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Office of
Science and Technology and International

Science and Technology Program Management Plan

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Science & Technology



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Office of Civilian Radioactive Waste Management
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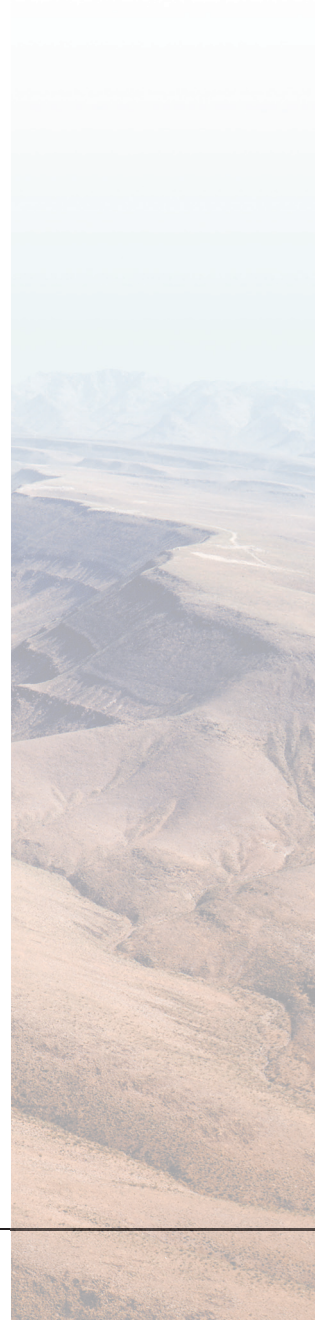
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List Of Acronyms

CO	—	Contracting Officer
COR	—	Contracting Officer's Representative
CRWMS	—	Civilian Radioactive Waste Management System
DEAR	—	Department of Energy Acquisition Regulation
DOE	—	U.S. Department of Energy
ES&H	—	Environment, Safety, and Health
FAR	—	Federal Acquisition Regulation
FOIA	—	Freedom of Information Act
GAO	—	General Accounting Office
GPRA	—	Government Performance and Results Act
IG	—	Inspector General
ISMS	—	Integrated Safety Management System
NEPA	—	National Environmental Policy Act
OCRWM	—	Office of Civilian Radioactive Waste Management
OMB	—	Office of Management and Budget
OSPD	—	Office of Strategy and Program Development
OST&I	—	Office of Science and Technology and International
QA	—	Quality Assurance
QARD	—	Quality Assurance Requirements and Description
S&T	—	Science and Technology
SCWE	—	Safety-Conscious Work Environment
TSPA	—	Total System Performance Assessment
YMP	—	Yucca Mountain Project

Introduction

The Office of Science and Technology and International (OST&I) is part of the U.S. Department of Energy's (DOE's) Office of Civilian Radioactive Waste Management (OCRWM). One of the programs OST&I manages is the OCRWM Science and Technology Program to conduct applied research and technology development and demonstration whose goal is to optimize the waste isolation processes at Yucca Mountain, specifically by exploring technological improvements that could enhance the Civilian Radioactive Waste Management System (CRWMS) performance and reduce costs. To meet this goal, it provides advanced research results, as well as innovative technologies and systems, to optimize performance and reduce costs of the CRWMS which includes the Yucca Mountain Project (YMP), the National Transportation Project, and the Nevada Transportation Project.

This Science and Technology Program Management Plan explains how OST&I manages science and technology activities to support the overall OCRWM mission. This document also reflects OST&I's ongoing drive to enhance efficiency and effectiveness in its business management practices, and to ensure that its mission is integrated within the overall OCRWM Program.

A separate management plan is being prepared for the International Program that is also managed by OST&I. However, this Plan does provide a brief discussion of the aspects of the International Program as they relate to the Science and Technology Program.



Purpose and Scope

This Science and Technology Program Management Plan provides a high-level description of OST&I's mission, vision, and strategies; a description of key management functions and activities; and a discussion of OST&I's interfaces within OCRWM. It also describes OST&I's managerial approach to program planning, formulation, execution, and evaluation activities. This document's primary audience is OCRWM Headquarters, the Targeted Thrust Teams, other Science and Technology Program participants, the Yucca Mountain Project, the National Transportation Project, and the Nevada Transportation Project management and staff. In addition, both DOE and non-DOE individuals and groups who interact regularly with OST&I programs should find it useful. The Management Plan provides the managerial framework within which the Science and Technology Program operates. It will be updated, as needed, to reflect OST&I management improvements, changes, and overall DOE and OCRWM issues affecting the Science and Technology Program.

The Science and Technology Program Management Plan is consistent with the OCRWM Strategic Plan for 2003 – 2013 and other OCRWM strategic and technical planning documents.

The Management Plan is not intended to replace OCRWM-level management plans or procedures; however, lower-level procedures applicable to particular Science and Technology Program processes should be consistent with the approach outlined in this document.

Document Description

The Science and Technology Program Management Plan is organized into the following sections:

SECTION	CONTENT
Introduction	Description of document's purpose and scope
Mission, Vision, and Strategies	Discussion of these specific concepts and how they relate to OCRWM's mission
Management Structure	Description of Science and Technology Program operation and functions
Process Overview	Highlights the key activities involved in the Science and Technology Program
Quality, Safety and Health, and Environmental Compliance	Outline of Science and Technology Program compliance requirements
Communication	Summary of communication approach

Mission, Vision, and Strategies

The Science and Technology Program provides a range of science and technology resources and capabilities, from targeted applied research through technology development and demonstration, needed to deliver scientific and technological enhancements to optimize repository performance. Enhanced understanding of the repository system is also a goal of the Program and will offer greater insight leading to technology design changes that will enhance the waste management system's efficiency and/or cost effectiveness.

Mission

OST&I's Science and Technology Program mission is:

Provide advanced science and technology to continually enhance our understanding of waste isolation at Yucca Mountain and to reduce the cost and schedule for the OCRWM mission.

OCRWM has identified three critical objectives for the Science and Technology Program and each science and technology investment must support at least one of them. These are:

- Reduce the costs and schedule of the repository and supporting systems
- Enhance understanding of the processes related to waste isolation at the repository
- Accelerate and increase innovative technology application.

Vision

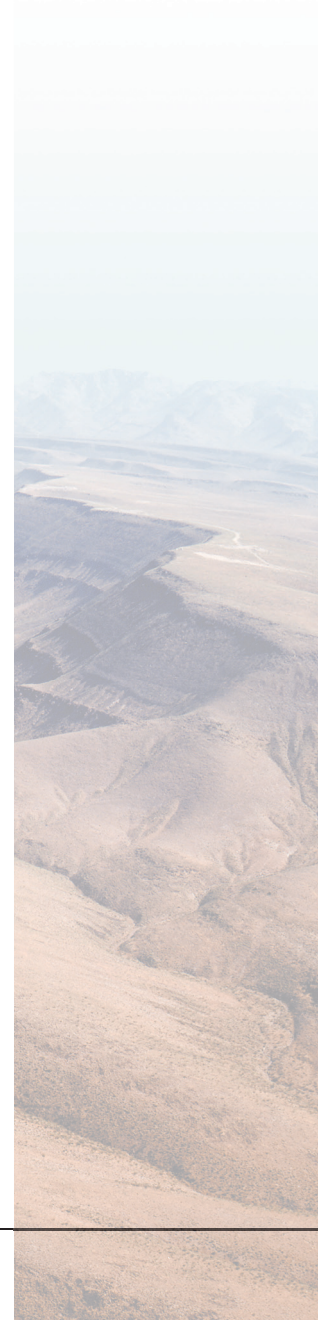
The program and management strategies outlined in this Science and Technology Program Management Plan are driven by the following vision:

OCRWM and the affected public will value the contributions that scientific and technological advances have made toward safer, more expeditious, and more cost-effective waste isolation.

