) at JRSO headquarters.

Progress reporting

Edit and produce the JRSO FY23 Quarter 4 report, three JRSO FY24 quarterly reports, and the JRSO FY23 Annual Report.

Expedition outreach

Facilitate activities of Onboard Outreach Officers during JRSO expeditions.

Legacy and technical documentation

Routinely archive electronic copies of all documents, reports, technical documentation, and scientific publications produced by 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 Integrated Ocean Drilling Program legacy program expeditions).

10. JRSO FY24 budget

The budget summary and detailed departmental budgets in this section describe the overall JRSO FY24 budget requests to provide a framework for interpreting fiscal data in quarterly reports delivered to NSF by JRSO.

Table 10.1 provides the cumulative total for each major expense category in the JRSO FY24 budget, Table 10.2 shows the detailed budget request for each department, and the budget explanation for each expense category is provided in Section 10.1.

Table 10.1. FY24 expense category summary.

Expense category	Cost
Salaries and fringes	11,815,743
Equipment	136,000
Travel	741,600
Materials and supplies	1,408,283
Consultant/professional services	375,458
Computer services	80,000
Subcontracts	48,830,855
Other direct costs	2,606,798
Shipping	1,162,289
Communication	5,736
Business conferences	19,900

Expense category	Cost
Training	136,650
Insurance	655,764
Maintenance and repair	612,359
Other	14,100
JRSO total direct costs	65,994,737
JRSO total modified direct costs	17,027,882
JRSO indirect costs	4,427,249
Grand total JRSO FY24 budget request	\$70,421,986

Table 10.2. FY24 JRSO budget detail by department.

Department/expense category	Cost
Management and Administration	
Salaries and fringes	996,939
Equipment	50,000
Travel	130,200
Materials and supplies	72,750
Consultant/professional services	57,664
Computer Services	80,000
Subcontracts	48,830,855
Overseas Drilling Limited	44,597,731
Day rate	34,689,708
Fuel and lubricants	5,226,680
Per diem	680,257
Port calls	1,969,580
Travel—ODL AS	727,000
Insurance— <i>JOIDES Resolution</i>	751,595
Other	552,911
Schlumberger Technology Corporation	4,167,917
Day rate	3,757,674
Supplies	15,000
Shipping	10,000
Travel	31,500
Equipment rental	150,383
Maintenance and repair	203,360
Rutgers-IODP Core Repository	65,207
Salaries and fringes	41,533
Materials and supplies	0
Indirect costs	23,674
Other direct costs	735,789
Shipping	30,200
Business conferences	19,900
Training	15,715
Insurance	633,764
Maintenance and repair	15,000
Other	6,210
Total Management and Administration direct costs	50,939,197

Department/expense category	Cost
Science Operations	
Salaries and fringes	3,648,634
Equipment	0
Travel	151,700
Materials and supplies	921,283
Consultant/professional services	164,600
Computer Services	0
Subcontracts	0
Other direct costs	1,174,874
Shipping	1,125,689
Communication	0
Training	12,125
Insurance	22,000
Maintenance and repair	14,000
Other	1,060
Total Science Operations direct costs	6,061,091
Technical and Analytical Services	
Salaries and fringes	4,157,108
Equipment	50,000
Travel	315,500
Materials and supplies	279,500
Consultant/professional services	0
Computer Services	0
Subcontracts	0
Other direct costs	97,170
Shipping	6,400
Training	29,600
Maintenance and repair	59,000
Other	2,170
Total Technical and Analytical Services direct costs	4,899,278
Technology Services	
Salaries and fringes	1,357,089
Equipment	36,000
Travel	116,900
Materials and supplies	121,250
Consultant/professional services	140,169
Computer Services	0
Subcontracts	0
Other direct costs	602,165
Communication	5,736
Training	69,210
Maintenance and repair	524,359
Other	2,860
Total Technology Services direct costs	2,373,573

Department/expense category	Cost
Publication Services	
Salaries and fringes	1,655,973
Equipment	0
Travel	27,300
Materials and supplies	13,500
Consultant/professional services	13,025
Computer Services	0
Subcontracts	0
Other direct costs	11,800
Training	10,000
Other	1,800
Total Publication Services direct costs	1,721,598
JRSO total direct costs	65,994,737
JRSO total modified total direct costs	17,027,882
JRSO indirect costs	4,427,249
Grand total JRSO FY24 budget request	\$70,421,986

10.1. 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 Table 3.1). Fringe rates are calculated based on actual costs.

