

EMSP

Environmental Management Science Program



DOE/ID-10739

January 2000

Environmental Management Science Program Fiscal Year 2000-2004 Multi-Year Program Plan

*U.S. Department of Energy
Office of Environmental Management*



**Environmental Management Science Program
Fiscal Year 2000-2004
Multi-Year Program Plan**

**Department of Energy
Office of Environmental Management**

**January 2000
Rev. 0**

ENVIRONMENTAL MANAGEMENT SCIENCE PROGRAM

FY 2000-2004 MULTI-YEAR PROGRAM PLAN

SIGNATURE PAGE

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CONTENTS

CONTENTS	v
1. EXECUTIVE SUMMARY	1
1.1 Participants	1
1.2 Budget.....	2
1.3 Technical and Programmatic Strategy.....	2
1.4 Proposed Activities.....	3
2. PROGRAM BACKGROUND	5
2.1 Problem Description	5
2.2 Need for EMSP.....	5
2.3 Major Accomplishments	6
2.3.1 Solicitations and Awards.....	7
2.3.2 Technology Integration and Transfer	8
3. VISION AND MISSION	9
3.1 EM, OST, and EMSP Missions	9
3.2 EMSP Vision	9
3.3 Integrating Missions	9
3.4 Integrating the EMSP Within EM	9
4. GOALS AND STRATEGIES	12
4.1 Success Indicators for EMSP	12
4.2 End-User Expectations.....	13
4.3 Near-Term and Long-Term Objectives and Results.....	13
4.4 General Strategy.....	13
5. RELATIONSHIP TO OTHER PROGRAMS	14
5.1 Programmatic Advisory Groups	14
5.2 Program Definition Groups	14
5.3 End-users.....	15
5.4 Technical Advisory Groups	16
5.5 Program Direction	16
6. TECHNICAL PROGRAM	18
6.1 EMSP Program Elements.....	18
6.2 EMSP Program Management	20
6.3 Research Needs and Opportunities Assessment	20
6.4 Research Solicitation	21
6.5 Project Research	22
6.6 Portfolio Management and Analysis	22
6.7 Research Integration	23
6.8 Communications	27
6.9 Current Projected Research Needs.....	28
6.10 Future Solicitations.....	31
Appendix A: EMSP KEY PERSONNEL/ORGANIZATION	A-1
Appendix B: STCG NEEDS/MULTI-YEAR FUNDING RESPONSE TABLE	B-1
Appendix C: PRIORITIZATION PROCESS	C-1
Appendix D: MAJOR MILESTONES	D-1

1. EXECUTIVE SUMMARY

This Multi-Year Program Plan (MYPP) defines the program strategies and activities required to meet the strategic goals and objectives defined in the R&D Program Plan, the S&T Strategic Plan, and the annual appropriations language. The MYPPs of the Office of Science & Technology (OST) serve as a coordination tool for integrating activities across the various EM-50 programs including the Environmental Management Science Program (EMSP), Focus Areas, technology integration, risk, and Crosscutting Programs. This MYPP will emphasize research transition activities from basic research sponsored by EMSP to applied research sponsored by the Focus Areas, as well as activities to ensure research results are documented and captured for future use. In addition, because of the EMSP's close partnership with the Office of Science, interactions and communication with the research community is also addressed.

The MYPP is intended to provide significant detail on the current year and out-year program (within a five year rolling window). The MYPP was written in accordance with guidance issued by EM-50. The intended audience for this document includes EM Headquarters, EMSP managers, and EMSP team members. The principal use of the MYPP is to describe the direction of the program for the next five years. In general, the MYPP does not address policies or issues covered in higher level planning documents, nor does it discuss individual work assignments.

1.1 Participants

The EMSP is a collaborative partnership between the Department's Office of Environmental Management (EM) and Office of Science (SC) to sponsor hypothesis-driven, targeted basic research to establish the scientific and engineering understanding required to solve the most challenging technical problems facing the government's largest, most complex environmental cleanup program.

The conference report that created the EMSP directed that the program be managed by the Office of Energy Research [now the Office of Science (SC)]. The Secretary of Energy subsequently decided to establish the program as a joint effort between EM and SC to ensure a continuing focus on both research merit and program relevance. The Office of Science provides the science program management expertise and encourages the science community (including many of their funded researchers) to support EMSP research needs. EM keeps the program focused on the Department's environmental cleanup needs and works to ensure that research is transferred to the appropriate end user to support decision making or further technical development.

The Department's Idaho Operations Office (ID) was selected to work as the lead organization to administer, manage, and coordinate the award of research grants. Idaho's other primary activities include research integration/research transfer and communications support.

In addition to the primary partners, the Savannah River Operations Office, the Richland Operations Office and the Office of Scientific and Technical Information (OSTI) have made significant contributions to the program's management. Since 1996, the EMSP research funds have been awarded annually to researchers from DOE National Laboratories, governmental and private laboratories, universities, research institutions, and industries from around the world.

1.2 Budget

Funding levels for the EMSP yearly budgets are summarized in Figure 1.2 below. This program was mandated by Congress and received recommendations from several external advisory groups such as the National Academy of Sciences and the Secretary of Energy Advisory Board. Figures for Fiscal Year 2001 and beyond are estimated.

EM Science Program Budget History and Projection Estimates										
(Dollars in Millions)										
	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	Totals
Number of Awards by FY:	136	66	33	39						274
Funding Levels by FY:										
New Awards & Outyear Costs -										
FY 1996 General	45.9	23.3	25.2	20.4						\$114.8
FY 1997 General		21.0	9.2	8.0	7.8					\$ 46.0
FY 1998 D&D/HLW			10.0	3.4	9.8	6.7				\$ 29.9
FY 1999 LD/SC				10.3	5.0	12.1	5.0			\$ 32.4
FY 2000 General					5.4	2.6	5.2	2.7		\$ 15.9
FY 2001 HLW						6.6	3.1	6.2	3.2	\$ 19.1
FY 2002 SC/MW/NM							14.7	7.1	14.1	\$ 35.9
FY 2003 LTS								12.0	5.8	\$ 17.8
FY 2004 D&D/HLW									4.9	\$ 4.9
Small Business Innovative Research-	1.3	1.2	1.2	1.2	0.8	0.8	0.8	0.8	0.8	\$ 8.9
Peer and *External Reviews-	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	\$ 9.9
Strategic Development and Research Integration-	1.7	1.4	1.3	2.6	2.1	2.1	2.1	2.1	2.1	\$ 17.5
Totals	\$50.0	\$48.0	\$48.0	\$47.0	\$32.0	\$32.0	\$32.0	\$32.0	\$32.0	\$353.0

*Environmental Management Advisory Board Science Committee and NRC.

Figure 1.2. EMSP Yearly Budget Funding Levels

1.3 Technical and Programmatic Strategy

The mission of the EMSP is to identify and fund basic science research that results in transformational or breakthrough approaches to solving DOE's environmental problems. This can be new knowledge that will be used for decision making or research that can be utilized for technology development. This involves identifying and soliciting relevant concerns that can be influenced by science; selecting the best research proposals for funding; monitoring the research; and facilitating interaction between researchers, EM Focus Areas and Crosscutting Programs (referred to as FAs); and site end-users to ensure the research will be utilized as it progresses. The general strategy, in accordance with the EM Strategic Plan for Science and Technology, is to integrate the EMSP into the EM clean-up programs by working within EM to identify science needs and opportunities to reduce risk, costs or schedule; development and oversight of a research program designed to meet these needs and opportunities; and integration of the research into clean-up baselines.

The EMSP core processes that are used to support this strategy include:

- (1) Working with EM Focus Areas and STCGs to identify research needs and opportunities
- (2) Development of solicitations and selection of research
- (3) Management, monitoring, and analysis of the portfolio
- (4) Transitioning mature research towards utilization or further technical development
- (5) Enhancing program visibility and communication of research results to fully utilize new knowledge.

Research projects are solicited and selected according to scientific merit and DOE site program needs that can be influenced by science. Research awardees conduct the research and interface with Focus Area representatives at multiple points in the process. Research is integrated into technology development activities of the Focus Areas and site end-users through a number of facilitated interactions such as topical workshops, national workshops, and other EM program functions.

