

# APPENDICES

## *Appendices*

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## ***A. Abbreviations and Acronyms***

ADAS	Associate Deputy Assistant Secretary
AFP	Approved Funding Program
AL	Albuquerque Operations Office (Albuquerque, NM)
APP	Annual Performance Plan
ASME	American Society of Mechanical Engineers
ASTD	Accelerated Site Technology Deployment
AVS	Automated Visualization System
B&R	Budget and Reporting
BNL	Brookhaven National Laboratory
BPI	Business Process Improvement
BPR	Business Process Redesign (also Business Process Reengineering)
CCB	Change Control Board
CCP	Critical Closure Path
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFO	Chief Financial Officer
CH	Chicago Operations Office (Chicago, IL)
CIO	Chief Information Officer
CMST	Characterization, Monitoring, and Sensor Technology
COE	Center of Excellence
COR	Contracting Officer's Representative
COTR	Contracting Officer's Technical Representative
CP	Crosscutting Program
CPA	Critical Path Analysis
CRADA	Cooperative R&D Agreement
CRB	Corporate Review Budget
CRE	Center for Risk Excellence
D&D	Deactivation and Decommissioning
DAS	Deputy Assistant Secretary
DDFA	Deactivation and Decommissioning Focus Area
DEAR	Department of Energy Acquisition Regulation
DFS	Deployment Fact Sheet
DM	Disposition Map
DNAPL	Dense Non-Aqueous Phase Liquid
DNFSB	Defense Nuclear Facilities Safety Board
DOD	Department of Defense
DOE	Department of Energy
DP	Defense Programs
EIS	Environmental Impact Statement
EM	Environmental Management (also Office of Environmental Management)
EM-50	Office of Science and Technology
EM-52	Office of Science and Risk Policy

EM-53	Office of Technology Systems
EM-54	Office of Technology Integration
EMAB	Environmental Management Advisory Board
EMI	EM Integration
EMSP	Environmental Management Science Program
EPA	Environmental Protection Agency
ER	Environmental Restoration
ESAAB	Energy Systems Acquisition Advisory Board
ESP	Efficient Separations Program
ETP	Environmental Technology Partnership
FA	Focus Area
FACA	Federal Advisory Committee Act
FAR	Federal Acquisition Regulations
FETC	Federal Energy Technology Center
FIS	Financial Information System
FO	Field Office
FPDR	Financial Plan Data Report
FRAM	Functions, Responsibilities, and Authorities Manual
FY	Fiscal Year
GAO	General Accounting Office
GPRA	Government Performance and Results Act
HQ	Headquarters
HLW	High-Level Waste
ICT	Integrating Contractor Team (also Integration Core Team)
ID	Idaho Operations Office (Idaho Falls, ID)
IEC	Integration Executive Committee
IG	Inspector General
INEEL	Idaho National Engineering and Environmental Laboratory
IPABS	Integrated Planning, Accountability, and Budgeting System
IPABS-IS	IPABS-Information System
IPL	Integrated Priority List
IRB	Internal Review Budget
ISM	Integrated Safety Management
ITSR	Innovative Technology Summary Report
JPODPM	Joint Program Office Direction on Project Management
LCAM	Life-Cycle Asset Management
LLW	Low-Level Waste
LSDP	Large-Scale Demonstration Project
LSDDP	Large-Scale Demonstration and Deployment Project
M&I	Management and Integration
M&O	Management and Operations
MAP	Management Action Process
MD	Material Disposition
MLLW	Mixed Low-Level Waste
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding

MWFA	Mixed Waste Focus Area
MYPP	Multi-Year Program Plan
NAPL	Non-Aqueous Phase Liquid
NAS	National Academy of Sciences
NDAA	National Defense Authorization Act
NE	Nuclear Energy
NEPA	National Environmental Policy Act
NM	Nuclear Material
NMS	Needs Management System
NN	Nonproliferation and National Security
NOPI	Notice of Program Interest
NRC	National Research Council
NTIS	National Technical Information Service
NTS	Nevada Test Site
NV	Nevada Operations Office (Las Vegas, NV)
OCRWM	Office of Civilian Radioactive Waste Management
OCTR	Office of Computational and Technology Research
OD	Office Director
OMB	Office of Management and Budget
OR	Oak Ridge Operations Office (Oak Ridge, TN)
ORNL	Oak Ridge National Laboratory
OSRP	Office of Science and Risk Policy (EM-52)
OST	Office of Science and Technology (EM-50)
OSTI	Office of Science and Technology Information
OTI	Office of Technology Integration (EM-54)
OTS	Office of Technology Systems (EM-53)
PAIT	Program Area Integration Team
PBS	Project Baseline Summary
PEG	Program Execution Guidance
PFA	Plutonium Focus Area
PI	Principal Investigator
PL	Product Line
PM	Program (also Project) Manager
PMP	Program (also Project) Management Plan
PON	Program Opportunity Notice
PRDA	Program R&D Announcement
PTS	Progress Tracking System
QMR	Quarterly Management Review
R&D	Research and Development
RBX	Robotics
RCRA	Resource Conservation and Recovery Act
REFTS	Rocky Flats Environmental Technology Site
REP	Recommendation Evaluation Plan
RFA	Request for Application
RFI	Request for Information
RFP	Request for Proposal

RFQ	Request for Quote
RI/FS	Remedial Investigation/Feasibility Study
RL	Richland Operations Office (Richland, WA)
ROA	Research Opportunity Announcement
ROD	Record of Decision
ROI	Return on Investment
RW	(Office of Civilian) Radioactive Waste (Management)
S&M	Surveillance and Monitoring
S&T	Science and Technology
SCFA	Subsurface Contaminants Focus Area
SERDP	Strategic Environmental Research and Development Program
SLC	Strategic Laboratory Council
SME	Subject Matter Expert
SNFFA	Spent Nuclear Fuel Focus Area
SNM	Special Nuclear Material
SOP	Standard Operating Procedure
SR	Savannah River Operations Office (Aiken, SC)
SRS	Savannah River Site
STCG	Site Technology Coordination Group
TAC	Technology Acceleration Committee
TAS	Technology Acceptance and Support
TBD	To Be Determined
TCR	Task Change Request
TD	Technology Development
TFA	Tanks Focus Area
TMS	Technology Management System
TPO	Technical Program Officer
TRU	Transuranic
TSS	Technology Summary Sheet
TTP	Technical Task Plan
URL	Universal Resource Locator
USACE	U. S. Army Corps of Engineers
USC	User Steering Committee
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure
WIP	Work In Progress (also Process)
WIPP	Waste Isolation Pilot Plant
WM	Waste Management
WP	Work Package
WWW	World Wide Web

## **B. Improvement Areas**

Within EM's changing environment, OST is using new management techniques and reviewing its processes to keep pace with changes in and anticipate, when possible, EM's direction and technological breakthroughs. OST recently conducted an in-depth review of management practices and processes. It is also pursuing process improvements to take advantage of initiatives proposed from within OST and the Field, as well as identified as "corporate best practices" within the government and industry. OST initially identified four key areas for improvement:

- Program Focus
- Roles and Responsibilities
- Information Management
- Project Tracking and Funds Control.