Equipment

Procurement, upgrade, or fabrication of operational equipment with an acquisition cost of more than \$5,000, including tools and equipment in support of logging operations and computer and network equipment to replace aged network models, workstations, and plotters as well as 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 and support equipment. Estimated equipment costs are projected based on potential for loss during operations and 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 \$1,600 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 \$4,000 for regular meetings and \$3,500 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, engineering, laboratory, and logistical supplies for shipboard and shore-based analytical and engineering laboratory and test facilities and expeditions. Cost estimates for drill and core 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 for processing images on shore; general operational and office supplies, including printer and copier supplies and paper; noninventory 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 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, 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, 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. AGI SODBD fee for inclusion of new citations, Science Open fee for featuring publications, CrossRef annual membership and administrative costs, digital object identifier (DOI) registration charges, CrossMark registration charges, and publications archiving fees.

Computer 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.

ODL AS

Subcontract for operations of the *JOIDES Resolution*. Costs related to this subcontract include the following:

Day rate

Vessel staffing for the subcontractor's sailing crew and drilling personnel, not including the cost of JRSO personnel or scientists aboard the ship. The day rate varies according to the mode of the ship, which is operating (drilling or cruising) or standby (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 budgeted amount is based on 366 days, including demobilization, and allows for two CPI-U adjustments and two ECI adjustments of 2.25% each. The anticipated operating/cruising and standby day rates, respectively, are \$91,135.91 and \$88,145.45 through October 2023, \$92,448.27 and \$89,414.76 in November 2023, \$92,885.09 and \$89,837.23 from January through April 2024, \$94,222.64 and \$91,130.90 from May through June 2024 and \$94,667.84 and \$91,561.49 in July through September 25, 2024. Five days at the agreed-up termination rate are included for September 26 - 30, 2024, in the event that demobilization is completed and the ship is vacated at that time.

In addition to the day rate described above, a separate supplemental day rate of \$2,000 is included in the budget. It represents IODP's contribution to the estimated costs for major dry dock activities scheduled to occur in FY24 that are required after a vessel has been in service for 45 years. The supplemental day rate is expected to remain in effect through 30 September 2024 and will not be subject to escalation by movement of the CPI-U or ECI.

Fuel and lubricants

Fuel to be purchased for the riserless vessel is estimated at 5,200 metric tons (mt) of Marine Gas Oil (MGO). This total includes one refueling of 1,800 mt in Amsterdam, two refuelings of 1,000 mt each (Napoli, Italy) and one refueling of 800 mt in Reykjavik, Iceland. Quantities are based on ODL's fuel forecast as of 03 June 2023. All prices per metric ton were obtained from the OilMonster website on 30 April 2022. A 10% inflation factor to allow for cost increases and fuel analysis fees of \$200 per refueling are also included.

Per diem

Shipboard catering costs associated with meals and berthing on the vessel and cleaning of the laboratory stack. For normal scientific operations, it is assumed there will be 60 persons on board (POB). During the tie up/maintenance period, it is estimated that there will be only 15 POB. Thirty POB are estimated during demobilization. No escalation factor is included because the catering contract is in its final year. Per diem for the ship subcontractor's sailing crew and drilling personnel is paid as part of the "Day rate" above.

Port call costs

Vessel port agent's expenses, subcontractor freight, and meals and lodging costs incurred during subcontractor's crew rotations for five port calls. Port calls are scheduled in Napoli, Italy; Reykjavik, Iceland; and Amsterdam, Netherlands. Each port call's duration is expected to be 5 days, with the exception of the tie up periods in Reykjavik and Amsterdam.

Insurance—*JOIDES Resolution*

Annual insurance premiums for subcontractor and TAMRF, including subcontractor's premium costs for All Risks Marine Hull and Machinery (H&M) insurance and TAMRF premium costs for Cargo, Equipment, Control of Well, Excess Liabilities, Foreign General Liability, Contingent Auto Liability, Foreign Workers' Compensation, Contractor's Pollution, and Charterers Liability insurance are included.

Travel—ODL

Subcontractor transportation, including airfare for ship subcontractor's crews to/from five scheduled crew changes: Amsterdam, Netherlands, for Expedition 401; Napoli, Italy, for Expedition 402 and 402T (tie up); Reykjavik for Expedition 403; and Amsterdam for Expedition 404D (demobilization). The estimate is based on a crew of 60 personnel with various domestic and international originating fly points arriving and departing each port call.

Other—ODL

Nonroutine expenses that are not identified with any other budget categories. These include very small aperture terminal (VSAT) communications services between the ship and shore, minor maintenance and repair not covered by ODL's day rate, medivac costs, and additional ODL personnel costs. Also included are some costs resulting from precautionary measures and staffing requirements due to COVID-19.

Schlumberger wireline logging subcontractor

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 expedition and support from the base of operations; and the services of a district engineer, staff engineer, electronics technician, and special services engineer as needed. Costs (including shipping charges) related to leasing equipment needed for wireline fishing, back-off and severing services, day rate, and travel expenses for the wireline logging engineer and maintenance engineers (as needed for tie up), and 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 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 and 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 VSAT communication and Inmarsat communication to and from the *JOIDES Resolution*.