Strategies

To accomplish the mission and vision and achieve a comprehensive, integrated approach to developing and providing science and technology initiatives, OCRWM has established a number of technical program strategies. These strategies will help ensure investments are focused on providing the science and technology enhancements that OCRWM managers can introduce to optimize performance of the OCRWM mission:

- Results Oriented – Activities will be focused on potential advances that can significantly reduce the costs and schedule of the OCRWM projects while maintaining or enhancing safety.
- Integrated with the CRWMS – Activities will be linked to program goals, and it is expected that financial accountability will transfer from science and technology funding to the OCRWM projects as technologies move toward implementation.
- Comprehensive in Scope – Activities will cover a wide range of science and technology (i.e., targeted applied research to technology development to technology demonstration leading to technology deployment).



- Credible Decision Process – Processes used to establish priorities, set program and project direction, allocate funding, and select project teams are based on a clear set of criteria and are applied in an open, transparent manner (see Process Overview).

In addition to these strategies, OST&I will also emphasize the following management strategies:

- Coordinate and Collaborate with OCRWM Projects – OST&I activities will be coordinated with the projects and a collaborative relationship will be established from project planning and execution to the transfer of results and products for implementation. End users will be engaged from the initiation of the technology development effort.
- Integrate with the Vendor Community – Planning for technology development, demonstration, and implementation will be carried out early in the process. For technologies that will be demonstrated through the commercial market, potential vendors are enlisted early and become partners in development.
- Employ Sound Business Practices – OST&I will conduct applied research and advanced technology activities in a way that ensures the greatest possible return from the investment of funds, time, and human resources.
- Engage Science and Technology Review Groups – OST&I will engage science and technology review groups, including among others, the National Academy of Sciences and the Nuclear Waste Technical Review Board, to provide guidance and keep them informed of OST&I science and technology plans, activities, and results. OST&I will reach out to the international radioactive high-level waste management community for identifying new technologies and for collaboration opportunities to advance progress with Science and Technology Program initiatives.

Management Structure

OST&I will work in close collaboration with OCRWM projects for the identification of science and technology initiatives. The project line organizations are responsible for implementing the operating baseline for the repository while the Science and Technology Program is chartered to investigate advances that may ultimately become part of the baseline.

The Science and Technology Program will foster international collaborations to add to the knowledge base of the national effort and draw on the work that has already been done in other countries, thereby maximizing the use of resources. It is also the goal of OCRWM to establish the United States as a world leader in radioactive high-level waste management and disposal.

The Overall OST&I Organization

Management of Science and Technology Program-sponsored work is distributed among organizational components in a way that places the authority and responsibility for specific activities at the lowest appropriate management level. The Science and Technology Program clearly assigns authority and responsibility to appropriate levels consistent with the existing DOE/OCRWM organizational structure:

- Headquarters is responsible for policy development, guidance, funding decisions, program analysis/oversight, setting priorities, and reporting

- Each Targeted Thrust Team is responsible for planning, directing, and managing the implementation of that Team’s program
- Targeted Thrust Teams and participant organizations are responsible for implementing their assigned work scopes
- In certain circumstances there may also be specific tasks that will be co-managed by OST&I Headquarters and field personnel (e.g., an advanced technology project).

OST&I is composed of two major elements. The *Science and Technology* element consists of *Targeted Thrusts and Advanced Technologies*. The second element is *International*.

The *Science and Technology* element directly supports the OCRWM Program Strategic Performance Goal of continuing efforts to optimize the national disposal system. The *Science and Technology* element is devoted to the application of advanced technologies for construction, operations, fabrication, and waste verification; new/improved scientific investigation methods or tools for waste package characterization, natural systems, and monitoring; and targeted studies on improving capabilities for assessing repository performance and enhanced understanding leading to cost savings and schedule acceleration.

Targeted Thrusts are responsible for focusing efforts on key areas of targeted applied research for science and technology initiatives. As the Science and Technology Program continues to evolve, additional *Targeted Thrusts* may be identified in collaboration with OCRWM projects. Targeted Thrust Teams plan and direct targeted work, and provide a central coordinating and facilitating function, to provide continuity and integration with technical investigators, technology developers, the vendor community, and OCRWM project end users. The Teams collaborate with the OCRWM projects and Headquarters to jointly plan, execute, and evaluate science and technology results. Moreover, Targeted Thrust Teams work directly with the OCRWM projects staffs to identify topics and to develop technical programs within those areas.

Advanced Technologies include projects involving potentially adaptable technologies and/or systems requiring some additional development work leading to a demonstration. If successfully demonstrated to offer significant cost reductions or system acceleration, these technologies are then made available to OCRWM projects for insertion into the baseline.

The *International* element also contributes to optimizing the CRWMS. One OCRWM Program Strategic Goal is to establish the United States as a world leader in radioactive waste management and disposal through ongoing international cooperation. To advance its leadership role, OST&I’s International group actively seeks the involvement of international agencies, foreign national agencies, and foreign technical organizations, exchanges strategies and technologies with other nations, and participates in conferences and relevant organized discussions with other radioactive high-level waste management and disposal programs. OST&I will also leverage and collaborate with the expertise and unique research facilities (e.g., underground research laboratories) available from the international community to support the programmatic objectives of the Science and Technology Program.