1.4 Proposed Activities

Activities that will be occurring over the next year to support the core functions include:

- (1) Identification and development of research needs and opportunities through:
 - Identification and development of current complex-wide research needs
 - Support of the development of the Paths to Closure document.
- (2) Development of solicitations and selection of research by:
 - Strategic planning for further portfolio development.
- (3) Management, monitoring, and analysis of the research portfolio through:
 - Grant administration activities
 - Refinement of the Multi-Year Program Plan and communications plan.
- (4) Transitioning mature research towards utilization or further technical development by:
 - The EMSP National Workshop
 - Selected topical workshops including Actinide Chemistry and kick off of the FY 99 vadose zone and low dose ionizing radiation solicitation awards
 - Project advocacy for transfer of appropriate mature research to Focus Areas, Crosscutting Programs, industry, or other research sources
 - Participation in Focus Area mid-year review and strategic planning meetings
 - Technical liaison efforts with the Focus Areas
 - Facilitating transfer of research results to cleanup project managers.
- (5) Enhancing program visibility and communication of research results through:
 - Communication of research results to interested parties
 - Participation in selected conferences and workshops including paper/presentation development and deployment of the EMSP exhibit booth
 - Publishing of an EMSP annual report
 - Support of the Environmental Management Research and Development Program Plan
 - Support of Environmental Quality portfolio strategic planning

- Information archiving performed by OSTI
- Development and issuance of the EMSP annual and final reports for EMSP researchers
- EMSP web page maintenance
- Provide web access to EMSP related e-prints, journal publications, search tools, and web mining tools.

There is a call for proposals planned in FY 2000 based on current budget projections. Further solicitations anticipated in FY 2001 will be based on the evaluation of site-specific needs and gap analyses defining the extent to which completed projects or nearly completed projects are expected to meet those needs. The EMSP will work closely with Site Technology Coordinating Groups (STCGs) and Focus Areas during the annual science and technology needs and opportunities identification process to identify research needs from across the DOE Complex. Research needs will be evaluated against the current EMSP research project portfolio. The EMSP will work to coordinate with the Focus Areas to assess needs, identify research gaps, prioritize areas of research, and identify appropriate areas for future proposal calls. Future solicitations will also involve the Focus Areas in solicitation development and proposal review.

Integration activities of future calls will include involvement with the Focus Areas in the areas of research needs identification, participation in appropriate areas of the solicitation and review process, and research transfer. It is anticipated that the Focus Areas will develop budgets in future years which will incorporate research transfer and applied research.

2. PROGRAM BACKGROUND

2.1 Problem Description

In DOE/EM-0362 “*Accelerating Clean-up: Paths to Closure*” (hereinafter referred to as “*Paths to Closure*”), DOE estimates that clean-up of the weapons complex will cost approximately \$147 billion and take several decades to complete. The immensity of the clean-up effort in the face of decreasing federal funding accentuates the need for research. The EMSP funds basic research relevant to EM’s clean-up mission.

2.2 Need for EMSP

The EMSP was established in response to a mandate from Congress in the FY1996 Energy and Water Development Appropriations Act. Congress directed DOE to provide “sufficient attention and resources to longer-term basic science research which needs to be done to ultimately reduce clean-up costs” and directed DOE to “develop a program that takes advantage of laboratory and university expertise” and to “seek new and innovative clean-up methods to replace current conventional approaches which are often costly and ineffective.” Further, the implementing language contained in the February 9, 1996 Federal Register announcement of the program stated the objectives of the program are as follows:

- Provide scientific knowledge that will revolutionize technologies and clean-up approaches to reduce future costs, schedules, and risks
- “Bridge the Gap” between broad fundamental research and wide-ranging applicability such as the DOE’s Office of Energy Research (now the Office of Science) and needs-driven applied technology development that is conducted in EM’s Office of Science and Technology
- Focus the nation’s science infrastructure on critical DOE environmental management problems.

A major impetus for the EMSP was the special report to the Secretary of Energy Advisory Board issued by the Galvin Commission, which stated:

Probably the most important reason behind the slow pace of assessment and clean-up [of DOE waste sites] is the low quality of science and technology that is being applied in the field . . . There is a lack of realization that many — and some experts believe most — existing remediation approaches are doomed to technical failure. Others would require unacceptable expenditures and much extended time to reach their stated objectives. There is a particular need for long-term, basic research in disciplines related to environmental clean-up. Adopting a science-based approach that includes supporting development of technologies and expertise could lead to both reduced clean-up costs and smaller environmental impacts at existing sites and to the development of a scientific foundation for advances in environmental technologies.

The EMSP partnership between EM and SC provides an effective team that integrates the expertise of SC in managing basic research with the expertise of EM-50 identifying EM specific needs and integrating with technical development and deployment programs.

2.3 Major Accomplishments

Planning for the Program began in early 1995 in partnership with the Office of Science. Later that year it was initiated in response to a congressional mandate and recommendations from several external advisory groups, including the National Academy of Sciences (NAS) and the Secretary of Energy Advisory Board.

1. Several indicators pointing to the early success of the Program include:
 - Receipt of the Vice President's Hammer Award – May 1998
 - Establishment of a successful management partnership between EM and SC with a clear mission to ensure quality research is supported and focused on the DOE clean-up mission
 - Establishment of effective consultation with environmental management problem holders to clearly understand problems and focus the solicitation and project selection process on the problems
 - Partnerships with Focus Areas to integrate research for utilization or technology development activities.
2. Annual Research reports submitted by EMSP researchers were reviewed by an EMSP team with the following results noted:
 - One hundred seventy reports have been submitted and reviewed by EMSP staff as follows:
 - 73 of the '96 projects
 - 64 of the '97 projects
 - 33 of the '98 projects
 - One hundred fifty-eight reports summarize project accomplishments and 143 reports summarize future research plans.
 - One hundred eighty-three graduate students are listed as being supported by EMSP grants:
 - 114 students were supported by 28 (out of 73) '96 projects
 - 51 students were supported by 21 (out of 64) '97 projects
 - 18 students were supported by 9 (out of 33) '98 projects
 - The researchers were asked to provide a listing of publications supported by their EMSP grants. One hundred thirty-one reports listed a total of 989 documented communication products (publications, posters, presentations, reports, abstracts):
 - 60 (out of 73) '96 projects list a total of 635 communication products
 - 51 (out of 64) '97 projects list a total of 287 communication products
 - 20 (out of 33) '98 projects list a total of 67 communication products
 - Project impacts were subjectively inferred from the annual reports by the report reviewers:
 - 133 projects improve fundamental scientific knowledge and understanding
 - 36 projects offer new, improved technologies
 - 72 projects improve methods, processes, or techniques
 - Thirteen projects are noted by the reviewers as having results immediately useable by DOE-EM.

- Eight reports mention intellectual property issues (e.g. patents) and four reports disclose optional proprietary information.
 - Nine reports mention external awards or recognition; however, only one such award was mentioned in the reviewer's comment section: an award from the Society of Toxicological Risk Assessment.
 - Twenty-nine reports indicate budget, schedule, or resource issues. (under review)
 - Twenty-three reports indicate DOE end-user contact.
3. More specific accomplishments based upon feedback from researchers have been captured in the October 1999 Research Accomplishments Report quarterly update. These figures were voluntarily submitted by researchers and include:
- 128 Post Doctoral Graduate Students and 202 Graduate Students, and 59 Undergraduates supporting the program
 - 142 Journal Articles have been published
 - 40 peer reviewed papers have been presented at conferences and symposia
 - Over 62 project presentations at conferences and workshops
 - 22 collaborations between EMSP researchers and DOE end-users or private industry have been reported
 - 23 national laboratory internal reports or white papers
 - Numerous poster presentations and media reports
 - 17 transfers of research results to Focus Areas, Crosscut programs and private industry
 - 5 patent disclosures and applications.

2.3.1 Solicitations and Awards

Five research solicitations have been completed to date. The first, issued in FY 1996, covered a broad range of "representative areas, including bioremediation, contaminant plumes, ecology, environmental restoration, health, mixed waste, radioactive waste tanks, spent fuel, and waste treatment, storage, and disposal." A total of 136 research projects were awarded in the first solicitation and are scheduled for initial project period completion in FY 1999.

The FY 1997 solicitation was more focused to address specific research needs received from DOE sites and "gaps" identified in the FY 1996 research portfolio. Specific technical challenges covered in the solicitation were high level radioactive waste tanks, spent nuclear fuel, fissile material, mixed and radioactive low level waste, waste disposal forms and risk, and quantitative methodologies, as well as human and environmental health analyses. A total of 66 research projects are currently being funded for three years under the solicitation.

In FY 1998, two research solicitations targeting the critical areas of decontamination, decommissioning, and high level waste were completed. A total of 33 research projects were awarded through the FY 1998 solicitations. In FY 1999, two more Request for Applications to solicit research proposals were issued by

the EMSP concentrating on the low dose radiation research program and subsurface contamination/vadose zone.

The FY 1999 solicitation targeted the research areas that include the vadose zone and the effects of low dose ionizing radiation. Thirty-one new awards were made in the area of vadose zone research and 8 awards were made to support study on the effects of low dose ionizing radiation.