While emphasizing these key improvement areas, OST will continue to review best practices to ensure that management processes meet the EM Program's mission, vision, and goals. OST will also continue to ensure periodic internal and external program evaluations using performance measures directly associated with major EM objectives. OST welcomes and will rapidly respond to any recommendations included in reviews performed by external organizations, such as the General Accounting Office (GAO) and the National Academy of Sciences (NAS)/National Research Council (NRC).

As part of OST's continuous improvement efforts, OST improvement area champions and their teams are working in the four improvement areas. Representative improvement initiatives identified during the course of ongoing business process redesign (BPR) and business process improvement (BPI) initiatives begun in 1998 are also included for each of the four areas.

### **Program Focus**

Strengthen the alignment and integration of S&T projects with EM end-user programs by increasing the effectiveness of OST's program planning and budget formulation activities:

- Identify and implement more effective methods to link S&T program planning activities with end users and their specific needs
- Implement a consistent, clearly defined, and independent process for reviewing and selecting S&T projects to strengthen credibility and improve effectiveness
- Continue to improve the Work Package prioritization methodology and criteria to establish a stronger and more effective national prioritization system.

## Roles and Responsibilities

Update and/or clarify the roles and responsibilities of OST functional elements and partners relative to the EM Program's newly articulated mission and vision:

- Define the recently expanded role of Focus Areas in providing technical assistance, and implement the necessary changes to satisfy stated objectives and customer expectations
- Clarify the role of the Crosscutting Programs in supporting Focus Areas in the increasingly Focus Area-centered environment
- Clarify the multi-organizational relationships, roles, and responsibilities of those organizational units involved in key OST-related initiatives and activities
- Clarify the roles and responsibilities of individuals within the OST organizational network, including Headquarters Office Directors, Headquarters Program Managers, Field Leads, and Product Line Managers.

## Information Management

Improve internal and external OST communication, and streamline information management while ensuring consistency and integration with EM-wide initiatives:

- Streamline the OST Headquarters data requirements and collection cycle
- Integrate OST information management processes and tools into the EM-level Integrated Planning, Accountability, and Budgeting System-Information System (IPABS-IS)
- Develop an OST *Communication Plan* that facilitates an integrated, consistent, and efficient approach to providing S&T information to a variety of audiences, including Congress, EM decision-makers, end users, regulators.

## Program Execution (Project Tracking and Funds Control)

Redesign OST's funds control and project tracking activities and tools to improve effectiveness and efficiency, and to ensure funding continuity during program execution:

- Streamline OST project baseline tools (e.g., Technical Test Plans [TTPs]) and reporting process
- Establish and implement effective performance measures at appropriate OST operating levels
- Implement improved processes for verifying and validating technology implementation data.

## C. Organization

### C.1. Introduction

OST accomplishes its mission through an array of organizational partners. Within the DOE complex, these include EM Headquarters, OST Headquarters and Field staff, DOE Field Offices, site contractors, and National Laboratories. Outside the complex, OST interacts with private industry, academia, other Federal agencies, international agencies and organizations, and other sectors of the science and technology (S&T) community to solve EM problems. This extensive network allows OST to leverage resources and mobilize participation to provide fully integrated, technically defensible solutions for cleanup and environmental stewardship at DOE sites.

OST works with EM Headquarters offices in corporate-level planning, policy coordination, budget development, and program advocacy. Through the Focus Area-centered approach, shown in Figure C.1, OST manages national EM S&T programs, including the EM Science Program (EMSP), the Technology Development Program, the Technology Integration Program, and the Risk Program.

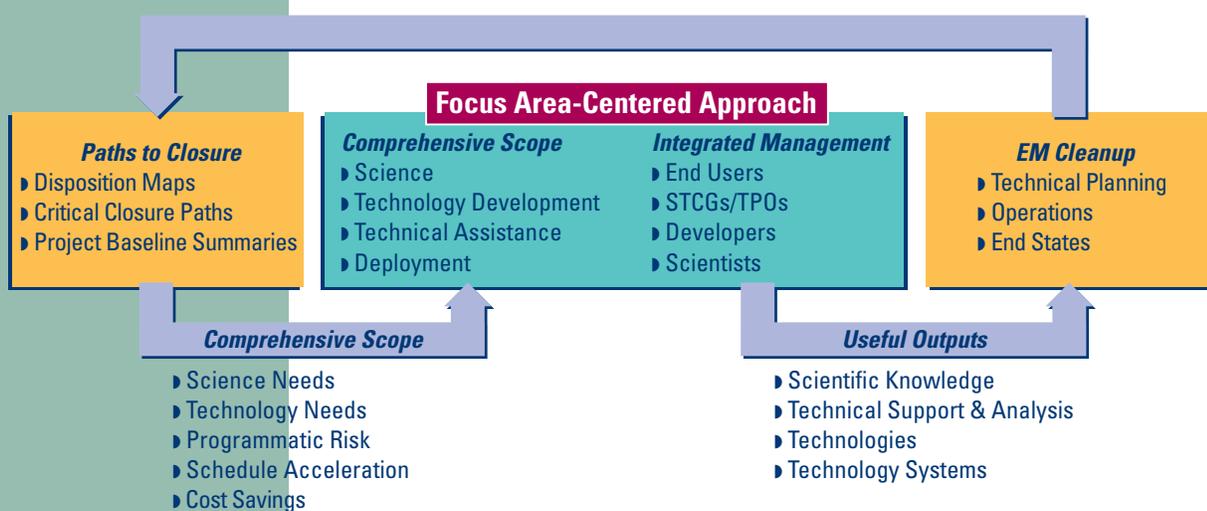


Figure C.1 - OST uses a Focus Area-centered approach to manage its S&T program.

DOE Field Offices coordinate and implement site-specific EM S&T program activities based on OST's guidance. In executing and evaluating its programs, OST interacts with independent oversight groups and review committees, as well as with other sectors of the S&T community such as National Laboratories, private industry, universities, and other government agencies. These organizations, and their roles in OST's coordinated effort to provide technology solutions to EM end users, are described in the remaining sections.

## ***C.2. Headquarters Office of Environmental Management***

The Assistant Secretary for EM directs seven Deputy Assistant Secretary (DAS) Offices at EM Headquarters to develop the national strategy; issue programmatic policies and guidance; ensure that management, safety, and process improvement systems are in place; establish and monitor performance metrics; communicate lessons learned; and serve as an informed advocate with DOE management, national stakeholders, and Congress.