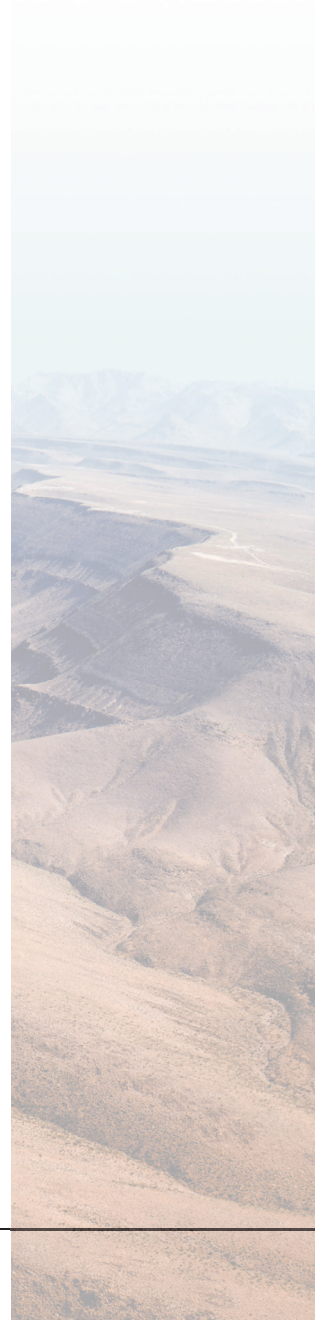
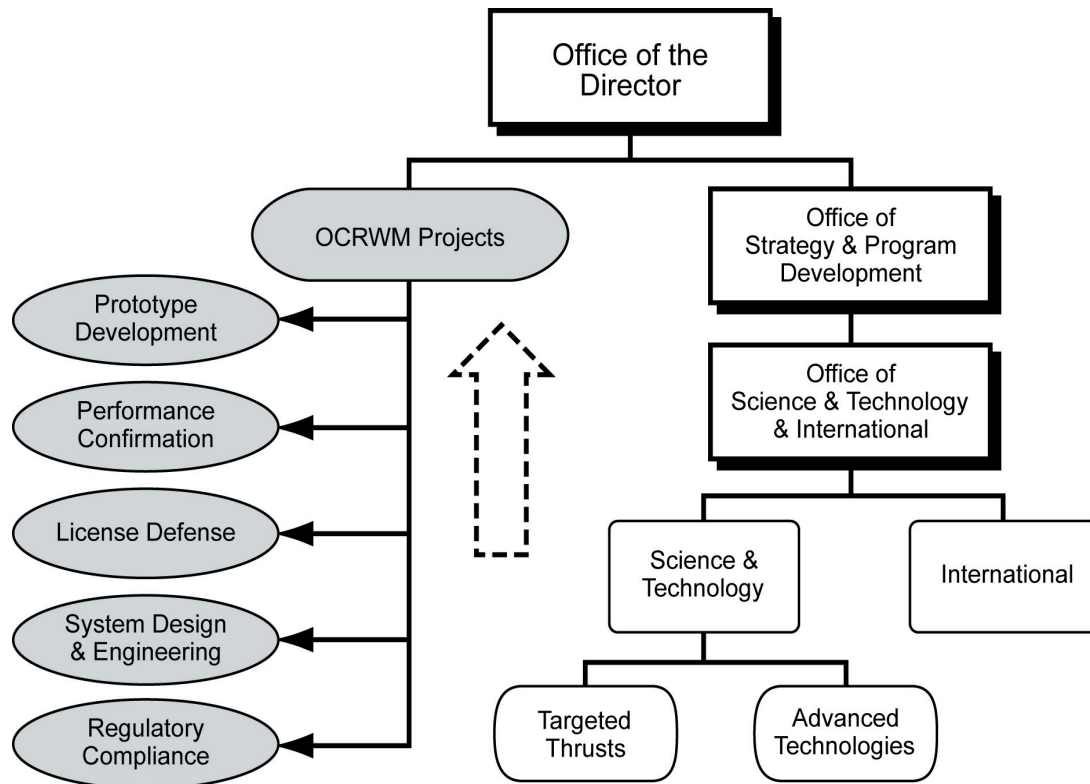


Figure 1 The Office of Science and Technology and International organization is responsive to optimizing the CRWMS in collaboration with the OCRWM projects



The Headquarters Organization

The Headquarters organization sets and articulates clear goals to assure that all parties have a clear understanding of the near-term and the long-term objectives. The Headquarters management activities of policy development, guidance, program analysis/oversight, priority setting, and reporting are accomplished through a traditional DOE organizational structure with a management team approach

Headquarters Management Team

The OCRWM Director has delegated Science and Technology Program operational responsibility to the OST&I Director. The principal functions of the OST&I Director are to:

- Manage overall activities
- Implement functions described in this OST&I Science and Technology Program Management Plan
- Assure the coordination of all Science and Technology Program operations.

The Headquarters OST&I Science and Technology Team is expected to cultivate and manage an array of crosscutting networks, including for example, inter-office project teams spanning OCRWM, DOE, and other agencies, and to facilitate efforts and better integrate the OST&I Science and Technology Program with the OCRWM projects systems and approaches.

The OST&I Headquarters Science and Technology Team ensures that applied research and technology development is managed and executed in accordance with DOE requirements by:

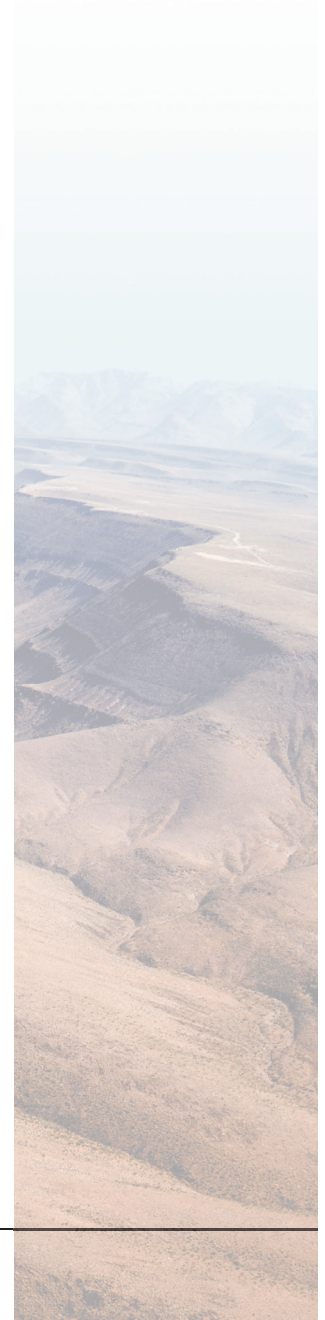
- establishing OCRWM science and technology policy, guidance and requirements
- performing management oversight of all science and technology work accomplished by OST&I-sponsored entities using Targeted Thrust Teams as a “field” resource
- managing and resolving issues regarding security, environmental permitting, policy, and intergovernmental relations, and interfacing with OCRWM projects when appropriate
- serving as an advocate for science and technology in part by representing the value of science and technology investment to stakeholders and other interested organizations, including Congress
- prioritizing science and technology technical responses
- approving program plans and distributing funds
- reporting Science and Technology Program performance
- ensuring OCRWM project technology opportunities are identified and communicated to senior OCRWM management
- communicating the results of science and technology projects and the potential benefits of specific enhancements
- tracking successes and lessons learned
- preparing and maintaining information relevant to the Science and Technology Program.

Targeted Thrust Teams and Advanced Technologies

In general, OST&I’s projects are managed and executed by Targeted Thrust Teams. The Targeted Thrust Teams are organized by major potential enhancements or optimization areas, and are responsible for the management of the relevant activities. Targeted Thrust Team Leaders are responsible to ensure investment in a balanced portfolio to meet both near- and long-term enhancement opportunities. The Leaders have the management prerogative to delegate responsibilities to other program participants making up the Targeted Thrust Team with the understanding that the Leaders are held accountable by OST&I management for the overall Team’s performance. The Targeted Thrust Team Leaders are the primary point-of-contact with OST&I management regarding the Team’s activities.

The Targeted Thrust Teams:

- manage and coordinate the work that is accomplished by multiple performers
- interface with project customers to develop technical programs that are responsive and relevant to OCRWM
- prepare Annual Performance Plans
- construct and prioritize work activities for out-years of the program
- prepare and execute the program according to multi-year plans
- support OST&I budget requests
- conduct competitive solicitations whenever feasible
- ensure independent peer reviews are conducted of work performed
- monitor quality assurance-related activities of any technical projects in which quality assurance requirements are imposed
- conduct and report reviews of activities under their purview
- transfer results to OCRWM project end users
- publish research results in peer-reviewed publications of Targeted Thrust Team projects and periodic reports on the progress of the Team.



Projects in Advanced Technologies will be managed by an OST&I Headquarters Program Manager in collaboration with an OCRWM project Technical Monitor. The Program Manager will perform similar activities to those outlined above for the Targeted Thrust Teams. However, in most cases, Advanced Technologies Program Managers will be engaged in a single, specific technology project that may have multiple performers.