2.3.2 Technology Integration and Transfer

The first National EMSP Workshop was held in July 1998 to communicate the progress and plans of all then-active projects. It served as an opportunity for scientists in different disciplines across the program to become acquainted with each other, and to discuss and coordinate research plans. Abstracts for those projects are available in CD-ROM and hardcopy formats and can also be accessed from the EMSP web site at <http://emsp.em.doe.gov>. The EMSP web site also provides up to date information about ongoing research projects, future events, updated technology needs, and links to other related environmental R&D programs.

The second National EMSP Workshop is scheduled for April 24 – 28, 2000 in Atlanta, Georgia, and will employ new ways of getting better end-user participation by more heavily involving Focus Area and site personnel in breakout sessions and information exchanges. The EMSP was featured in New Orleans during August 1999 at the American Chemical Society (ACS) national meeting in eight sessions on Early Results of the EMSP. Similar effective topical workshops have already been held at the Savannah River, Richland, and Idaho DOE sites that have successfully linked researchers with EM problem holders by accomplishing the following:

- Identification and refinement of EM's science needs
- To provide forums to discuss areas where long-term scientific breakthroughs can be utilized
- To directly involve site end-users in discussions with researchers regarding current research and site needs
- Stimulation of ideas for spin-off technologies and new approaches to solving current problems.

3. VISION AND MISSION

3.1 EM, OST, and EMSP Missions

Environmental Management was founded with a three-fold mission—waste management processing from ongoing production activities, stewardship of existing waste currently in storage from past weapons complex operations, and environmental contamination clean-up. The OST was founded to develop new technologies where existing ones were determined to be unsuitable, too costly, or to involve high degrees of risk. The EMSP was established to provide further scientific basis for those in the future. The mission of the EMSP is to identify and fund research that will result in transformational or breakthrough approaches for solving DOE's environmental problems considered intractable without new knowledge.

3.2 EMSP Vision

The EMSP will support research that seeks scientific understanding leading to reduced remediation costs, schedules, or risks, and helping solve currently intractable problems. The sites will use the understanding gained through EMSP supported research to improve their clean-up efforts. Implementing these approaches will lead to significantly long-term reductions in clean-up costs, as well as reductions in risks to workers and the public.

3.3 Integrating Missions

Integrating the EMSP mission with EM's technology development and end-user missions is accomplished in cooperation and partnership with the Office of Basic & Applied Research (OBAR), formerly known as the Office of Science & Risk Policy (OSRP); DOE-SC; and DOE-ID. DOE-SC provides a strong link to the leaders of the national scientific community. This office participates in the development of program policies and solicitations of research projects, is responsible for ensuring proper review of the scientific merit of EMSP proposals, shares with EM the responsibility for selection of projects to be funded, and participates in scientific integration and communication activities associated with the EMSP. DOE-ID is the lead field office for program execution and assists OBAR in identifying programmatic needs, involving stakeholders, managing financial aspects, and getting research results to the Focus Areas and other end-users.

3.4 Integrating the EMSP Within EM

Focus Areas coordinate the overall science and technology investments within each of six problem areas identified in the Research and Development Strategic Plan developed by EM. Moving research results to application by end-users involves:

- Working with DOE problem holders to identify needs and priorities
- Working with the OST Focus Areas to coordinate activities
- Communicating science results to Focus Area technology developers and EM problem holders.

Figure 3.4 on the next page illustrates the relationship between the EMSP and the Focus Areas.

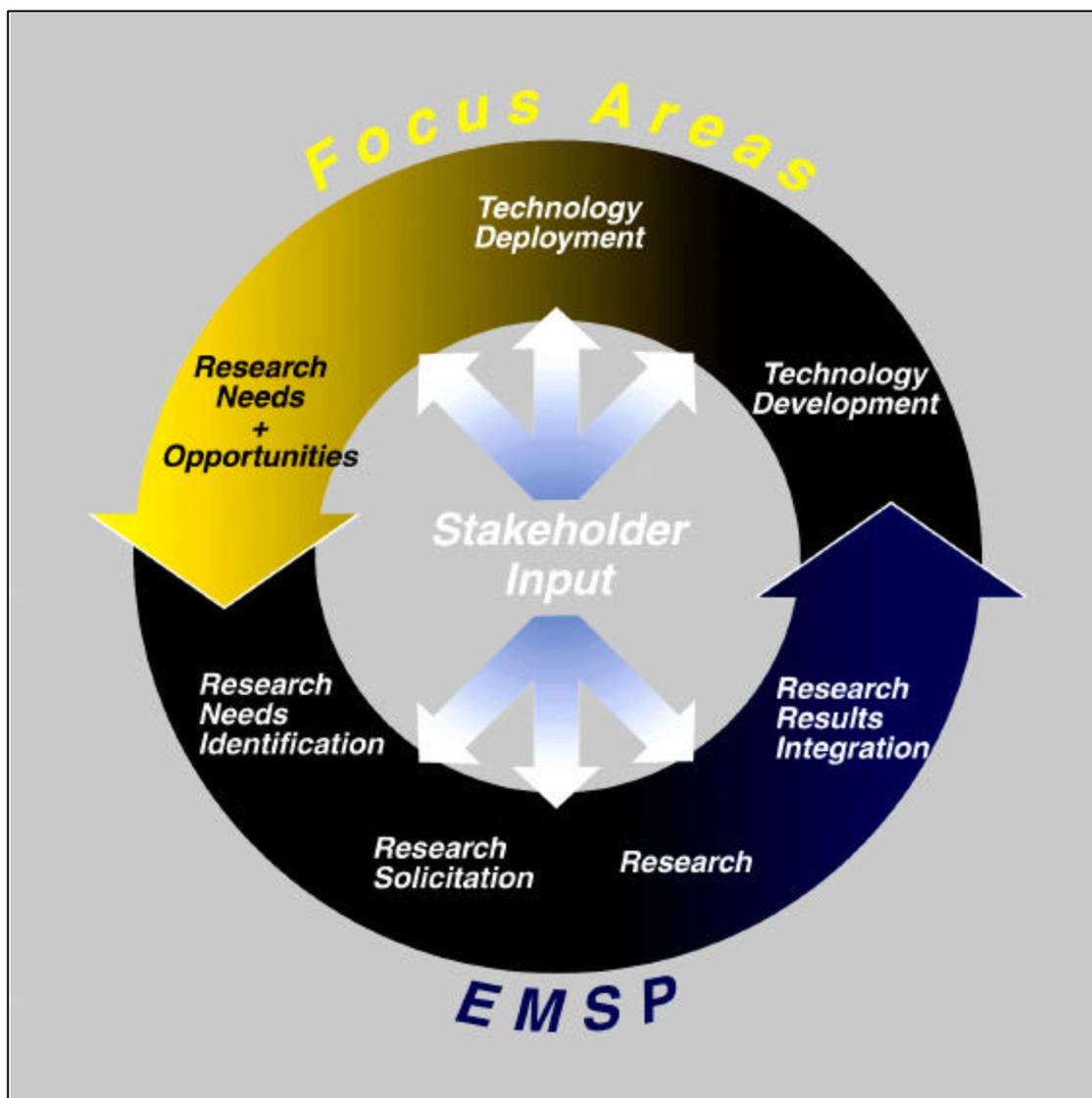


Figure 3.4. The EMSP Process Relative to the Focus Areas

Successful integration of the EMSP mission with the overall EM clean-up mission includes developing the cadre of scientific talent needed to solve the Department's long-term technical problems. By attracting new ideas and technical innovation outside EM's traditional applied research programs, the EMSP will expand the technical assistance pool that EM can use or draw upon for future contributions and scientific breakthroughs. It is intended that this pool will also include the best new talent from universities and industry, in combination with DOE's national laboratories and other federal facilities.

One key to successful integration is to allow for the new knowledge developed by the research within the EMSP to impact the baselines of the Focus Areas. Currently, EM Focus Areas are integrating basic and applied research into their planning through the development of research specific work packages that effectively provide budgetary mechanisms to transfer applicable research into the Focus Areas. The research transferred to the Focus Areas can be knowledge ready for utilization (basic research) or research ready further development along EM's technology development path (applied research). To ensure that

the research results and research in progress are anticipated and incorporated into technology development activities of the Focus Areas, Crosscutting Programs, and clean-up activities of site end-users, DOE is taking an active role in facilitating communication among these groups and EMSP researchers. Research is integrated into the activities of the Focus Areas, Crosscutting Programs, and site end-users through a variety of mechanisms and processes that allow for the communication of research results, both anticipated and unanticipated. Other mechanisms for knowledge transfer include:

- EMSP National Workshop
- Annual research summaries of EMSP projects
- EMSP web site (<http://emsp.em.doe.gov>)
- Assorted EMSP publications (fact sheets, news releases, peer-reviewed papers, etc.)
- Topical workshops.