### **Offices of Environmental Management**

- EM-1** - The **Office of the Assistant Secretary for EM** provides centralized direction for waste management operations, environmental restoration, nuclear materials and facility stabilization, site operations and related research, and development programs and activities within DOE.
- EM-10** - The **Office of Management and Evaluation** serves as the Assistant Secretary's principal advisor on all administrative functions and activities for EM line offices.
- EM-20** - The **Office of Planning, Policy, and Budget** analyzes and provides support on policy and planning issues associated with environmental compliance and cleanup activities, waste management, nuclear materials and facilities stabilization, overall budget and priority setting analyses, nuclear nonproliferation policy practices, and the ultimate disposition of surplus materials and facilities.
- EM-30** - The **Office of Waste Management** minimizes, treats, stores, and disposes of DOE waste to protect people and the environment from waste-related hazards.
- EM-40** - The **Office of Environmental Restoration** remediates sites and facilities to protect against risks posed by inactive and surplus DOE facilities, and restores contaminated areas for future beneficial use.
- EM-50** - The **Office of Science and Technology** provides complete life-cycle S&T resources and capabilities to deliver fully integrated, technically defensible solutions for cleanup and environmental stewardship of DOE sites.
- EM-60** - The **Office of Nuclear Material and Facility Stabilization** program's mission is to protect people and the environment from the hazards of nuclear materials and to cost-effectively deactivate surplus facilities.
- EM-70** - The **Office of Site Operations** acts as a focal point and champion for the Operations Offices and Field sites, and serves as a facilitator, coordinator, and ombudsman for crosscutting EM issues and topics.

OST primarily interacts with EM-30, EM-40, and EM-60. These offices represent end-user programs for which OST provides S&T solutions. The EM end-user programs actively participate in OST activities to ensure that S&T Program objectives are aligned with end-user needs. In addition, OST works closely with EM-20 for budgeting and execution activities.

### ***C.3. Headquarters Office of Science and Technology (EM-50)***

OST Headquarters comprises three offices, as shown in Figure C.2, to centrally manage its national programs. OST covers the full range of S&T resources and capabilities, from basic and applied research, to advanced development, implementation, support for deployment, and acceptance of innovative technologies.



Figure C.2 - OST Offices.

Central to OST's program management structure are the Focus Areas that manage the development and delivery of technology solutions to EM end users, as shown in Figure C.3. Focus Areas are dedicated to each of EM's major remediation and waste management problem areas. The Focus Area management structure is integral to the entire OST Program in that for each problem area, the complete set of S&T activities, from applied science through solution deployment, is managed as an integrated investment. Focus Areas coordinate with all three OST Headquarters offices to identify, expedite, and deliver solutions to end users.

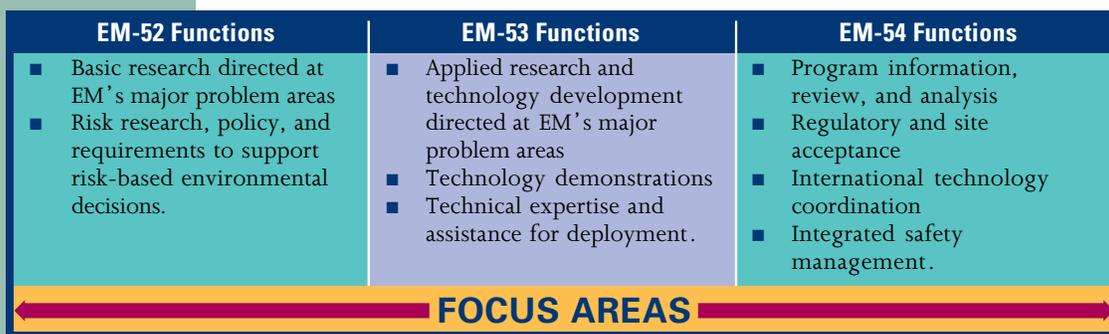


Figure C.3 - Program Relationships to Focus Areas.

OST Headquarters establishes national policies and strategies for S&T programs. As depicted above, all three OST Headquarters offices work with and are "customers" of each Focus Area. This ensures that plans for implementing

S&T programs are communicated, coordinated, integrated, and consistent with DOE and EM programs, policies, and national priorities. OST Headquarters also shapes policy and strategy, formulates a national program budget, and measures Field performance. The following sections describe EM's S&T programs as related to the OST Headquarters functions.

### ***C.3.1. Office of Science and Risk Policy (EM-52)***

The Office of Science and Risk Policy manages the EMSP and policy formulation for the National Risk Policy Program.

#### **EM Science Program**

The EMSP develops a targeted, long-term basic research portfolio for environmental programs that will result in transformational or breakthrough approaches for solving EM problems. It also seeks to bridge the gap between fundamental research and needs-driven applied technologies through communication of science results and coordination with Focus Areas and end users.

Management of the EMSP is accomplished through a partnership between two key departmental organizations: EM-52 and the DOE Office of Science. EM-52 has the lead for soliciting research needs, ensuring that research projects selected can be applied to EM's cleanup problems, and ensuring that research results are communicated to EM and site contractor personnel with cleanup responsibility. EM-52 also has EMSP fiscal responsibility. The Office of Science manages the solicitation of research applications, the scientific review process, and the technical management of the research program. In addition, the DOE Idaho Operations Office helps the EMSP conduct needs analyses and financial management and procurement, and interfaces with other DOE Field Offices.

EMSP research is explicitly focused on EM cleanup problems. EMSP research needs are categorized into seven EM problem areas that are aligned with high-level waste, spent nuclear fuel, mixed waste, plutonium and nuclear materials, remedial action, decontamination and decommissioning, and health/ecology/risk. As with Focus Areas, the EMSP relies heavily on end users and problem holders at the sites to identify needs and select relevant research projects.

#### **National Risk Policy Program**

The National Risk Policy Program develops and implements national policies, practices, guidance, tools, support, and training for credible, risk-based environmental decisions that protect human health and the environment while ensuring stakeholder participation.

The National Risk Policy Program for EM is managed by EM-52 in partnership with the Center for Risk Excellence (CRE), operated by the DOE Chicago Operations Office. In this partnership, EM-52 takes the lead in developing and establishing policy, interacting with national stakeholders, and representing the Risk Program to Congress. The CRE provides site-oriented technical

support in risk activities; develops the framework for collecting risk information; engages EM Field Offices, other Federal agencies, and professional societies in risk activities; and provides input to EM-52 for risk policy decisions.

### ***C.3.2. Office of Technology Systems (EM-53)***

The Office of Technology Systems is responsible for applied research and technology development programs within Focus Areas that develop, test, demonstrate, and provide technical assistance to deploy solutions for EM's major environmental problems. These programs produce innovative technologies and technology systems to meet national needs for regulatory compliance, lower life-cycle costs, and reduce risks to the environment. OST's technology development programs are leveraged and integrated through Focus Areas.

#### **Focus Area Programs**

OST supports five Focus Areas targeted at major EM problem areas. Figure C.4 describes the current Focus Areas, the cognizant DOE Field Office, and the technical expertise provided by the program. In the future, additional areas may be added, or current areas eliminated or further partitioned, to ensure that research and technology development remain focused on EM's most pressing needs.

<b>Focus Area</b>	<b>Location</b>	<b>Expertise</b>
Mixed Waste FA	ID	Characterization, treatment, and disposal of mixed, low-level, and transuranic waste
Tanks FA	RL	Radioactive tank waste remediation
Subsurface Contaminants FA	SR	Containment and/or remediation of subsurface contaminants
Deactivation and Decommissioning FA	FETC	Deactivation and decommissioning of aging, contaminated buildings
Plutonium and Nuclear Materials FA	ID	Remediation, stabilization, and disposition of plutonium and nuclear materials

Figure C.4 - Focus Areas.