Science and Technology Program Participants

OST&I draws on national laboratories, other federal agencies, universities, and the private sector in executing the Science and Technology Program. Program participants:

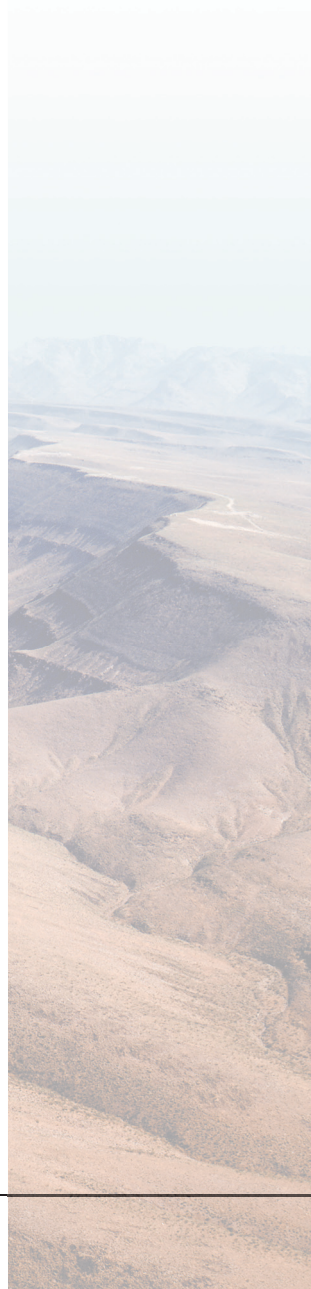
- manage and perform scopes of work, monitor performance, and take appropriate corrective actions to ensure contractual requirements are met
- provide quality assured products in accordance with cost and schedule requirements
- report costs, schedules, and progress per contract requirements
- provide support and input to strategic plans, cost/schedule improvements, reviews, OST&I reports and communications, and international program as requested
- elevate issues requiring OST&I attention to Targeted Thrust Team Leaders.

Science and Technology Program Roles and Responsibilities

Roles and responsibilities of the OST&I Headquarters Management Team and the Targeted Thrust Teams/Program Participants must be well defined for this distributed and collaborative OST&I management approach to be successful. Table 1 depicts the major roles and responsibilities for the key organizations making up the Science and Technology Program.

Table 1 Science and Technology Program Organizational Roles and Responsibilities

PROGRAM PLANNING, ORGANIZATION, AND MANAGEMENT			
<i>Covers the functions associated with program planning, organization, and management. Includes organizational structure, strategic and program planning, development of policies and procedures, and resource management.</i>			
	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	OCRWM PROJECT OFFICES	THRUST TEAMS/ PROGRAM PARTICIPANTS
ORGANIZATION	<ul style="list-style-type: none"> Establish the S&T Program organizational structure including the organizational roles, responsibilities, authority, and accountability for key program functions. Implement the S&T organization. 	<ul style="list-style-type: none"> Establish, document, and communicate roles, responsibilities, authority, and accountability of project personnel assigned to participate in the S&T Program. Designate a Project Liaison for each Thrust Team to collaborate in identifying S&T opportunities. 	<ul style="list-style-type: none"> Establish, document, and communicate roles, responsibilities, authority, and accountability of participant personnel.
STRATEGIC AND PROGRAM PLANNING	<ul style="list-style-type: none"> Confirm mission and establish strategic objectives. Establish upper tier milestones. Integrate and compile strategic and program plans. 	<ul style="list-style-type: none"> Establish and communicate project recommendations for S&T Program priorities, performance objectives, and performance metrics. Support development of strategic and program plans. Assist in developing project plans. 	<ul style="list-style-type: none"> Support development of strategic and program plans. Develop project plans. Plan and schedule work and implement plan to meet performance objectives and performance metrics.
POLICIES AND PROCEDURES	<ul style="list-style-type: none"> Establish requirements and policies for S&T Program. Interface on policy issues with senior management, other OCRWM offices, other DOE offices, outside agencies, and stakeholders. Develop and implement S&T Program procedures. Resolve policy issues elevated by program participants. 	<ul style="list-style-type: none"> Support policy development. Develop and implement S&T project procedures if necessary. Elevate issues requiring management attention. 	<ul style="list-style-type: none"> Develop and implement participant policies and procedures to meet S&T Program requirements. Elevate issues requiring management attention.
RESOURCE PLANNING	<ul style="list-style-type: none"> Allocate DOE personnel resources for S&T Program. Issue staffing and training guidance. Implement training for personnel in OST&I. 	<ul style="list-style-type: none"> Allocate project personnel resources to support S&T Program. 	<ul style="list-style-type: none"> Manage resources and execute contracts within approved cost and schedule. Define and implement training program for participant personnel.



QUALITY ASSURANCE (QA)		
<i>Covers QA and quality management functions for the Science and Technology Program. This includes development of QA requirements and plans and implementation of QA activities such as audits, assessments, inspections, surveillance, nonconformance control, corrective action, and continuous improvement programs.</i>		
	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
QUALITY ASSURANCE PROGRAM	<ul style="list-style-type: none"> • Exercise overall responsibility for establishment and successful execution of OCRWM QA Program. • Ensure implementation of OCRWM Quality Assurance Requirements and Description (QARD) requirements. • Participate in the annual management assessments of the QA program. 	<ul style="list-style-type: none"> • Develop, implement, and manage a QA program meeting QARD requirements as appropriate. • Establish an independent QA organization as appropriate. • Perform compliance-based surveillances, audits, and quality control inspections to ensure compliance with QA program requirements. • Participate in the annual management assessments of the QA program.

SAFETY-CONSCIOUS WORK ENVIRONMENT (SCWE)		
<i>Covers activities associated with developing, managing, and maintaining a Safety-Conscious Work Environment.</i>		
	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
SAFETY-CONSCIOUS WORK ENVIRONMENT	<ul style="list-style-type: none"> • Establish the vision and expectations for a Safety-Conscious Work Environment (SCWE). • Endorse SCWE and monitor implementation in S&T Program. 	<ul style="list-style-type: none"> • Establish and maintain a SCWE to meet DOE requirements.

ENVIRONMENT, SAFETY, AND HEALTH (ES&H)		
<p><i>Includes all Science and Technology Program activities required to ensure environmental protection and health and safety of workers and the public. Includes development of National Environmental Policy Act (NEPA) documentation, environmental monitoring, safety analysis, and Integrated Safety Management program requirements.</i></p>		
	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
ENVIRONMENTAL AND REGULATORY COMPLIANCE	<ul style="list-style-type: none"> Exercise overall responsibility for establishment and successful implementation of S&T Program ES&H requirements. 	<ul style="list-style-type: none"> Develop and implement ES&H requirements in project activities.
SAFETY AND HEALTH	<ul style="list-style-type: none"> Implement OCRWM Program policy, expectations, and performance metrics for an Integrated Safety Management System (ISMS). Stop work if a clear and present safety danger exists. 	<ul style="list-style-type: none"> Work within an ISMS culture and maintain institutional ISMS support. Develop, implement, and maintain programs for industrial safety and health protection, radiological protection, and emergency management. Establish, implement, and maintain a hazard identification and control program. Stop work if a clear and present safety danger exists.