Business conferences

Catering, supply, and incidental costs associated with hosting postexpedition meetings, EPSP, core sampling events, educational workshops, on-site training events, and visits to the GCR. The cost per meeting is based on 3 years' expense data prior to the pandemic for these meetings, adjusted upward by a small amount to allow for current cost increases. IODP JRSO hosts approximately 21 meetings per year.

Training and Professional Development

Registration, transportation, per diem, and lodging expenses related to professional courses and meetings and online training courses. Technical books, journals, and other resources, including subscriptions to professional publications and documentation materials required for reference.

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, loading dock equipment, deep freezers, shrink-wrap and bagging machinery, office equipment, copiers, postage meter, imaging equipment such as cameras, vehicle fleet, and IT computer hardware and software. Drilling, coring, logging, 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 coolers.

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

Texas A&M University's (TAMU's) Information Security Controls Catalog is available at <https://it.tamu.edu/policy>. Additionally, TAMU Rules and Standard Administrative Procedures are available at "University Rules and SAPs - Texas A&M University (<https://rules-saps.tamu.edu/rules-saps-library/>).

The JRSO policy for shipboard communications is available at <https://goo.gl/SrILWS>.

All employees must take yearly information security awareness training as required by TAMU. 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

JRSO completes an annual information security risk assessment report as required by TAMU and the State of Texas. The results are electronically reviewed by the Supervisor of Information Technology, department manager, Director of Science Services, and TAMU Vice President for Research and then filed with the TAMU Division of IT Risk Management Office for further assessment and follow-up.

Roles and responsibilities

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

- Applying platform technical safeguards,
- Applying critical system patches within 30 days of release,
- Supplying the first-level response (i.e., restoration services) to any security breach, and
- Immediately reporting any security breach to the Supervisor of Information Technology & Support.

Supervisor of Information Technology 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, TAMU Vice President for Research, and TAMU'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 TAMU Vice President for Research; and
- 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 TAMU policy.

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, multifactor authentication, and other file protections, where possible. Audit logging shall also be enabled. User privileges shall be set utilizing the “least privileges” and “separation of duties” concepts in accordance with TAMU policy to provide the minimum amount of access required to perform job functions and minimize risk. Separation of duties includes dividing mission functions and system support functions among different individuals or roles, conducting system support functions with different individuals (e.g., configuration management, system management, applications development, and network security), and ensuring that security personnel administering access control functions do not also administer audit functions. The use of passwords shall be enabled in accordance with TAMU policies referenced below. When feasible, multifactor authentication shall be used by system and network administrators when accessing IT infrastructure with elevated privileges.

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 JRSO and TAMU data centers on shore is granted only to authorized personnel whose job responsibilities require access to the facility and to vendors when necessary. JRSO’s data center is secured using centrally controlled electronic locks with swipe card access capability. TAMU’s data center is secured 24/7 using biometric access capability and armed guard(s).

Data center information

Power to the JRSO shore data center 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.

TAMU’s West Campus Data Center is a 50,000 square foot facility with up to 30,000 square feet of raised floor, HVAC services providing 7.4M BTU/hr cooling capacity, two 2.5 MW generators for backup power, three UPS systems totaling 4,000 kVA, and Very Early Warning Aspirating Smoke Detection (VESDA) and fire suppression systems.

Data backups

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 every 30 days.

Cybersecurity breach notification procedures

In the event of a cybersecurity breach:

1. Departmental IT personnel have information security roles and responsibilities that take priority over normal duties.
2. Departmental IT personnel are responsible for notifying the Cybersecurity Policy Analyst, Supervisor of Information Technology and department manager and initiating the appropriate action, including restoration. The department manager will notify the Director and TAMU'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 to TAMU'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 shall send an after-action report to the TAMU Chief Information Security Officer or designee by email to security@tamu.edu.

Security measures for nonemployees

All subcontractors, researchers, and others who have access to the systems employed in support of this contract are required to follow all TAMU and JRSO security policies.

Appendix II: recommended program of insurance

Texas A&M Research Foundation (TAMRF) will utilize the risk management services of Texas A&M University (TAMU), which 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 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 FY21.

The FY24 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 *JOIDES Resolution* Science Operator (JRSO), will assess specialty risks and procure insurance if warranted.

JRSO FY24 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	751,595
Control of Well (COW)	25,000,000	50,000	84,671
Seepage & Pollution Liability ²	1,000,000	Included in COW	Included in COW
Cargo	5,000,000	25,000	36,813
Third Party Property/Equipment	10,000,000	25,000	23,285
Charterer’s Legal Liability	1,000,000	10,000	24,080
Contractor’s Pollution Liability—Gradual	10,000,000	1,000,000	29,545
Umbrella	200,000,000	Underlying policy limits	295,031
Worker’s Compensation & Maritime Employer’s Liability	1,000,000	None	82,427
Comprehensive General & Automobile Liability	1,000,000	None	55,512
Total estimated annual premiums			1,382,959

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

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