#### **Crosscutting Programs**

Crosscutting Programs (CPs) support OST's overall technology development program by targeting problems common to more than one Focus Area. CPs are managed by designated OST Field staff members who work closely with, and as part of, all Focus Areas to respond to identified needs. Current CPs, DOE Field Office locations, and technical expertise provided by the program are summarized in Figure C.5.

Crosscutting Program	Location	Expertise
Characterization, Monitoring, and Sensor Technologies CP	NV	Characterization technologies for site characterization, waste assay, and monitoring
Efficient Separations and Processing CP	OR	Separations and treatment technologies that minimize risk and offer reductions in the volume of high- and low-level waste and secondary waste volumes
Robotics Technology Development CP	AL	Robotics systems that reduce worker exposure while providing proven, cost-effective, and, in some cases, the only acceptable approach to problems
Industry Programs	FETC	Provision to Focus Areas and CPs of the ability to include private industry and others in their programs through direct DOE procurements
University Programs	FETC	Provision to Focus Areas and CPs of the ability to include universities in their programs.

Figure C.5 - Crosscutting Programs.

CPs work closely with Focus Areas to avoid duplication across the Focus Areas and to integrate crosscutting technology development projects with high-priority technology needs defined by end users. Planning and budget formulation activities are integral to the Focus Area budget process.

### ***C.3.3. Office of Technology Integration (EM-54)***

The Office of Technology Integration is responsible for programs and activities that facilitate acceptance and deployment of innovative technologies and information management within EM. These activities are consolidated under the Technology Acceptance Support (TAS) Program. EM-54 provides uniform guidance, tools, and initiatives to support EM and OST Headquarters, Focus Areas, and Field Offices in:

**Program information** - Systems to collect, access, and communicate information on technology development, deployment, and performance

**Review and analysis** - Standardized methodologies for technology cost savings and impacts, and facilitate external, independent reviews of OST programs and technologies

**Regulatory and site acceptance** - Facilitate state regulatory cooperation to encourage and promote acceptance of innovative technologies

**International technology coordination** - Identify and evaluate foreign technologies that meet EM cleanup needs and aid technology transfer and access to expertise

**Safety and health support and coordination** - Support for integrated safety management principles to assure worker safety.

### ***C.4. Researchers and Technology Developers***

OST obtains the very best technical knowledge and expertise available to support the varied and complex problems in EM cleanup and remediation efforts. OST identifies Principal Investigators (PIs) from the DOE National Laboratories, DOE site contractors, private industry, and universities to participate in developing and deploying technologies that solve EM cleanup problems. OST strives to maintain a balanced program and encourages collaborative working relationships among researchers. Characteristics of each are:

**National Laboratories** - OST exploits the unique capabilities, facilities, resources, and working knowledge of EM's environmental problems that reside within the National Laboratory system. In addition to the Focus Area/Lead Laboratory support discussed earlier, National Laboratories offer full scientific and engineering expertise, large-scale R&D capabilities, an understanding of the nuclear waste legacy, and a commitment to national needs. In many cases, since they can also be the problem holders, National Laboratories offer opportunities for real-world demonstrations and subsequent deployment of innovative technology solutions.

**Industry** - OST provides requisite support and mechanisms to allow industry (private sector contractors outside the DOE site contractor and National Laboratory system) to propose and deliver competitive solutions to EM problems, and to compete in the broader commercial market for environmental technologies. OST's industry programs (working within the Focus Area management structure) broaden and enhance its ability to provide innovative technology solutions to EM end users by tapping private-sector resources, knowledge, and ideas.

**Universities** - OST engages academia in executing its programs to add depth and breadth to its pool of S&T expertise. Researchers and PIs affiliated with numerous colleges and universities are active participants in developing technologies for the myriad of environmental problems facing EM. A majority of EMSP projects are carried out through grants to university researchers. In addition, university researchers may team with researchers at National Laboratories to conduct research and develop technology solutions.

### ***C.5. Review Panels, Working Groups, Steering Groups and Committees***

Internal and external peer and sponsor reviews are generally recognized in the S&T community as important adjuncts to decision-making. OST uses a number of ad hoc and standing review panels, working groups, and steering groups and committees to help develop policies and strategies, identify problem areas, establish technical program direction, evaluate a project's technical merit, and assess program and project performance.

Membership and representation in any panel, group, or committee varies depending on the nature of the charter. OST review organizations include, but are not limited to, the Office of Science, Strategic Laboratory Council (SLC), Environmental Management Advisory Board (EMAB), American Society of Mechanical Engineers (ASME), National Academy of Sciences (NAS), and U.S. Army Corps of Engineers (USACE).

### ***C.6. Other Government Agencies***

In its drive to develop and integrate the best technology solutions for EM programs, OST draws upon resources and capabilities of other government agencies, including other DOE organizations as well as other Federal, state, and international agencies.

**Federal** - OST cooperates with DOE organizations and Federal agencies (e.g., Office of Science, DoD, EPA) to gain access to expertise, facilities, information, and efforts that complement OST S&T activities and avoid duplication of effort. This cooperation allows OST to leverage financial and personnel resources, and to provide additional technical expertise to EM problems.

**State** - In cooperation with state governments, particularly through their regulatory cooperation initiatives, OST supports greater access to DOE facilities. OST can leverage the states' involvement and increase their awareness and approval as stakeholders in providing technical solutions to site problems.

**International** - International technology exchange is an important element of OST's strategy to solve EM problems. In cooperation with international partners, OST gains access to and integrates the best technology solutions the world has to offer. In addition, OST leverages its resources against the wide array of scientists and technology solution providers who are addressing similar problems in other countries.

## D. Key Management Documents and Products

(Type: P=Planning, B=Budget, EX=Execution, EV=Evaluation, I=Information)

Type	Product	Primary Objective	Prepared By	Approved By	Customers	Frequency	Data Capture Method?
P	Accelerating Cleanup: EM Paths to Closure	Describe status of EM's clean up program and direction forward to complete achievement of the 2006 vision	EM	S-1	EM, Congress, stakeholders	Annual update	Data call through IPABS
P	EM S&T Strategic Plan	Articulate mission and vision for S&T programs	EM	EM	EM, stakeholders, Congress	As required	N/A
P	EM R&D Program Plan	Establish EM's investment strategy for a 5-year period	EM	EM	EM, stakeholders, Congress	Annual update	IPABS & Focus Area input
P, B, E X, EV	EM IPABS Handbook	Provide EM-wide guidance planning, budgeting, execution, and evaluation processes with responsibilities	EM	EM-1	Used by all EM programs	Annual continuous updates	N/A
P	OST Management Plan	Provide top-level description of management process used to accomplish OST mission	EM-50	EM-50	EM-50, EM, DOE Field Offices	As required	OST Office Director (OD) direction
P	Multi-Year Program Plan (MYPP)	Establish Focus Area goals and objectives for a 5-year period	Focus Areas	Focus Area Executive Steering Committee, EM-50	EM end users, stakeholders, Focus Areas	Annual updates	IPABS & Focus Area input

(Type: P=Planning, B=Budget, EX=Execution, EV=Evaluation, I=Information)