4. GOALS AND STRATEGIES

The goals of the EMSP are to support targeted basic science research that will:

- Lead to significantly lower clean-up costs and reduced risks to workers, the public, and the environment over the long term
- Bridge the gap between broad fundamental research that has wide-ranging applicability, such as that performed in DOE-SC, and program needs-driven applied technology development that is conducted in the DOE-OST (EM-50)
- Serve as a stimulus for focusing the nation's science infrastructure on critical national EM clean-up problems
- Expand the EM research knowledge base by publishing EMSP research results, through such media as peer reviewed papers in scientific journals or presentations, in professional society conferences and symposiums
- Serve as the research arm of the EM technology development and deployment cycle to develop new knowledge that is transferred to technology developers such as the EM Focus Areas, site end users, or other programs for utilization or further development with the intention of positively impacting current EM clean-up baselines.

4.1 Success Indicators for EMSP

Section 2.3 identified some of the program successes. In order to ensure an effective program, several success indicators have been developed and monitored. EMSP success indicators include the following:

- Implementation of a research agenda identified by gap analysis, including interaction with and validation by the Focus Areas, to concentrate on the most serious DOE-EM problems for which no adequate solution has been found, and measured by tying EMSP projects to DOE Complex science needs
- Support of the application of research results to DOE-EM problems, using a measure such as the number of projects whose results are successfully transferred to the FAs
- Expansion of scientific resources focused on EM problem areas using a measure of long-term community commitment to EMSP, such as the number of projects that are transferred for use or further development and increasing the number of researchers and graduate students supporting EM related research
- Publishing of EMSP research results in both scientific journals and the media such as in a number of peer reviewed papers or presentations
- Increasing of the number of collaborations between EMSP and Focus Areas, industries, universities, and other government agencies through shared prioritization of needs
- Expansion of the cadre of environmental research personnel through increasing the number of funded graduate students each year
- Increasing of the general awareness of the program to support full utilization of research results by publishing an annual report, press releases, fact sheets, etc.
- Transferring of research project knowledge to FAs, other government agencies, industry, and universities for utilization or further development

- Enhancement of information exchange by utilizing an EMSP web page and utilizing “hit” counters, feedback functions, and discussion threads to measure and maintain effectiveness of the site.

4.2 End-User Expectations

The end-user community has made its needs known to the EMSP through the *Paths to Closure* document and through workshops carried out by the EMSP, Site Technology Coordination Groups (STCGs), and Focus Areas. DOE sites are anticipating breakthroughs by EMSP researchers in order to remedy the intractable clean-up problems and complete their mission as defined in *Paths to Closure*.

Basic research can provide new knowledge that forms the basis for development of technologies allowing current clean-up to be completed safely and more effectively. Results from EMSP research will support end-users as a basis for decisions intended to ultimately impact current clean-up processes.

4.3 Near-Term and Long-Term Objectives and Results

As a near-term goal, the EMSP envisions some of the research results moving directly to end-users for input in solving problems with existing clean-up methods and technologies. The majority of EMSP research projects will require further development. If further basic science is needed the researchers can competitively bid for further funding of the research. A long-term commitment to have competitive calls from various stakeholders (i.e., Focus Areas, universities, and other federal agencies) will be needed to complete the development of technologies based on the concepts defined and proven within the EMSP.

4.4 General Strategy

The EMSP will work within the structure defined in the Environmental Management Strategic Plan for Science and Technology and EM Research and Development Program Plan. The four major objectives identified in the R&D Program Plan are as follows:

- Meet site high priority needs
- Reduce the cost of clean-up
- Reduce technology risk
- Bridge the gap between development and use.

The EMSP will work closely with both site STCGs and Focus Areas to support the EM R&D Program plan objectives of reducing risk and cost through technology development and deployment. To support this, the EMSP will utilize EM science needs and opportunities to develop a relevant research program and integrate research into the problem areas, as identified in the Focus Areas' MYPPs.

In order to maintain a balance between nearer term operational goals of the DOE sites and longer term strategies beyond most planning horizons, the EMSP will also integrate advice from such organizations as the National Academy of Sciences and EMAB into its strategic planning. This is to ensure broader long-term research needs beyond the five-year planning horizon are identified and considered well before they become issues that may impact site clean-up schedules.

The EMSP will also continue the policy of competitive research project selection using merit and relevancy reviews.

5. RELATIONSHIP TO OTHER PROGRAMS

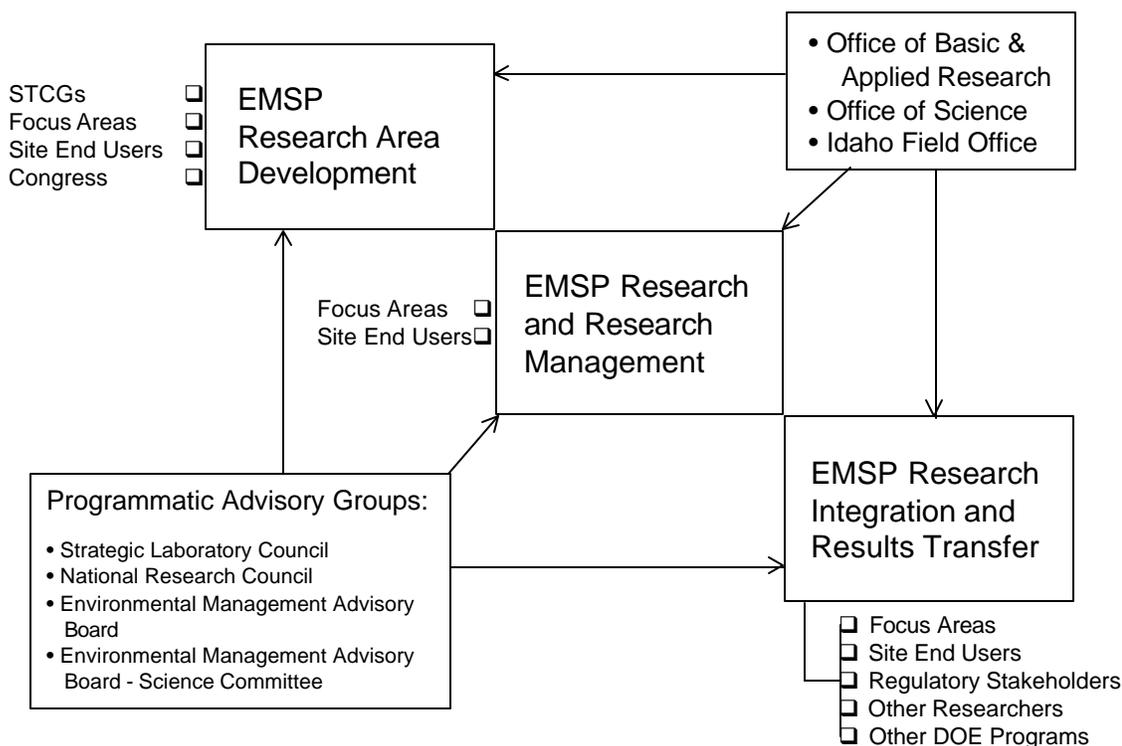


Figure 5. EMSP Interfaces and Relationships to Other Programs

5.1 Programmatic Advisory Groups

- A. The National Research Council is an invited advisor to the EMSP that looks at issues requested by the program such as the recent committee empanelled to assist the OBAR with developing a long range science plan for subsurface contamination research (Committee on Subsurface Contamination Research at DOE Complex Sites).
- B. The Environmental Management Advisory Board reviews and advises on the overall EMSP program.
- C. The Environmental Management Advisory Board – Science Committee looks at the quality of research and the processes used to select the research and provides recommendations.
- D. The Strategic Laboratory Council evaluates EMSP planning and execution in order to identify and communicate issues that require resolution to assure program relevance and successful utilization of research results.

5.2 Program Definition Groups

- A. Site Technology Coordinating Groups (STCG) are site specific organizations responsible for the development and management of site research and technology needs. These needs form the basis for the EMSP and the Focus Areas’ baselines that are intended to address these needs.