PROCUREMENT AND CONTRACT MANAGEMENT		
<p><i>Covers all activities associated with procurement of materials, supplies, and services for the Science and Technology Program. Includes acquisition planning, procurement, and contract management functions.</i></p>		
	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
ACQUISITION PLANNING AND PROCUREMENT	<ul style="list-style-type: none"> Implement OCRWM overall acquisition policy and expectations consistent with Federal Acquisition Regulation (FAR) and Department of Energy Acquisition Regulation (DEAR). Conduct monitoring of participants. Serve as federal Contracting Officer's Representatives (CORs). 	<ul style="list-style-type: none"> Procure services and supplies within designated procurement limits and authority. Serve as technical monitors. Plan and perform work in accordance with contract requirements. Propose and provide input on DOE-proposed contract provision changes. Evaluate technical direction and guidance against contract requirements and notify Contracting Officer (CO) and OST&I management of issues that could require a potential change in work scope. Report cost, schedules, and progress per reporting requirements.



BUDGET AND FINANCIAL MANAGEMENT

Addresses Science and Technology Program budget development, funds management, and other financial management issues.

	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
BUDGET DEVELOPMENT AND MANAGEMENT	<ul style="list-style-type: none"> • Set programmatic priorities and issue budget formulation guidance early in budget cycle. • Review budget requests. • Develop OST&I budget. • Defend budget during interactions within DOE, and with the Office of Management and Budget (OMB) and the Congress. • Issue initial budget guidance and approve prioritized work scope, consistent with the budget. • Allocate appropriated budget and provide funding guidance. • Review Thrust Team financial reports and take management actions as appropriate. 	<ul style="list-style-type: none"> • Develop work planning input as directed. • Implement a system to manage available funds within budgets and estimate-at-completion forecasts. • In consultation with OST&I, recommend cost/schedule improvements where appropriate. • Support OST&I interactions on funding issues. • Develop, maintain through baseline management, and execute multi-year annual work plans. • Report financial accounting results to OST&I.

PROGRAM MONITORING AND CONTROL

Covers activities associated with the process controls; establishing, monitoring, and reporting program objectives and performance.

	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
PERFORMANCE OBJECTIVES	<ul style="list-style-type: none"> • Establish S&T Program performance objectives and performance metrics. • Support implementation of Government Performance and Results Act (GPRA). • Develop and implement long-term performance goals and annual performance goals. • Collect timely and credible performance information. • Direct independent reviews of the S&T Program by scientific experts as appropriate. 	<ul style="list-style-type: none"> • Assist in development of performance objectives and metrics. • Conduct activities to meet performance objectives and performance metrics. • Monitor to ensure compliance with policies and procedures. • Provide input to the S&T Program long-term goals and annual performance goals. • Commit to and work toward the annual and long-term S&T Program goals. • Conduct independent Thrust Team peer reviews, and document for OST&I management. • Support independent reviews of the S&T Program.
BASELINE CONTROL	<ul style="list-style-type: none"> • Support policy requiring development and maintenance of a program baseline. • Conduct program reviews and monitor key performance indicators for program. • Provide periodic reports on S&T Program performance to OCRWM Director. 	<ul style="list-style-type: none"> • Report on technical, cost, and schedule performance and variances per contract requirements. • Provide “early alert” reports to OCRWM Director, OST&I on emerging issues and trends. • Maintain required records to document and track scope, cost, and schedule baseline changes. • Manage technical, cost, and schedule performance to established baselines. Identify and perform corrective actions where necessary. • Provide periodic reports on project performance to OST&I.
PROGRAM MONITORING AND REPORTING	<ul style="list-style-type: none"> • Ensure compliance with policies and procedures. • Implement accounting policy and support audit activities. • Provide S&T Program input to OCRWM Annual Report. • Provide S&T Program input for DOE Performance and Accountability Report. • Provide S&T Program input for responses to General Accounting Office (GAO)/DOE Inspector General (IG) audits and Congressional questions and inquiries. 	<ul style="list-style-type: none"> • Implement accounting policy and support audit activities. • Support development of OCRWM Annual Report. • Support development of DOE Performance and Accountability Report. • Support development of responses to GAO/DOE IG audits and Congressional questions and inquiries.



EXTERNAL COMMUNICATION AND STAKEHOLDER INVOLVEMENT PROGRAMS		
<i>Includes communications with parties external to the program, including members of Congress; Federal, State, and local government; Indian Tribes; the technical community; the public and other stakeholders. Includes outreach, public information, and stakeholder involvement as well as institutional and intergovernmental programs.</i>		
COMMUNICATIONS	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS PROGRAM PARTICIPANTS
	<ul style="list-style-type: none"> • Implement OCRWM Director's policies for project communications. • Support OCRWM Communications in responding to news media inquiries on the S&T Program and activities. • Represent OST&I at DOE and other technical conferences and meetings. • Report to OCRWM Director on interactions with OCRWM Communications regarding S&T Program media inquiries and advise about emerging media issues. • Directly address S&T Program Freedom of Information Act (FOIA) requests and provide input to OCRWM FOIA requests. 	<ul style="list-style-type: none"> • Support DOE external communication and stakeholder involvement programs in accordance with OCRWM Director's policies. • Advise OST&I about emerging media issues. • Provide analysis to address media inquiries as requested. • Support public affairs activities such as meetings and development of press releases and displays/exhibits for the public. • Support external communication and stakeholder involvement programs. • Provide input to FOIA requests. • Disseminate research results in peer-reviewed publications, laboratory reports, professional presentations, etc. in accordance with OCRWM policies and procedures.
INSTITUTIONAL AND INTERGOVERNMENT	<ul style="list-style-type: none"> • Establish budget and priorities for institutional and intergovernmental activities. 	<ul style="list-style-type: none"> • Support institutional and intergovernmental activities as requested.

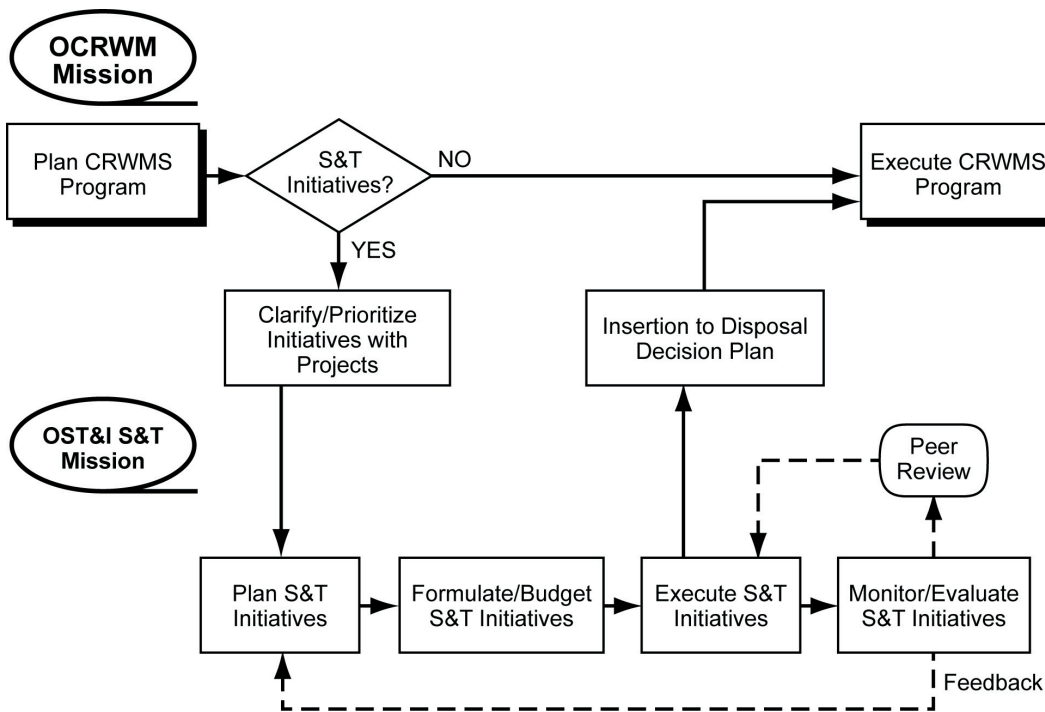
INTERNATIONAL		
<i>Covers all interactions and supporting activities associated with the OCRWM International Program.</i>		
INTERNATIONAL INTERFACES	OFFICE OF SCIENCE AND TECHNOLOGY AND INTERNATIONAL	THRUST TEAMS/PROGRAM PARTICIPANTS
	<ul style="list-style-type: none"> • Develop/manage International Program by developing requirements and representing OCRWM in international activities and foreign visits. 	<ul style="list-style-type: none"> • Support International Program. • Identify opportunities for international collaboration by leveraging and teaming with expertise and unique facility capabilities in the international repository community to support OST&I programmatic needs in S&T Program initiatives.