Type	Product	Primary Objective	Prepared By	Approved By	Customers	Frequency	Data Capture Method?
P	S&T Needs and Opportunities Statement	Identify and define site S&T needs and opportunities	Site end users & STGCs	Site end users	Focus Areas, EMSP technology providers	Annual updates	IPABS-Needs Management System (NMS)
P	Technical Response to STCG Needs and Opportunities Statement	Define and communicate Focus Area strategy and metrics to address need	Focus Areas	Focus Areas with end-user input	End users	Annually	IPABS/NMS Focus Areas Information Systems
P, B, EX, EV	Annual Performance Plan (APP)	Establish set of performance indicators and key objectives to measure each program	EM-50	EM-50 ODS	OST HQ, EM, DOE, OMB, Congress	Annually	TMS
B	OST Project Baseline Summary (PBS)	Summarize cost, schedule, and scope baselines for S&T projects	EM-50	EM	DOE, OMB,	Annually	EM data call
B	Corporate Review Budget	Build a technology development budget that reflects national program priorities	OST HQ with Field input	EM	DOE, EM, OMB, Congress	Annually	Budget call
B	Work Package (WP)	Set of well-defined technical or programmatic activities focused on solving a common problem at one or more sites	Focus Areas, programs	EM-50 OD	Headquarters & HQ PMs, & end users	Annually	OST data call, NMS

(Type: P=Planning, B=Budget, EX=Execution, EV=Evaluation, I=Information)

Type	Product	Primary Objective	Prepared By	Approved By	Customers	Frequency	Data Capture Method?
EX	Technical Task Plan (TTP)	Document technical, cost, and schedule baseline and other required project information for proposal, authorization, and record purposes	PIs, TPOs	HQ PMs & Focus Area field leads	HQ PMs and TPOs	Annually	OST data call through IPABS
EX	Site Deployment Management Plan	Document the DOE site's technical and management approach to technology deployment	Field Offices	Site Managers	EM	As requested	By Field at their discretion; info posted on EM PTC Internet site
EX	Deployment Fact Sheet (DFS) Book	Communicate site-specific experience and results of a technology deployment	Field Offices, Focus Areas	Site Managers	EM, Congress	As requested	IPABS-TMS
P	Safety plan	Describe, on a case-by-case basis, how safety requirements are addressed on a project	Contractors	Field Offices	Contract personnel, EM	As specified by contract	Info copies to Focus Areas & HQs
P	Quality Assurance Program	Fulfill quality objectives Program (DOE) 0414.1	Focus Areas	Focus Areas	Focus Areas	As required	Info copies to HQ Program Managers & Field TPOs
B	Program Execution Guidance (PEG)	Provide programmatic guidance for executing and reporting on a funded activity	Focus Areas, programs	ODs	TPOs, PIs	Annually	Long form TTPs & work acceptance sheets

(Type: P=Planning, B=Budget, EX=Execution, EV=Evaluation, I=Information)

Type	Product	Primary Objective	Prepared By	Approved By	Customers	Frequency	Data Capture Method?
B	Approved Funding Program (AFP)	Authorize and allocate funds and funding limits for obligation and expenditure	EM-2-3	EM-2-3	Field & HQ PMs, CFO	Monthly	CCB process & TCR form
EX	Task Change Request (TCR)	Request changes to the AFP	HQ or Field PMs	HQ EM-5-0	Focus Areas, TPOs, PIs, EM-2-3	Monthly	TCR form
EX	Progress Tracking System (PTS) Report	Report status of project against established cost and schedule baselines	TPOs or designees	PMs, Focus Areas, or HQ	Field & HQ PMs	Monthly	PTS, IPABS
I	Innovative Technology Summary Report (ITSR)	Provide summary and user-oriented marketing information on technology demonstration results for technical and non-technical audiences	Focus Areas	ODs, EM-5	Public, users	Project end	TMS, Office of Science and Technology Information (OSTI)
I	Annual Technology Report to Congress	Provide summary of EM S&T activities to Congress	EM-5-0	EM, S-1	Congress	Annually	OSTI
EX	Notice of R&D Project	Provide R&D information to R&D Tracking System for dissemination to the National Technical Information Service (NTIS) and the public	Contractors	PM & Contracting Officer's Technical Representative (COTR)	Public, scientific community	At award of Contract	OSTI
I	Focus Area Annual Reports	Provide an overview of the year's funded activities in individual S&T Program areas	Focus Areas	Agency & OMB reviews	End users, technology providers	Annually	OSTI

(Type: P=Planning, B=Budget, EX=Execution, EV=Evaluation, I=Information)

Type	Product	Primary Objective	Prepared By	Approved By	Customers	Frequency	Data Capture Method?
I	Deployment Verification	Obtain comprehensive information on OST-supported technologies and on deployment events for DOE and non-DOE users	HQ staff supported by contractors	EM-50 ODS	EM, end users, Congress, OMB	Annually	Third-party questionnaire based process
EV	Gates Process Document	Provide guidance for applying the Gates Review process	EM-50	EM-50	HQ programs, Focus Areas Managers, end users	Utilized at mid-year review & other Gates, as needed	Focus Area input
I	EM Functions, Responsibilities and Authorities Manual (FRAM)	Provide guidance for conduct of operations	DOE	S-1	Used by all EM programs	As required	Guidance from EM-1
I	Working Charter for EM Program Integration	Outline integration opportunities to achieve program efficiencies	EM	EM-1 & Field Office Managers	Used by all EM programs	Updated as required	
I	EM Operational Expectations Owendoff Memorandum 11/2/98	Operational expectations for EM	EM-1	EM-1	Used by all EM programs	As required	Memo from EM-1
EX, I	Communications Plan and Notebook	OST communication strategy and communication products (e.g., success stories, fact sheets, and reports)	EM-54	EM-50	Congress, OMB, HQ and Field	Annually	N/A
EX	Technical Report	Document R&D results	PIs	Field PMs	HQ programs, Focus Area Managers, scientific community, OSTI	As required by contract (minimally at contract end)	OSTI