- B. The EM/OST Focus Areas provide the linkage between the EMSP projects and the Department's ongoing waste management and clean-up programs within the Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and Nuclear Materials and Facility Stabilization (EM-60). The Focus Areas incorporate the basic and applied research needs into their technology development baselines and are the main conduit for research transfer. The five Focus Areas OST has currently implemented are:
- Tanks Focus Area (TFA)
 - Mixed Waste Focus Area (MWFA)
 - Nuclear Materials Focus Area (NMFA)
 - Remedial Action/Subsurface Contaminants Focus Area (SCFA)
 - Deactivation and Decommissioning Focus Area (DDFA).
- C. Site End Users are the problem holders who are responsible for communicating areas where research may be necessary to solve a problem or where an opportunity exists for research to reduce risk, cost, or accelerate schedule. This information is generally communicated through STCGs but at times is communicated directly to Focus Area or EMSP members.
- D. Congress has at times, specified areas of research for the EMSP to pursue. The EMSP incorporates this guidance into calls for proposals. Selection and management of the research is conducted through the standard processes identified in Section 6.

5.3 End-users

- A. The EM/OST Focus Areas provide a dual role and providers of program definition as well as end-users. Through regular communication and close cooperation between STCGs and EM's site end-users, the Focus Areas identify opportunities to integrate the research results of EMSP projects to improve performance and reliability of their baseline clean-up technologies. The Focus Areas also evaluate EMSP projects and results to uncover opportunities to develop breakthrough technologies that will solve EM's long-term environmental problems and reduce risks.
- B. Spent Nuclear Fuel (SNF) integrates and coordinates the technology for management of DOE SNF waste from existing storage through disposal. The Office of Civilian Radioactive Waste Management (OCRWM) is the long-term end-user of the SNF program and sets the waste acceptance criteria for SNF.
- C. OCRWM is responsible for managing the safe storage and ultimate disposal of the nation's commercial spent nuclear fuel. The EMSP portfolio includes projects that offer enhancements and other scientific benefits to this program. OBAR keeps OCRWM apprised of research activities and promising results through periodic publication of workshop results, annual reports, and direct interaction with OCRWM program managers.
- D. Knowledge of other environmental research allows collaborative, non-duplicative research to be performed. Relevant research programs conducted by DOE and other agencies include:
- *Natural and Accelerated Bioremediation Research Program (NABIR)* sponsored by DOE-SC to increase understanding and utilization of contaminant bioremediation processes
 - *Nuclear Energy Research Initiative (NERI)*, sponsored by DOE's Office of Nuclear Energy to help overcome technical and scientific obstacles to future nuclear energy use

- *Small Business Innovative Research (SBIR) topics*, including those outside EM, managed by DOE-SC to increase private sector commercialization of federally-funded technologies
- The *Strategic Environmental Research and Development Program (SERDP)* is the Department of Defense's (DOD) corporate environmental R&D program. SERDP is planned and executed in full partnership with DOE and the Environmental Protection Agency with participation by numerous other federal and non-federal organizations
- DOE Office of Science Low Dose Radiation Research Program. The Low Dose Radiation Research Program supports research to determine if low dose and low dose-rate radiation presents a health risk to people that is the same as or greater than the health risk resulting from the oxidative by-products of normal physiological processes.

5.4 Technical Advisory Groups

- A. EMSP gathers technology and specific needs information from the STCGs and uses them to validate the science needs.
- B. The EM Integration Program team identifies ways to improve efficiencies and cost savings across EM projects and advises the EMSP program managers on science priorities associated with critical waste streams. The EMSP takes that information and matches promising researchers to the critical waste streams to find solutions.
- C. The EMSP is integrated with the full range of Focus Area activities. The Focus Areas provide technical support in the definition of the program's direction in terms of research needs from across the EM complex, and are users of the results coming out of the research.

5.5 Program Direction

- A. The EMSP takes the mission and program strategy from the Office of Basic and Applied Research and reports results to EM-1 through that office.
- B. The EMSP identifies the science needs that help drive the strategic R&D plan for Science and Technology.
- C. The Office of Science manages the solicitation of research applications, oversees the scientific review, manages the technical aspects of the research program, and ensures that EMSP-funded research does not duplicate other research.
- D. The DOE Idaho Operations Office (DOE-ID) works as the lead field office in partnership with the Office of Science and Technology's (EM-50) OBAR.

The EMSP portfolio is organized according to seven problem areas—the five Focus Areas, Spent Nuclear Fuels, and Health/Ecology/Risk. Figure 5.5 shows the distribution of research funding by each of the seven problem areas.

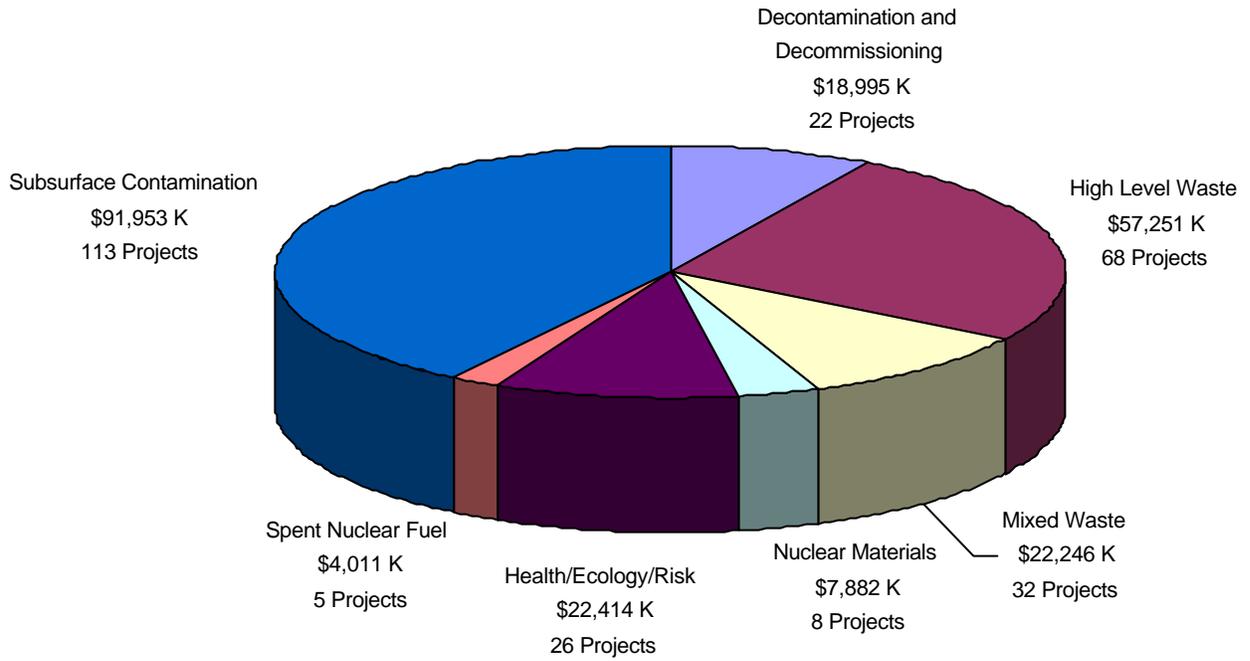


Figure 5.5. EMSP Funding by Problem Area

6. TECHNICAL PROGRAM

The EMSP is a collaborative partnership between the DOE Office of Environmental Management (DOE-EM) and the DOE Office of Science (DOE-SC) to sponsor targeted research that will lead to reduction of the costs and risks associated with cleaning up the nation's nuclear complex. The Idaho Operations Office was selected to work in partnership with OBAR to support the EMSP. Researchers from DOE laboratories, governmental and private laboratories, universities, research institutions, and industries from around the world carry out the targeted research.

The EMSP is divided into seven functional elements: Project Management, Research Needs and Opportunities, Research Solicitation, Project Research, Portfolio Management and Analysis, Research Integration, and Communications. Briefly, the major elements are:

- *Project Management* – supports the development of strategic policy for EMSP and plans and administers the key EMSP processes in a way that provides a defensible basis for program activities.
- *Research Needs and Opportunities* – identifies and prioritizes research needs and opportunities of DOE sites, EM Focus Areas and Crosscutting Programs, and other existing sources of information for input to EMSP solicitations, research integration, and other processes.
- *Research Solicitation* – ensures that procedures are followed for contracting and distributing of award funds, supports the development of policy for EMSP project continuation, and performs procurement services for EMSP projects.
- *Project Research* – the actual performance of the research either by universities, national laboratories, or private entities.
- *Portfolio Management and Analysis* – collects and maintains information on the EMSP portfolio of research projects in order to provide pertinent information to other organizations and to perform analysis as needed to meet program requirements.
- *Research Integration* – ensures the results of EMSP research will be transferred, communicated and incorporated into the ongoing technology development programs of the Focus Areas, Spent Nuclear Fuel Program, Crosscutting Programs, and clean-up activities of the DOE sites.
- *Communications* - ensures research results and information about the program is communicated to the appropriate party such as FA, potential end-users, and stakeholders. This will be accomplished by participation at relevant conferences, and through news media, the Internet, and in-house publications.

The following sections describe in general the processes used to implement the program. The final sections describe current research needs and future anticipated subject areas for research calls for proposal.