Process Overview

OCRWM/OST&I has adopted systems engineering and technology roadmapping as key tools in its approach to business. The systems engineering approach provides the foundation for OCRWM program decisions and implementation that are technically defensible and cost-effective, and that satisfy stakeholders and regulators. Technology roadmapping provides a methodology to define and focus science and technology investments and activities to provide the maximum benefit to the OCRWM program.

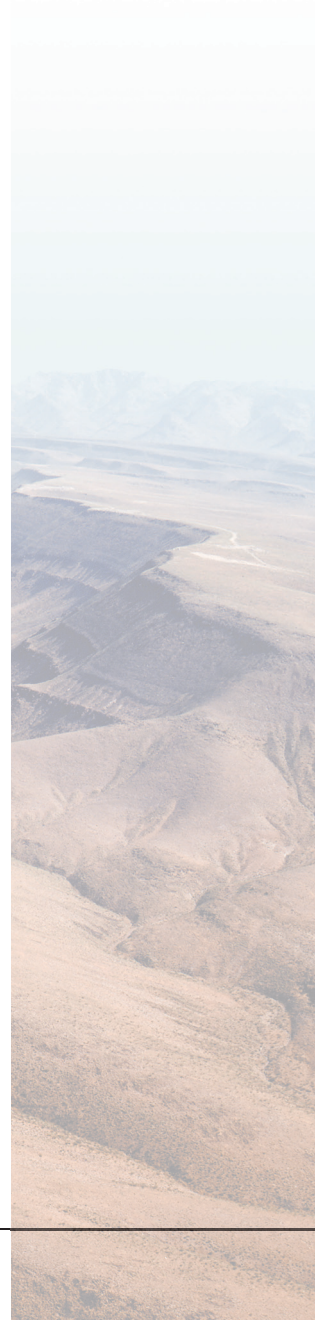
The development and execution of OCRWM’s science and technology investments use a four-step process with a feedback loop comprised of 1) planning, 2) formulation, 3) execution, and 4) evaluation. These four steps are briefly described in the following sections. Independent peer review, a critical component of managing science and technology activities, is an integral part of the program.

Figure 2 The Science and Technology Program’s mission and process are fully integrated with the OCRWM Mission



Program Planning – *Defining the Program*

Program planning involves identifying areas in which science and technology activities can yield substantial reductions in cost or schedule for completion of the OCRWM mission or significant enhancements in our understanding of the waste isolation system leading to cost savings and schedule acceleration.



Data Collection and Analysis

The first step is the identification of areas in which science and technology initiatives are warranted. Input from the OCRWM projects technical staffs is essential to accurately define and validate these potential areas.

Program initiatives are currently derived from the following information sets:

- Project technical staff analyses – provide information on the priority, the timing, (including potential deployment/implementation schedule) and the technical detail associated with a potential enhancement.
- Information from outside OCRWM – gathered from workshops and other venues used to supplement information within OCRWM.
- Critical pathway analyses and disposal decision plan insertion mapping – provide an understanding of the maturity of the planned scientific or technological enhancement, and link the proposed science and technology work to key activities and events in the path to ultimate CRWMS development and operations. The OCRWM systems analysis model uses results from the Total System Performance Assessment (TSPA). TSPA is an integrated total system performance assessment of Yucca Mountain repository long-term performance after closure and will be used in supporting identification of potential science and technology initiatives. Sensitivity and uncertainty analysis tools within the TSPA framework provide technical insights of the potential enhancement that the targeted thrusts may have on the long-term performance of Yucca Mountain repository.
- OCRWM Cost Reduction Process – initiatives identified by an integrated team annually evaluating improvements in cost and schedule, reductions in radiological dose to workers and releases to the environment. The members of the team are from the Offices of Repository Development, Systems Analysis and Strategy Development, OST&I, National Transportation, and Program Management and Integration.

These information sets provide insight as to the size (costs and pervasiveness) and complexity of the technical issues facing OCRWM. They also identify when the enhancement could be implemented, and the impact of implementing it.

Technical Response Development

A proposed approach to a science or technology optimization initiative is called a *technical response*. Technical responses are developed through dialogue among the OCRWM projects technical staffs, Targeted Thrust Teams, and the science and technology developers. OST&I works closely with projects technical staffs and Targeted Thrust Teams to identify and document specific science and technology initiatives. OST&I staff members and Targeted Thrust Teams serve as liaisons with the OCRWM projects technical staffs working on optimization projects. OCRWM projects also designate an individual Project Liaison for each Targeted Thrust Team to collaborate with the Team in identifying the specific science and technology initiatives that may support system optimization.

The Targeted Thrust Teams prepare a technical response document for each proposed project. These are in the format of a proposed statement or scope of work that includes a description of specific tasks and associated budget and schedule. Annual and longer-term milestones and performance measures, including decision points (“off ramps”) are identified for each of the projects. Information from the technical responses is then summarized in a multi-year planning template for each of the Targeted Thrust Teams. These documents are then provided to OST&I for review and prioritization.

A similar process is used for each of the Advanced Technologies proposed projects.

The preparation of the technical response includes the integration of the specific science and technology investment with the corresponding OCRWM project, an essential ingredient for successful implementation. It is through this process of integration that joint planning is done to ensure budgets are adequate to support the development efforts, schedules line up with technology insertion points, and the OCRWM projects have plans for the financial resources and technical support to enable ultimate implementation and deployment of enhancements.

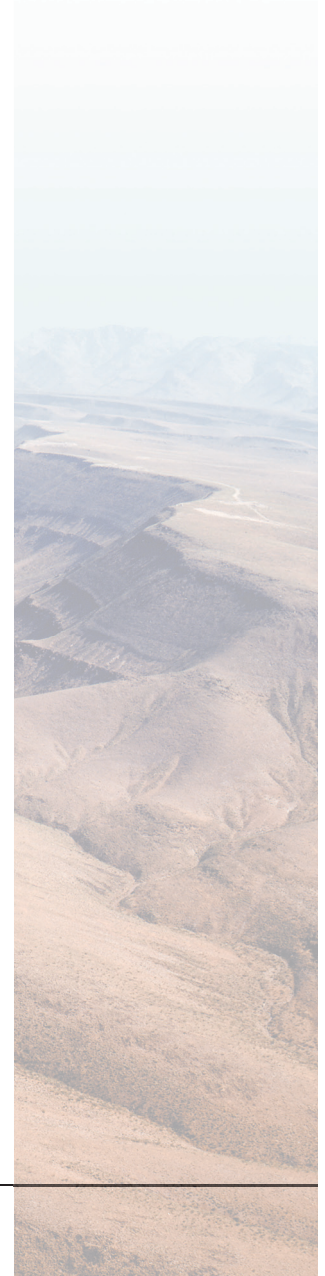
Finally, ongoing science and technology investments are evaluated at key decision points, to determine if an effort should be continued or if an alternate strategy should be adopted. OCRWM projects technical staffs are involved in these project evaluations to ensure continued commitment to implementation.