## E. Needs Determination Process

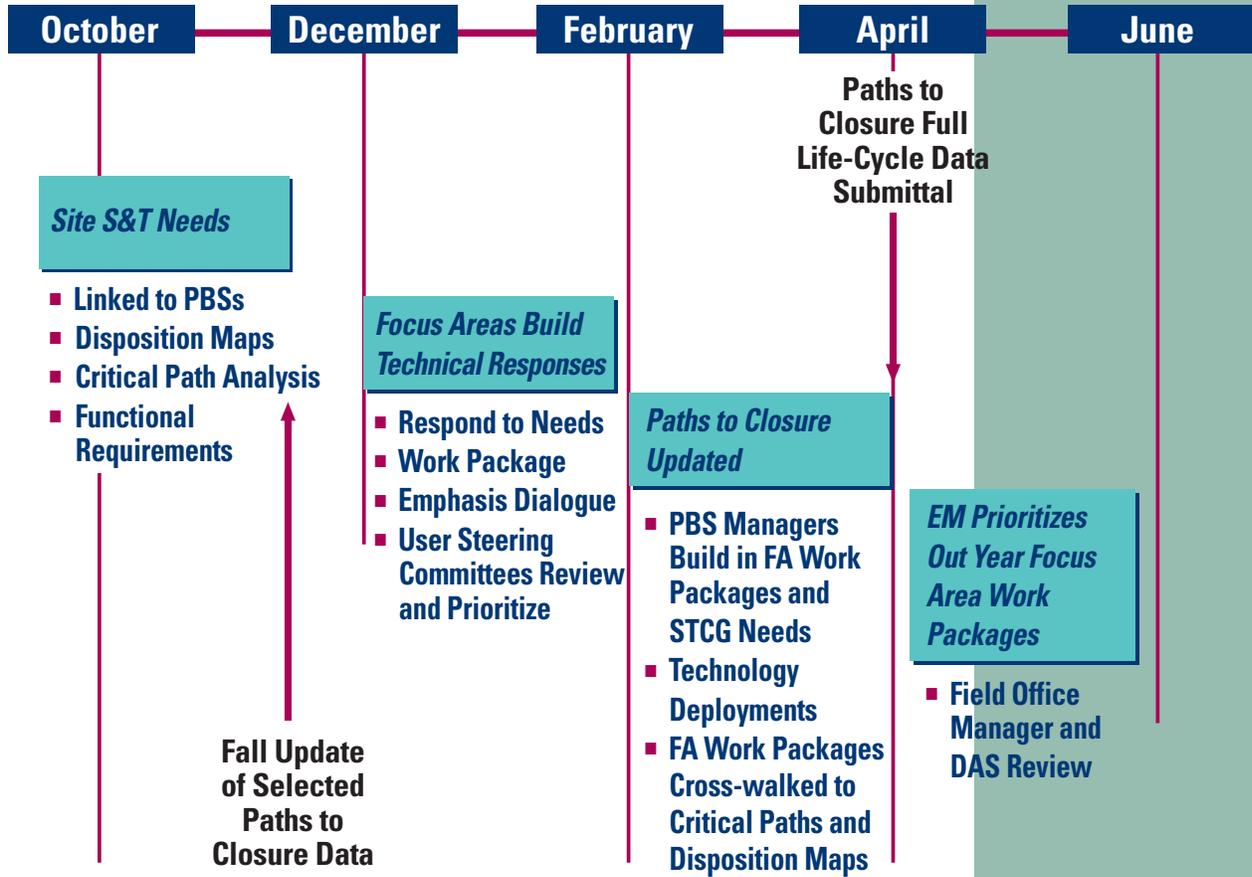


Figure E.1 - Needs Determination Process.

## F. Evaluating Technology Maturity (Gates Status) in OST

A technology maturation model (or “gates model”) charts an idealized course for technology innovation from basic research through five intermediate stages to implementation (deployment). OST began using the gates model to review and manage R&D project maturation in 1997. Criteria for six gates that enable project tracking through the maturation stages have been specified elsewhere (Interim Guidance, Office of Science and Technology Decision Process, May 8, 1997).

**OST and Focus Areas apply a technology maturity (gates) model to monitor a project’s maturation, document each project’s comprehensive management analysis, and ensure that the project meets EM schedules and critical needs.**

Under the Focus Area-centered approach, the gates model will be used rigorously and consistently as a decision support tool for managing technology development projects. Three important actions for gates implementation are:

- Technical Task Plans (TTPs) contain milestones or checkpoints for providing information related to the gate’s criteria
- Annual Mid-Year Reviews are conducted as a validation point and documentation mechanism to assess project maturity and progress
- Focus Areas maintain files of quality records and documents, including engineering data supporting each project’s gate assignment.

**Basic Science** - Fundamental scientific research for building and documenting core knowledge not tied to a specific need; includes basic laboratory experimentation, development of theories and analytical models, and proofs of principle

**Applied Research** - Directed scientific/engineering research linked to specific environmental management needs

**Exploratory Development** - Technical feasibility assessment of potential solution applications; includes laboratory-scale prototyping, analysis of user needs, estimates of life-cycle costs, and identification of functional performance requirements and operational concepts

**Advanced Development** - Proof of design; includes full-scale laboratory testing, preliminary field testing, technical specification development, and infrastructure development plans

**Engineering Development** - Detailed approach for full-scale design; includes documentation such as drawings, schematics, and computer code; construction and demonstration units; prototypes and pilot-scale systems and evaluations; reliability testing; infrastructure plans; and procurement specifications

**Demonstration** - Practical product or technology demonstration and demonstration at a DOE site or “real world” situation, using actual or simulated waste streams and/or anticipated operating conditions to verify underlying assumptions and expectations

**Implementation/Deployment** - Viable, cost effective, applicable product or technology put into service by the end user; must be available for transfer to the private sector or already commercially available for use.

Figure F.1 - Seven Stages of the Gates Model.

### Three Major Program Areas

The seven stages of the gates model are represented in three gates programs: Stages 1 and 2 (Basic Research and Applied Research) are supported through the EM Science Program. Stages 3 through 6 (Exploratory Development, Applied Development, Engineering Development, and Demonstrations) form the Focus Areas' core programs. Stage 7 (Implementation [Deployment]), is supported through the Accelerated Site Technology Development (ASTD) Program. Transitioning from one of the three gates programs to another is a major project advancement, and each transition requires submission of a new proposal for internal and external reviews of its technical and programmatic merit.

### Determination of Technology Maturity

The maturity of each technology in the Focus Areas' portfolios must be determined each year by a review panel during the Mid-Year Review. This determination should be made using an abbreviated set of gate criteria similar to those established by OST (Interim Guidance). This will ensure that each project has generated the gate deliverables established in its TTP. Each criterion's relative importance varies from gate to gate, generally increasing with higher gates. Each Focus Area maintains a central file of deliverables from each project and records maturation progress. Gates deliverables include such documents as cost-benefit analyses, commercialization plans, technical merit review results, and regulator/stakeholder analyses. Focus Areas may add requirements specific to their technical and business needs. These would be addressed by Principal Investigators (PIs) to aid in the stage/gate determination. Focus Areas may conduct project reviews, separate from the Mid-Year Review, during the normal course of project management.

The Mid-Year Review addresses the abbreviated gate deliverables related to the six major criteria governing the scope of each OST project: user commitment; technical quality; cost versus benefit; safety, health, and environmental considerations; stakeholder, regulatory, and tribal issues; and commercial viability. The following questions will be addressed:

- Has the project been reviewed for advancement through a gate during the past year? If yes, what was the result?
- Is the project scheduled for a gate status review in the next 6 months?

If the response to both questions is "yes," the result will be reported as part of the review record. If the response to both questions is "no," the following issues will also be addressed during the review:

- Has an end user committed to implementing the technology?
- Has a technical peer review been completed? Is the work highly rated?
- Has a cost benefit analysis been performed for this technology? Does it show potential savings when compared to the baseline?

- Will this technology meet or exceed current safety, health, and environmental protection levels and/or reduce the risk to the public, workers, and the environment when compared to the baseline?
- Briefly discuss any activities and/or interaction with stakeholders, regulators, and tribal organizations relative to the continued research and utilization of this technology.
- Have invention disclosure and intellectual property issues been addressed? Briefly discuss measures taken to include private industry in the technology's development and application.
- Is the current stage assignment for this project the proper one? If not, what is the proper stage?