6.1 EMSP Program Elements

The EMSP program elements identified in Figure 6.1 are the closest analogy to Work Packages. The level of detail will be consistent with work package level of detail. These elements, which are described in detail below, support the overall EMSP key processes but do not directly correlate with them.

TECHNICAL PROGRAM

UNDER EMSP

<u>EMSP Program Management</u>	<u>Research Needs and Opportunities</u>	<u>Research Solicitation</u>	<u>Project Research</u>	<u>Portfolio Management and Analysis</u>	<u>Research Integration</u>	<u>Communications</u>
<ul style="list-style-type: none">• Strategic Planning• Program Oversight• Program Support• Systems Integration Support• Metrics Development	<ul style="list-style-type: none">• Comprehensive Needs Collection• Research Needs Screening, Selection, and Prioritization• EMSP Linkage Development• Research Needs Analysis• EMSP Needs Database Management	<ul style="list-style-type: none">• Solicitation Support ID Support Reviewers• Research Project Selection Pre-Application Review Merit Review - Formal Application Relevance Review - Formal Application Review Feedback• Research Funding	<ul style="list-style-type: none">• University Grants• National Laboratory TTPs• Commercial Contracts	<ul style="list-style-type: none">• Research Project Funding• Grant Administration• Project Disposition• EMSP Data Management• Data Analysis• Research Project Reviews	<ul style="list-style-type: none">• Research Transfer• National EMSP Workshop• Topical Workshops• Conferences	<ul style="list-style-type: none">• Scientific Literature• EMSP Web Page• Focus Area Liason Support• Congressional Liason• Publications/ Press Releases• Popular Science Article• Contributions/ Inserts to Initiatives• EMSP Annual Report• EMSP Calendar• EMSP Exhibitions• Communications Plan• Research Accomplishments Report• Research Project Data Management

Figure 6.1. EMSP Technical Program Elements

6.2 EMSP Program Management

- **Strategic Planning.** The EMSP strategic guidance comes from the Office of Science and Technologies Strategic Plan and R&D Program Plan. Plans will be developed that direct the EMSP's overall course and direction at a long term, strategic level (1-5 years), in addition to guidance at a shorter term level (less than 1 year). This includes developing policy statements and the infrastructure needed to conduct operations, as well as assigning responsibility for carrying out those operations.
- **Program Oversight.** Program review functions are performed to ensure EMSP activities are conducted properly, within their defined scope, and within their assigned budget. Oversight also ensures EMSP activities are coordinated with other OST activities, such as the EMSP annual review, Internal Review Budgets, Focus Area research integration, EM-50 communication activities, and other OST activities as identified.

This function also provides the EMSP interface with external oversight groups, such as Congress, the National Academy of Sciences, the Environmental Management Advisory Board, and other advisory reviews commissioned by EM or Congress.

- **Program Support.** Program Support activities include three main activities: 1) planning and budgeting for the EMSP, 2) developing and maintaining the EMSP master schedule, and 3) providing administrative support for EMSP activities. This activity also develops the plan and interfaces necessary for the efficient and effective operation of the EMSP.
- **Systems Integration Support.** Integration support will involve developing and maintaining a configuration management and document control system consistent with the applicable DOE orders to ensure traceability and defensibility of our databases.
- **Metrics Development.** Based upon the success indicators, metrics will be developed and tracked for both the program and the individual research over the next year. Program metrics are needed that are quantitative and consistent with the Focus Areas. Both the National Research Council and Congress have asked for the use of metrics for this program.

6.3 Research Needs and Opportunities Assessment

The research needs and opportunity identification and assessment process follows the five-step approach described on the next page. Needs are defined as research needs necessary to support development of a technology not currently available, whereas an opportunity is an area where new research may positively impact a current process. Research needs and opportunities provide a consistent, defensible basis to identify potential gaps for future solicitations. These steps are as follows:

- **Comprehensive Needs Collection.** Research needs and opportunities are collected by EM through the *Paths to Closure* data collection process. The STCGs are responsible for working with site end users to identify relevant research needs and opportunities and these are communicated to the Focus Areas. Focus Areas are responsible for developing responses including research/technology paths forward that support solving a need. The EMSP then plans research agendas to support the Focus Areas. EMSP team members also work with sites to develop or clarify research needs and opportunities on an as-needed basis.
- **Research Needs Screening, Selection, and Prioritization.** The Focus Areas during the annual budget process, working closely with sites and STCGs prioritize needs and opportunities.

These prioritized needs are incorporated into basic and applied research work packages and provide a basis for establishing a relevant research program.

- **EMSP Linkage Development.** Prioritized needs and opportunities are linked to the existing portfolio of research projects to identify potential gaps between needs and research funded. Research projects are linked to the high impact clean-up projects and to the waste streams identified in *Paths to Closure*. Needs are also linked through the EM-50 Needs Management System (NMS) by STCG number. The EMSP is currently working with EM-50 to enhance integration with the NMS. Research needs are also linked to the EM-50 Analysis and Visualization System (AVS) through STCG number. Needs can be traced to specific waste stream disposition maps for EM.
- **Research Needs Analysis.** The list of potential gaps is then sent to the STCGs and the Focus Areas. This information is used for formulation of future solicitations.
- **EMSP Needs Database Management.** A key aspect of the needs assessment process is an Internet accessible database of EMSP needs. The database is valuable due to easy accessibility, and users may search for research needs by Focus Area, Crosscutting Programs, or Science Category.

6.4 Research Solicitation

- **Solicitation Development.** Development of the solicitation(s) is conducted in partnership with the DOE-SC, and is based on information gathered through the research needs identification process. Focus Areas also participate in identifying subject areas for the solicitation. Solicitations are published in the Federal Register in accordance with 10 CFR 600 and 605.
- **Solicitation Support.** Activities to support the distribution of the Request for Applications, pre-application and formal application relevance review processes are conducted jointly by OBAR and DOE-ID.
 - **ID Support**—DOE-ID assists in the distribution of the RFA(s) to perspective researchers. They prepare materials to support the pre-application and formal application screening during the relevance review process. These materials include research needs documents and Project Summary Documentation of existing research projects.
 - **Reviewers**—EMSP identifies federal reviewers for the pre-application review screening and includes Focus Area and other appropriate end-user representatives in the relevance review.
- **Research Project Selection.** The research project selection is a systematic process used to evaluate pre-applications and formal applications for scientific merit and relevance to the DOE environmental clean-up mission.
 - **Pre-application Review**—A review of all pre-applications is performed by DOE-SC to ensure the research will focus on basic science and by DOE-EM to ensure research needs will be addressed. Letters encouraging or discouraging submittal of formal applications, based on the results of the pre-application review, are sent to the researchers.
 - **Merit Review - Formal Applications**—The first part of the two-stage formal application review process is performed by DOE-SC. A panel of external peer review experts evaluate all formal applications to determine scientific merit. Formal applications with scientific merit are forwarded to the relevance review.
 - **Relevance Review - Formal Applications**—The second part of the two-stage formal application review process is performed by DOE-EM. A panel of federal scientists and

engineers including the Focus Areas, evaluate formal applications with scientific merit for relevance to DOE-EM's clean-up problems.

- **Review Feedback**—Reviewer comments are provided to successful and unsuccessful candidates in order to increase the transparency and technical credibility of the review process.
- **Research Funding.** The EMSP works with DOE-SC to determine the final award amounts for the successful applications and assists in assembling the award packages for grant and laboratory awards.

6.5 Project Research

- **Typical Project Life Cycle.** This section details the processes and events associated with the lifecycle of an EMSP project. The time period for events associated with a project extends over four years.

Grants are prepared and awarded to university based projects and EM Technical Task Plans are developed for national laboratory activities. Generally, university grants are awarded for the full three-year performance period, where as national laboratory activities are funded on an annual basis.

Following project award, the performance period begins. After completion of each year, the projects are required to provide an annual summary of research activities. In addition to the annual reports, project investigators are asked to provide periodic progress reports related to technical accomplishments, publications, and collaborations. These periodic reports can be associated with Program Tracking Summaries, participation in EMSP sponsored annual meetings, and attendance of EMSP sponsored topical workshops designed to inform DOE end-users. Project investigators are free to and encouraged to prepare and submit technical journal articles, present results at technical symposia, and present invited papers.

Within 90 days of completion of the three-year performance period, a final report is submitted. Since some projects progress at slower rates than others do and the program allows no-cost extensions on a case by case basis.

Researchers are encouraged to work with the EMSP program throughout the project lifecycle in order to maximize the ability to transfer research results to Focus Area projects or directly to EM end-user activities upon project completion as described in the Research Integration section. Further, researchers are encouraged to respond to future RFAs and to propose relevant research activities.