Formulation – *Prioritizing the Program to Maximize Returns*

The complexity and duration of the OCRWM mission, combined with budget constraints and regulatory changes, require the Science and Technology Program to carefully prioritize and sequence its projects. These same factors drive a continuous effort within OCRWM to rank and prioritize science and technology investments. The prioritization process is iterative and integrative, beginning at the specific project level within the Targeted Thrust and progressing to higher levels and greater breadth with each step. Prioritization factors include: 1) CRWMS cost/schedule reduction potential, 2) enhancement of repository understanding, 3) technology maturity, 4) project relevancy, 5) project schedule insertion, and 6) project cost.

The prioritization efforts are used to assist in decision-making and are the basis for out-year budget requests. OST&I prepares a final prioritized list of proposed projects received from the Targeted Thrust Teams and Advanced Technologies. This listing is then forwarded to the Office of Strategy and Program Development (OSPD) Deputy Director and OCRWM Director for final approval. This priority list is the basis for the Congressional budget request for OCRWM’s Science and Technology investment portfolio.

OST&I will prepare the Science and Technology Program budget based on guidance issued from the OCRWM Director. Guidance includes funding targets and requirements for each office and program. OST&I then issues guidance to the Targeted Thrust Teams including funding targets, strategy and performance goals, and format requirements. Targeted Thrust Teams are kept informed of budget status and may be called upon to support responses to questions from the OCRWM Director, the Department, OMB, or Congress.



Program Execution and Implementation - *Making it Work*

The final steps in the program development process are to make the planned investments in science and technology and then to ensure that the results are used. Performance measures are developed for the overall Science and Technology Program as well as for the Targeted Thrusts and Advanced Technologies based on guidance provided by the OCRWM Director.

Program Execution

Each fiscal year, Congress provides OCRWM with funding for the Science and Technology Program. These funds are allocated according to the integrated priority list. As a result, a set of work activities is authorized.

In general, a significant fraction of the investment portfolio is applied to the continuation of existing work scope, because many science and technology activities are multi-year efforts. However, when new work scope is to be initiated, as a general management approach, the work is announced and competed. This competition ensures that the best talent is brought to bear on OCRWM's science and technology initiatives. The requests for proposals are conducted through either targeted or broad solicitations depending on work scope. That is, new science efforts are generally broadly announced to the larger, technical community, while near term technology demonstration opportunities, requiring a more rapid response, may be targeted toward a narrower audience.

Program Implementation

Implementation of scientific and technical enhancements is the driving force behind OCRWM's science and technology investments. To meet the goals set forth in the OCRWM Strategic Plan for 2003 – 2013, the investment portfolio must continue activities to optimize the national disposal system. Currently, there are several dozen science and technology activities within the Science and Technology Program that are focused on improving repository cost, schedule, and technical understanding of performance leading to cost savings and schedule acceleration.

In general, the Targeted Thrust Teams will use national laboratories, other federal agencies, commercial entities, and universities in performing the funded applied research. These applied research projects will provide data, new or enhanced models, or analysis algorithms that OCRWM projects can adopt directly through incorporation into the TSPA.

Implementation for advanced technologies will primarily take place through contracts with technology developers to perform the technology work. Projects are competed within the private sector, universities, or, in those instances where unique facilities are required, among the laboratories or other federal agencies. Generally, multiple contract awards are made for a phased performance period. Initial awards will be to develop proof of principle, followed by a feasibility phase, and a third stage for actual demonstration. Depending on the confidence in successive development activities, the cost and the schedule, further down-selections may be made at each successive phase. In certain instances where an organization has unique capabilities, the work may be a sole source award. Each contract has specific deliverables and off ramps at critical points to determine whether there is significant improvement over the baseline technical approach.

Even if technology developers and OST&I/OCRWM projects work closely together to develop new technology, there is no guarantee that the technology will win in a competitive procurement. The technology must stand on its own merits, be cost effective, and offer significant and desired advantages over other approaches without introducing unacceptable technical and managerial risk.

Review and Evaluation -

Ensuring a Quality and Focused Program

Internal and external review by peers is generally recognized in the science and technology community as important to sound decision making. Reviews by independent peers are widely used to evaluate research proposals and to assess the productivity and progress of ongoing work. In addition, reviews present an opportunity to enable the OCRWM projects technical staffs to ensure that the technologies being supported can be implemented. Reviews create the foundation for program and project evaluation. The purposes of OST&I reviews are to secure knowledgeable counsel on the attributes of an ongoing or proposed activity and to document both the review and the actions taken in response to the review. OST&I reviews are conducted at three distinct levels: 1) high-level reviews, 2) programmatic reviews, and 3) project selection reviews.

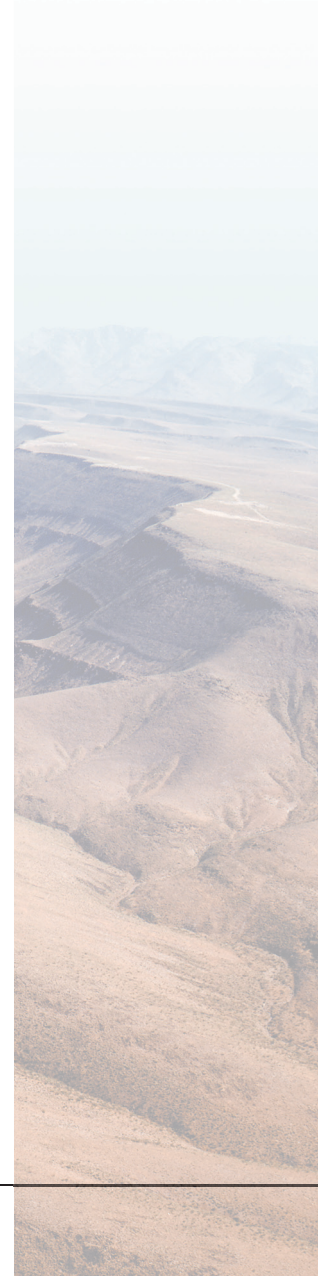
While the exact goals and methods of different levels of review vary, certain attributes are consistently important in all reviews:

- importance of the activity being addressed and the approach's cost vs. benefit and performance compared to baseline
- the technical merit of the proposed enhancement (i.e., whether it is excellent science or technology)
- provision of an enhancement that represents significant improvement over baseline
- opportunity for dramatic improvement in performance
- readiness of a technology to advance to a later development stage
- avoidance of redundancy
- feasibility and likelihood of technical and economic success
- performance record of the proposing or implementing institution and investigators.

Reviewers are briefed in advance regarding the purpose and criteria against which projects are to be evaluated and in compliance with the OCRWM QARD, as applicable. In addition to these attributes, reviewers are expected and encouraged to address additional issues deemed pertinent to the overall program.