### Follow-up Actions

Corrective actions taken by Focus Area or PIs will also be documented, as necessary. Major actions may require written interim status reports, and such documentation will be considered during subsequent reviews. Follow-up actions are directed by the Focus Area Program Manager, and are subject to the approval of OST EM-53. The status of corrective action follow-up will be assessed as part of subsequent reviews.

## ***G. Project Selection and Review System Overview***

OST conducts a scientific research and technology development program that serves the DOE EM mission to manage waste and clean up contaminated sites. Successful investments must be technically sound and programmatically relevant. Most importantly, results of the investment must be deployed by end users. Internal and external peer and sponsor reviews are generally recognized in the science and technology (S&T) community as an important adjunct to decision-making. Realizing this, OST established a system of reviews to ensure that project selection and evaluation decisions are made wisely. This appendix summarizes the review system used to identify and select projects for funding, and provides a technical review of ongoing projects. Within the principles and guidelines identified here, each program element (e.g., Focus Area) will formulate specific procedures.

### **Purpose**

The overall purpose of OST reviews is to secure knowledgeable counsel on the attributes of an ongoing or proposed activity or program, and to document the review and the actions taken in response to the review. While the exact goals, methods, and emphasis of different review system components vary somewhat, attributes that are important to all reviews include:

- Relevance to the EM mission
- Importance of the problem addressed and its cost versus benefit performance compared to the baseline
- Problem solving in the absence of a baseline
- Technology readiness to advance to a later development stage
- Creativity, originality, and uniqueness (avoiding redundancy)
- Feasibility and likelihood of technical and economic success
- Confidence in the proposing institution and investigators.

In addition to these attributes, reviewers are expected and encouraged to address any additional issues deemed pertinent to the overall program. Each review is conducted according to specific criteria. Before the review process begins, reviewers receive a briefing explaining the purpose and criteria of project evaluation.

### **Goal**

The goal of the review system is to secure the best possible scientific, technical, and sociopolitical assistance for the decision-maker. OST is committed to develop, deliver, and support implementation and deployment of new and improved technologies for environmental restoration and waste management with the greatest possible return on investment (ROI). ROI is a combination of timeliness, effectiveness, efficiency, and risk reduction, as well as the cost of

development. All these factors cannot be known with certainty at the decision-making stage. Reviews are used to inform the judgments that must be made in selecting and advancing technologies, in selecting which sites or investigators will pursue new development efforts, and in designating new areas of investment.

### Components of the OST Review System

**Project Selection Reviews** - OST Focus Areas conduct PSRs for technology development activities. The first step in the review system is the review of proposals for new research and development activities. These reviews combine the judgments of technical peers and of potential users of the results. The EM Science Program (EMSP) solicits pre-proposals in order to encourage full proposals. When full proposals are received, they are reviewed for technical merit and then for potential applicability to EM problems (relevance). Project selection reviews for the EMSP are a shared responsibility with the Office of Science. For technology development, proposals are requested within Work Packages (WPs) and are screened for programmatic relevance before the technical review is conducted.

**Peer Reviews** - New proposals or ongoing projects may be externally reviewed for technical merit. OST, which has its peer reviews conducted by the ASME, may require technical peer reviews for all new projects, at least every 3 years for continuing projects, and for projects entering the Engineering Development Stage (i.e., passing Technology Maturity Gate 4).

**Mid-Year Reviews** - Each Focus Area conducts annual programmatic progress reviews according to procedures adapted to its goals and methods. The principal focus of Mid-Year Reviews is relevance and progress toward meeting end-user requirements. Mid-Year Reviews seek to expose ongoing work to potential end users, and to seek the latter's help in determining the applicability and performance requirements of new technologies compared to baselines. The progress and readiness of each project for advancing to the next maturity stage are evaluated, and opportunities to productively integrate multiple projects are identified.

**Other Reviews** - Major program areas, specific technologies, or technology clusters (e.g., thermal treatment, subsurface barriers) are reviewed, as appropriate, on an ad hoc basis. These reviews generally address issues of broad program initiatives and help guide OST in addressing problems of greatest significance to EM and DOE.

All reviews culminate in written documentation. When appropriate, an action plan delineating steps to correct deficiencies and take advantage of new opportunities may be required. Program managers and line management consider review information in selecting or continuing projects for funding,

developing new areas of investigation, and evaluating programmatic progress. Such information is also used to document the progress and productivity of OST programs in reports to DOE senior management, Congress, and the public.

## Principles

Review actions are founded upon principles of scientific ethics. Particularly important are issues of confidentiality and appropriate use of privileged information. Therefore:

- Reviewers are chosen for their expertise and experience in the area(s) being reviewed
- Reviewers must have no direct interest in the outcome resulting from decisions that draw upon their advice or comments, and personal integrity is demanded to ensure proper use of information contained in confidential or privileged documents
- Review team members and specific review comments are matters of record and are to be available, but the identities of reviewer comments are strictly confidential
- If a team recommendation is formulated via discussions among reviewers, the review team must be constituted under the rules of the Federal Advisory Committee Act (FACA); non-FACA reviews reflect only personal comments
- Review comments or recommendations are formally directed to the next higher level of authority than the one being reviewed
- Reviewers cannot render decisions and are not responsible for their outcomes, as this authority and responsibility belong to the program manager and the OST/EM/DOE management
- The review's official record is documented in written comments and recommendations
- As OST's success depends upon deployment, a responsibility of technology end users, it is imperative that end users be integrally involved throughout this undertaking.

## OST Guidelines

Across the broad mission of OST, emphasis on particular review criteria varies according to program requirements. For basic research efforts, as in the EMSP, adherence to the scientific method and hypothesis testing is important. In large-scale demonstrations, cost and schedule factors are more important. At the deployment stage, adaptability to specific end-user needs and regulator/stakeholder acceptance become more significant. Relevance to EM needs, however, remains a major consideration at all stages.

The guidelines on OST procedures provide a broad template for planning and conducting reviews. They are not intended as rigid procedures, but rather as an indication of OST policy. Review procedures should be formulated by each program element, as appropriate, to the type of review being conducted. To ensure consistency among the different procedures, OST Headquarters concurrence is required. Therefore:

- Procedures should identify the Review Leader, review objectives and evaluation criteria to be used, the reporting hierarchy for review results, and a schedule for follow-up actions after receipt of the review results
- Procedures should be consistent with the purpose and principles outlined above, and with the detailed Review Guidelines (in preparation)
- Procedures should show the actual review structure, the information to be made available, the standard review criteria, and the mechanism and timing for the formal reporting of findings
- Decisions on commitments to fund projects or programs are made only by Federal employees
- Where the OST Review Leader is not a Federal employee (e.g., Product Line Managers in some Focus Areas), he or she may compile reviews and make a recommendation to the Federal program manager responsible for the program.