Reviews are founded upon principles of scientific ethics and conform to a set of basic guidelines:

1. Reviewers should have recognized expertise in the subject matter and experience in the area being reviewed.
2. Reviewers must be free from any direct interest in the outcome resulting from decisions that draw upon their advice or comments. In addition, integrity on the part of the reviewers is demanded to ensure that they not improperly use information contained in confidential or privileged documents.
3. Individual members of review teams and specific review comments are matters of record and are generally to be made available, but the identity of reviewers making particular comments is strictly confidential.
4. Review comments and recommendations are formally directed to the next higher level of authority than the one being reviewed. For example, reviews of specific projects are reported to Targeted Thrust Team management whereas reviews of the Targeted Thrust Teams themselves are reported to the OST&I Director.
5. Reviewers do not have authority for making decisions and are not responsible for actions based on their reviews. Such authority and responsibility belong to the appropriate Federal Program Manager and OST&I management.



OST&I requires all reviews culminate in written documentation. Program and line managers consider information acquired from reviews in selecting or continuing projects for funding, in developing new areas of investigation, and in evaluating programmatic progress. Such information is also used to document the progress and productivity of OST&I programs in reports to DOE senior management, Congress, and the public.

High-level reviews

Annual high-level reviews address issues of broad program importance and help guide the Science and Technology Program in addressing areas of greatest significance to OCRWM and DOE. OST&I will also participate in the annual OCRWM Cost Reduction Initiative Review that also includes M&O contractor participation.

Programmatic reviews

Targeted Thrusts and Advanced Technologies carry out periodic programmatic reviews to evaluate technical and administrative management aspects of projects. Programmatic reviews are conducted and play an important role in the annual budget cycle. Reviews combine the attributes of independent technical evaluation, programmatic status reviews, and forward-looking vision. Each Targeted Thrusts and Advanced Technologies project conducts reviews according to consistent general guidelines adapted to its goals and methods.

Project selection reviews

Targeted Thrusts, Advanced Technologies, and OST&I managers use project selection reviews to assist in determining which projects to support. Although project selection reviews are similar for proposed projects at all maturity stages, reviews for applied research differ slightly from reviews for technology development and demonstration. Funded projects with a period of performance in excess of three years will require a specific project review at the end of the third year of performance. This will entail an updated proposal for review prior to continuation of the work beyond a three-year period.

Quality, Safety and Health, and Environmental Compliance

All work performed with Science and Technology Program funding complies with applicable quality assurance, safety and health, and environmental compliance DOE Orders and other appropriate requirements. Individuals involved with the development of technologies for the Science and Technology Program will ensure:

- Technology development work is performed in a manner that is safe for the workers and the public, and protects the environment, and
- The technologies resulting from Science and Technology Program funding are demonstrated and implemented in a safe and environmentally acceptable manner.

All organizations performing Science and Technology Program work requiring a quality assurance program will develop and maintain one in accordance with OCRWM requirements. Appropriate and applicable quality assurance, safety and health, and environmental compliance requirements should be incorporated by reference into contracts and subcontracts.

Communication

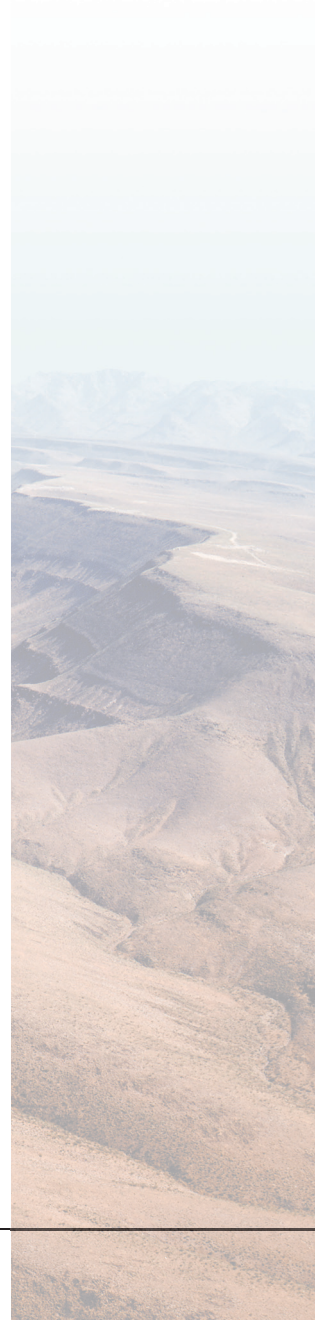
OST&I manages a Science and Technology Program that incorporates efforts at multiple locations. OST&I also functions within a Congressional budgetary setting where clear, accurate and credible communications are vital to a program's success.

The annually updated OST&I Headquarters Communication Plan defines OST&I's Communication Program. The Communication Plan articulates Headquarters' annual strategy, themes and messages, implementation approach, schedule, and audience-specific detail.

OST&I communicates its plans and accomplishments to foster cooperation and collaboration between and among its key constituencies— OCRWM projects, Targeted Thrust Teams, regulators, Congress, other government agencies, Headquarters and field management, vendors, and stakeholders. Proactive and innovative communications ensure an understanding of the Science and Technology Program initiatives, and ultimately the cost-effective achievement of OCRWM's mission. OST&I has a communication strategy that:

- Establishes an effective information network
- Fosters effective communications
- Encourages collaborative efforts
- Provides the right information in the right format at the right time to the right audience.

Implementing this strategy is the responsibility of a communications working group. This working group ensures that the products are focused on key audiences and addresses their needs, and also ensures consistency between and among information products. The OST&I Headquarters Communication Plan details these communication strategies, as well as OST&I themes used in its communication products, responsibilities for communication products, and an implementation approach and schedule. While this Communication Plan is designed for OST&I Headquarters and many of the documents are produced by OST&I Headquarters, it is the responsibility of the Targeted Thrust Teams to provide the necessary information.



Appendix 1 – Science And Technology Program Major Annual Activities And Roles

ACTIVITY	PERFORMERS				1ST QUARTER FY			2ND QUARTER FY			3RD QUARTER FY			4TH QUARTER FY		
	OCRWM	OST&I	TT/AT	PART	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Planning Activities (Budget Year + 1)																
Identify new S&T Initiatives	□	√	□	□												
Selection/Prioritization of new S&T Initiatives	□	√	□													
Prepare Technical Responses			√	□												
Update Multi-Year Program Plans (MYPP)			√													
Submit MYPP			√													
Corporate Review Budget (CRB) Call	√															
Submit Draft CRB		√	□													
Final CRB	√	□														
Receive Secretary's (S-1) Budget Decision	√															
Submit Office of Management and Budget (OMB) Budget	√															
Formulation Activities (Budget Year)																
Receive OMB Passback	√															
Prepare Congressional Request	√	□														
Submit Congressional Budget Request	√															
Congressional Hearings and Appropriations	√	□														
Congressional Appropriation	√															
Draft Annual Performance Plan (APP)			√	□												
Review Draft APP		√														
Submit Final APP			√													
Execution Activities (Current Year)																
Selection of new S&T Initiative program performers			√													
Fulfill commitments made in APP		√	√	√												
Manage and coordinate work		√	√	√												
Provide communication products		√	□	□												
Evaluation Activities (Current Year)																
Business reviews		√	□													
Programmatic reviews (peer reviews) as required			√	□												
S&T Panel review		√														

OCRWM = Office of Civilian Radioactive Waste Management
OST&I = Office of Science and Technology and International
TT/AT = Thrust Teams/Advanced Technologies
PART = Program Participants
√ = Lead/Major Role
□ = Supporting Role



Contacts

This publication was produced by the U.S. Department of Energy Office of Civilian Radioactive Waste Management (OCRWM)

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