## H. OST Management Principles for Procurement

### Purpose

OST's guiding principles for procurement provide management principles, processes, and common attributes that form the basis for managing and implementing science and technology (S&T) procurement actions regarding both internal and external sources. Internal sourcing concerns the selection process for tasking organizations, such as DOE National Laboratories, as well as management and operations (M&O) and management and integration (M&I) contractors. External procurement sourcing refers to the selection process for acquiring support from outside of the existing DOE contract base, which results in either new contracts or financial assistance. This guidance describes OST's philosophy of using industry partners and technology vendors to make technology available to better stabilize facilities and sites, manage waste, and restore the environment.

**OST procurement principles are consistent with DOE Acquisition Regulations, and are conducted with integrity, fairness, openness, and in compliance with statutory and regulatory requirements. These principles engender investment in solution-oriented S&T activities that meet the highest priority needs of EM cleanup project managers, reduce the cost of cleanup projects, reduce technology risk, and accelerate and increase technology deployment.**

### Goal

The goal of S&T procurement principles is to promote effective investment in science and technology that will reduce costs, reduce risk, and promote efficient clean up of the nation's nuclear complex. OST procurement provides for an acquisition system that encourages full and open competition and is oriented toward addressing end-user requirements. S&T's procurement actions foster partnerships among DOE managers, industry and university technology developers, and the contractor community, all of which are directed toward the use of innovative technologies. The focus is on research that will perform technically better than existing technologies, lead to the reduction of costs and risks, and shorten cleanup time.

### Key Principles

S&T procurement principles are designed to ensure all procurement actions are conducted according to applicable regulatory requirements, and the principles of integrity, fairness, openness, and full competition are used whenever practicable. Key principles forming the basis of these principles are:

- Conduct all procurement actions with integrity, fairness, openness, and in compliance with statutory and regulatory requirements
- Design contractual and financial assistance actions so they can be delivered in a timely manner; conduct basic research, applied environmental research, and innovative environmental technologies to meet end-user needs

- Select OST contractors and financial assistance recipients through a competitive merit-based approach that includes objective merit review procedures
- Structure procurement planning to encourage innovative contracting mechanisms to effectively move from technology development to deployment, emphasizing rapid DOE application and commercial viability for the OST investment, with the potential for leveraging contract results into the private sector marketplace
- Identify clearly stated end-user needs, waste stream priorities, and functional performance specifications, including regulatory requirements, to be integrated into and serve as the basis for procurement.

### Procurement Techniques and Award Types

In addressing an end-user need, OST first determines whether the desired product or service is to be made with in-house resources or procured from the private sector. This make-or-buy decision establishes the type of procurement award action. If the product or service is to be made in-house, an existing M&O, M&I, or National Laboratory R&D contract is used. If the product or service is to be procured from an external private sector or university source, either a competitive contract or a financial assistance procurement action. As a result, the S&T investment portfolio comprises R&D activities that are either the continuation of existing multi-year work scopes, or new work scope that is announced and competed. New research efforts are usually announced to the larger scientific community, while near-term deployment opportunities, requiring a more rapid response, are directed toward the private sector.

In developing its investment portfolio, OST primarily uses the following procurement techniques for competitive contracts:

- Specific request for proposals (RFPs)
- Broad announcements designed to collect “best-in-class” technology providers, including research opportunity announcements (ROAs), program research and direction announcements (PRDAs), and program opportunity notices (PONs)
- Request for applications (RFAs), which are competitive requests for grants to be used in basic research
- Support services, including Headquarters and Field support service contracts, to help the national program conduct basic and applied research, technology development, and deployment assistance.

In general, cooperative agreements and grants are used for basic and applied research activities. Such procurement actions involve developing scientific research for understanding and documenting fundamental principles underlying environmental cleanup problems. The products of these cooperative

agreements and grants are usually reports that document the concepts and results of testing. A majority of basic and applied research projects are carried out through grants to university researchers. In addition, university researchers team with researchers at National Laboratories to conduct research and develop technology solutions. As a result, OST procurement principles engage academia to add depth and breadth to OST's pool of S&T expertise.

### Process, Organization, and Schedule

Research and development contractors and recipients of financial assistance expect the S&T Program to be conducted in a manner above reproach, and that contractual and financial assistance funds are expended appropriately. Technologies are developed in response to site needs, and procurement considerations are reflected in OST program plans, which are an integral part of procurement plan formulation. OST conducts objective merit reviews of competitive awards, unsolicited applications, and other noncompetitive applications. Independent peer reviews are widely used to evaluate research proposals and to assess the productivity of ongoing work. Two issues are foremost during these reviews: scientific (or technical) merit and programmatic relevance. Technical merit reviews are conducted by the AMSE for OST, and programmatic relevance reviews are conducted by each Focus Area.

For OST's technology investments to be successful, the resultant innovative technologies must be transferred to the commercial sector for deployment. It is expected that these contract holders and financial assistance recipients will explore opportunities to join in public/private sector partnerships for technology development, and in public/private sector partnerships and private/private sector partnerships to commercialize and deploy developed technologies as widely as possible.

Focus Areas integrate contributions from the National Laboratories, DOE site contractors, private industry, and universities into technology solution activities for EM end users. To this end, Focus Areas use centralized procurement offices to maintain consistency across the EM complex. Focus Areas comprise three major components for which procurement actions are initiated: science and applied research; technology development, demonstration, and testing; and technology implementation and deployment.

**Science and applied research** procurement actions are generally initiated through the Science Program at the Idaho National Environmental Engineering Laboratory. They usually assume the form of financial assistance comprising cooperative agreements and grants. The submission process for financial assistance application under this part of the program is published in the *Federal Register*. A peer review by panels of external scientific experts evaluates the applications for scientific excellence. Then, panels of scientists and engineers from Departmental sites, who will be the end users of research results, evaluate applications for relevance to identified EM

problems. Funding is recommended only if the proposal scores highly in both reviews. Applied research is performed at the EM Federal Energy Technology Center (FETC) primarily through research opportunity announcements.

**Technology development, demonstration, and testing** includes activities to ensure that technology systems will function according to their system requirements or test plans, and intended performance level. Industry and university solicitations are both contractual awards and financial assistance grants, and are generally conducted through the FETC. Products from these contracts, cooperative agreements, and grants include subsystems and full-scale systems, complete with documentation of results (e.g., engineering drawings, specifications, test results, and technology verification data).

**Technology implementation and deployment** involves conducting a multi-site competitive award program under the Accelerated Site Technology Deployment (ASTD) Program at the Idaho National Environmental Engineering Laboratory. This program seeks to gain regulatory acceptance, provide technical assistance, and provide an incentive for Field Office use of innovative technology. Products and services are based upon competitively negotiated contracts. Relevant S&T procurement actions normally result in competitively awarded contracts.

Generally, procurement actions for technology development, demonstration, and testing support are separate from those for technology implementation and deployment. However, OST encourages use of phased contracts and other noncompetitive contract mechanisms to stimulate leveraging by technology developers and to expedite deployment. Phased contracts are those in which the successful completion of a demonstration phase leads to negotiation of a deployment phase without new competition.

The Figure H. 1 time-line depicts S&T’s general procurement schedule for basic science and in-house requests (mid-year review of new starts applies only to in-house requests). Other external procurement actions are performed as needed. Accelerated schedules are used for basic science and in-house procurement actions when warranted.



Figure H.1 - Major Procurement Milestones (Basic Science and In-House Requests).