6.6 Portfolio Management and Analysis

- **Research Project Funding.** Funding activities include identifying funds available for research projects selected as part of the current year's portfolio selection process, analyzing total available funding, identifying funding options for calculating funding distribution over the life of the research projects, and distributing funding between research partners.

In order to accomplish these objectives and to track progress EMSP must:

- Develop Program Execution Guidance (PEG) and Technical Task Plan (TTP) for new and previous awards

- Prepare Task Change Requests for funding changes
- Identify program management funding options
- Collect information from the Progress Tracking System (PTS) on project performance.
- **Grant Administration.** DOE–SC engages the researchers in discussions to develop final award amounts and ensures that any anomalies in the proposals are resolved. In order to establish the grant, EMSP works with DOE-ID Procurement to issue the research award funding. If it is necessary to modify existing awards, the EMSP works with SC and OBAR. Files with this basic data are created and managed for new and existing research awards in order to facilitate tracking and changes.
- **Project Disposition.** The close out of the projects include the distribution of a final disposition letter, a file disposition, a research results report analysis, and a resolution of database issues. The EMSP works to engage Focus Areas and site end users throughout the lifecycle of the research to support research results transition after completion of the research projects.
- **EMSP Data Management.** EMSP collects information on the research projects, such as abstracts, funding levels, researchers’ statistical information, DOE points of contact, and institution information for ready retrieval by DOE, researchers, and the public. As part of this function EMSP interfaces with researchers and DOE-ID Operations Offices to communicate, explain, and facilitate compliance with OBAR program expectations and requirements.
- **Data Analysis.** Analysis of the EMSP portfolio is required for information used in presentations and to inform decision-making by DOE-HQ, stakeholders, and other interested parties. Typical analyses include funding profiles (i.e., EM/SC category, by state, universities/national labs, etc.) and statistical profiles (i.e., numbers of projects by state, institution, etc.).
- **Research Project Reviews.** In addition to annual reporting requirements for researchers, EMSP conducts workshops where researchers are invited to report on the status of their research, and demonstrate the progress and relevance of their research project.

6.7 Research Integration

- **Research Transfer.** The objective of Research Integration is to facilitate the transfer of research results generated by EMSP-funded research so that promising ideas are transferred to the next technology development gate in an effort to close the so-called “Valley of Death” between applied research and technology development. Research knowledge integration or transfer is analogous to Technology Transfer, which historically has shown that pushing technology downstream does not work. For technology transfer to work it must be embraced and pulled by the next developer in the chain. Areas being developed to facilitate this include:
 - a) Promoting knowledge transfer and communication of research results to potential end users for follow-on work such as field studies and collaborative research
 - b) Developing/Encouraging Champions/Advocates/Sponsors to help researchers get the information they require about EM problems and promoting the results generated by the research to potential users
 - c) Using technical liaisons to support early and meaningful engagement of Focus Areas and site end users throughout the research lifecycle.

- **National EMSP Workshop.** The National Workshop is used in combination with other venues such as topical workshops and conferences to provide a comprehensive forum for information exchange. Objectives of the workshop are: (1) transfer knowledge from the researcher to the end-user, (2) give the researchers better understanding of the clean-up problems, (3) promote informational interchange among the researchers, and (4) increase public awareness of the EMSP.

Workshop objectives are accomplished by facilitating and promoting the exchange of information among EMSP researchers, site problem holders, Focus Area/Crosscutting representatives, and other interested end-users. This national event includes participation by the EMSP researchers as well as numerous stakeholders from across the EM program. The workshop provides opportunities for all interested parties to participate in informational exchange and helps ensure the EMSP stays focused on EM program needs.

The second National Workshop is scheduled for spring 2000 in Atlanta, Georgia. The DOE-SR Operations Office is providing significant technical and logistical support for hosting the National Workshop.

- **Topical Workshops.** The objective of the topical workshops is to establish and maintain lines of communication between EMSP researchers and potential end-users at a detailed level that enhances the quality of the research towards cleaning up legacy waste and promotes the research to the end-user. The topical workshops will fall into four categories:
 - Focus Area or Crosscutting specific workshops
 - Site-specific workshops focused on issues relating to individual DOE sites, such as the one conducted in July 1998 at the Savannah River Site
 - Workshops intended to address specific science or problem area issues
 - Leverage existing national professional meetings by funding and chairing sessions of interest to the EMSP.

Workshop proceedings will document recommendations, provide a contact list, and incorporate copies of presentations where available. The proposed 2000 workshops complement the subject areas covered by the 1999 workshops and are tentatively identified below:

- Characterization Monitoring and Sensor Technology (CMST) – March 2000
- Actinide Chemistry, Albuquerque, November 1999
- Vadose Zone, Hanford, November 1999
- Health Ecology and Risk and Non-Ionizing Radiation, DOE-HQ, November 1999

Table 6.7 shows a preliminary schedule of events for the next 14 months. The following sections describe the reasons and goals of participating in program reviews, meetings, and conferences.

- **Focus Area Reviews**—The objective of integrating the EMP into Focus Area reviews is to allow researchers with research pertinent to a particular Focus Area better understand end-user needs and site problems. Dialogue between the end-users and researchers provides a basis for better understanding of how the research results can be applied to a particular area and develops a foundation with potential end-users to "pull" mature research towards technical development and deployment. Focus Areas should indicate and facilitate interaction where there is a potential application and provide

recommendations for tailoring planned research activities towards meeting Focus Area needs.

- **Professional Society Meetings**—To reduce costs, promote information exchange, and access a greater diversity of scientific talent and end-users, EMSP will sponsor symposia at appropriate established professional meetings. These symposia will focus on integration and communication among scientists contributing to common R&D areas. EMSP will reach a broader audience of diverse scientific talent by collaborating with scientific professional organizations offering greater diversity in information and interactions. Symposia topics will be focused on EMSP R&D and provide the opportunity for real-time knowledge exchange. Topics for the individual symposium will be proposed by EMSP to the appropriate professional organization(s) for inclusion on the annual meeting program. The American Nuclear Society and the American Chemical Society are two professional organizations that may collaborate with the EMSP as a meeting sponsor. The product from each of these professional society meetings will be a report detailing the workshop, its findings, and action plans.
- **Conferences.** Attendance at conferences allows the EMSP to promote its funded research at selected meetings. This will allow a wide and promising audience of interested researchers or end-users to stimulate interest in the EMSP.

Table 6.7. FY 2000 Research Integration Events

Event	Start	End
Exhibitions		
11th TIE Workshop - Las Vegas, NV	10/26/99	10/28/99
Material Research Society - Boston MA	11/29/99	12/03/99
SERDP - Washington ,DC	11/30/99	12/02/99
Oak Ridge Environmental Conference Oak Ridge, TN	12/07/99	12/08/99
Waste Management 2K - Tucson	02/27/00	03/01/00
11th Annual Applied RD&D Technology Colloquium – Scottsdale, AZ	05/09/00	05/12/00
ER-Tec – DOE-SR -TBD (estimated dates)	06/06/00	06/08/00
ACS Fall 2000 - Washington, DC	08/20/00	08/24/00
Spectrum 2000 - Chattanooga, TN	09/24/00	09/27/00
Workshops		
DOE- AL Actinide Chemistry Workshop – Albuquerque, NM	11/08/99	11/10/99
Actinide Chemistry Workshop - AL	11/08/99	11/10/99
Low Dose FY 99 Awards Kick-Off Meeting - Washington, DC	11/8/99	11/10/99
Vadose Zone FY 99 Awards Kick-Off Meeting - Richland, WA	11/16/99	11/18/99
EMSP NATIONAL WORKSHOP Atlanta, GA	04/24/00	04/27/00
Focus Area Meetings		
SCFA Mid-Year Review – Albuquerque, NM	03/14/00	03/16/00
TFA Mid-Year Review – Las Vegas, NV	03/07/00	03/09/00
DDFA Mid-Year Review –Morgantown, WV	03/28/00	03/30/00
MWFA Mid-Year Review - SLC, UT	02/08/00	02/10/00
NMFA Mid-Year Review – Tucson, AZ	02/28/00	03/02/00

6.8 Communications

Communications will support the successful transfer of knowledge from research to end-user and will be considered in every aspect of the operation and management of this program. The communications plan is the guidance document that guides all communication with any of the stakeholder groups identified in Figure 5.0. The Communications Plan addresses the following elements:

1. Peer reviewed scientific literature – Journal articles and papers developed by the EMSP researchers
2. EMSP Web Page – Management and maintenance of the EMSP web pages including updates as necessary to web page content and provision of tools to find and link EMSP related information available online.
3. Focus Area Liaison Support – Federal employee-led function to promote good will and research cooperation between Focus Areas and EMSP
4. Publications/Press – Prepare press releases and articles promoting promising research results
5. Contributions/Inserts to *Initiatives* – Prepare articles and/or inserts for publication in *Initiatives* and subsequent distribution via existing channels to OST audiences
6. EMSP Annual Report – Prepare an annual status report, similar to the Focus Area Annual Reports, but aimed more at reporting on progress made and planned activities for the next year
7. EMSP Calendar – Maintain a calendar of dates important to EMSP, including EMSP solicitation dates, workshops, Focus Area meetings, and other EM-related events
8. EMSP Exhibit Support – Prepare and staff exhibits for selected meetings and conferences to promote EMSP to other EM Programs and the greater scientific community.
9. Communications Plan – Prepare and update a comprehensive communications plan that identifies and provides guidance for development of all aspects of EMSP communications.
10. Research Accomplishments Report – Develop quarterly updates to this document which captures EMSP research accomplishments including publications, peer reviewed papers, graduate student numbers, collaborations, and transfer of research results for use or further development. The document's objective is to provide a single source where an end-user can locate the description, maturity of research, points of contact, and other information necessary to maximize the transfer of research knowledge
11. Research Project Data Management – This function, performed by the Office of Scientific and Technical Information (OSTI) archives and manages the data produced by individual research projects. This data includes project final reports, peer reviewed papers, and recommendations for future research. OSTI functions both as a repository and library for this information.
12. Pre Print Server – The Environmental Protection Agency (EPA) is working with the EMSP to establish a pre-print sever to be able to provide access to EMSP scientific literature.

6.9 Current Projected Research Needs

With the assistance of the focus areas, the EMSP has assembled a current listing of research needs by problem area. These are general categories of research needs and will be used to support future program solicitations. More detailed information regarding needs may be obtained through the DOE-EM Needs Management System which may be accessed via the web at <http://EM-Needs.em.doe.gov>.

Deactivation and Decommissioning

Within the D&D investment portfolio, DOE funds research to advance science to solve environmental problems associated with placing equipment and structures in a desired end state. Desired end states include complete removal and remediation of the facility, release of the facility for unrestricted use, or release of the facility for restricted use. The following are some identified areas requiring scientific investigation:

- Detection and characterization of large metal and concrete structures
- Understanding the physics and chemistry of concrete or metal decontamination
- Characterization of contaminant binding
- Advancement of photon-assisted decontamination chemistry
- Methodologies for effective D&D of a large environmental site
- Understanding algae corrosion and development of growth inhibitors
- Generation of thermodynamic data for plutonium nitrate
- Development of neutron counting methods for sorting of remote handled radioactive waste.
- Improved modeling of thermodynamics properties.

The D&D basic research portfolio is concentrated in the scientific areas of analytical chemistry and instrumentation, biogeochemistry, engineering science, materials science, and separations chemistry.

Environmental Restoration

Research can assist the Department in solving environmental problems associated with hazardous and radioactive contaminants in soil and groundwater that exist throughout the DOE complex, including radionuclides, heavy metals, and dense, nonaqueous phase liquids. Currently, research is needed in the following areas:

- Fundamental improvements in the abilities to characterize contaminant geologic settings and chemistry, to assess data, and to predict the movement and fate of contaminants.
- New materials and designs must be developed and proven for caps and covers for buried waste and closed facilities in order to develop robust systems to insure waste isolation over the range of climate conditions and extreme events.
- Better understanding of the vadose zone processes which are complicated by the possibility of multiphase flow (e.g. water, air, contaminant), by competition between fluids for wetting of surfaces, by effects of alternating wet and dry periods and other factors.
- Improvements in treatment technologies for DNAPLs (including mercury). DNAPLs are the most difficult problem remaining for the saturated zone treatment since they exist as concentrated droplets or pools that slowly dissolve into or contaminate groundwater.
- Improved access, sampling, and delivery methods are needed since existing methods cannot place characterization and treatment technologies in DOE's deep plumes or concentrated zones to determine existence of contamination in these zones.

- Fundamental improvements to soil cleanup and segregation technologies in order to limit the volume of soil that must be excavated and stored in permitted waste facilities. The difficult problems are typically related to plutonium and uranium finely dispersed oxides at weapons test areas.
- Basic data or methods to support long-term decisions and to understand processes that affect the validity of remediation decisions and long-term effectiveness of remediation activities.

The research portfolio includes studies in actinide chemistry, analytical chemistry and instrumentation, engineering science, geochemistry, geophysics, hydrogeology, inorganic chemistry, microbial science, and plant science. Research also included in this area includes studies related to health, ecology and risk and associated with microscopic effects of radiation.

High-Level Waste

Within the High-Level Waste investment portfolio, DOE funds research that advances science to solve environmental problems associated with storage tanks containing highly radioactive wastes, which include organic and inorganic chemical compounds in solid, colloidal, slurry, and liquid phases. Specific basic science needs identified in the area of high-level waste are:

- Improved understanding of tank corrosion mechanisms and rates.
- Improved understanding of waste components with limited solubility in glass (phase separation and crystallization) to improve waste loading.
- Investigation of fundamental chemistry of key waste components including aluminum, chromium, and actinides.
- Investigation of the fundamental chemistry of technetium and potential technetium separation processes.
- Long-term performance models to evaluate low-activity waste form release rates as a function of physical and chemical environment in the disposal system.
- Development of improved separation agents and processes to remove cesium, strontium, technetium and transuranics from supernatant solutions.
- Data and models of site-specific moisture and contaminant transport properties, including recharge rates, hydraulic properties, and contaminant retardation factors.

Between 1997 and 2001, 42 research projects will be funded for a total amount of \$49.3 million. The most promising and applicable basic research projects will transition to applied research or more advanced stages of technology development. The present HLW directed research portfolio is concentrated in the scientific areas of actinide chemistry, analytical chemistry and instrumentation, engineering sciences, geochemistry, hydrogeology, inorganic chemistry, materials science, and separation chemistry.

Mixed Low Level Waste (MWWL)/ Transuranic Waste (TRU)

Within the MLLW/TRU investment portfolio, DOE funds research that advances science to solve environmental problems associated with very limited treatment options and disposal capacities. The following science needs have been identified in the area of MLLW/TRU:

- Characterization, handling, stabilization and transportation of waste streams associated with containerized waste.
- Develop non-invasive, nondestructive instrument concepts for remotely assaying transuranic constituents in waste that emit low intensities of neutrons or gamma rays with respect to the high background fission product emissions.

- Develop non-invasive, nondestructive instrument concepts for assaying transuranic waste containing hazardous metals and organics.
- Develop packaging concepts for enhancing the payload content of transuranic waste shipping containers.
- Stabilization of waste streams generated from operating and waste treatment facilities.
- Understand the mechanisms for the formation of dioxins and furans in off-gas streams.
- Characterization, handling, and stabilization of waste streams generated from environmental restoration, and decontamination and decommissioning projects.
- Storage and disposal of waste products.

The MLLW/TRU directed research portfolio is concentrated in the areas of actinide chemistry, analytical chemistry, and instrumentation engineering, science microbial science and, separations chemistry.

Nuclear Materials

Within the Nuclear Materials investment portfolio, DOE funds research that advances science to solve environmental problems associated with unstable materials, such as plutonium metals and oxides, highly enriched uranium and nuclides of other actinide elements, and the long-term storage of stabilized materials. The following topical areas for science were identified in the area of nuclear material:

- Stabilization, processing, packaging, and transportation of nuclear materials streams.
- Development of new process parameters (specifically for the magnesium hydroxide precipitation process) to allow the processing of impure and concentrated solutions.
- Evaluation of process parameters (for melting of fuel and dilution of fissile material with aluminum and depleted uranium).
- Storage (long-term) and disposal of nuclear materials stream products.
- Development of new concepts for reducing the radioactivity of the nuclear materials stream products.

The nuclear materials directed research portfolio is concentrated in the scientific areas of actinide chemistry, analytical chemistry and instrumentation, engineering science, and materials science.

Spent Nuclear Fuel

The Department funds research that advances science to solve environmental problems associated with safely and efficiently managing spent nuclear fuel from both domestic and foreign reactors. Six types needs requiring improved scientific understanding were identified in the area of spent nuclear fuel:

- Stabilization of spent nuclear fuel, including mechanism of pyrophoricity and combustion parameters for various fuel types.
- Characterization/nondestructive examination (moisture content, radioisotope inventory, physical conditions, criticality, and synergistic effects) of spent nuclear fuel.
- Characterization of corrosion, degradation, and radionuclide release mechanisms, kinetics, and rates for the representative fuel matrices; mechanisms which may lead to accelerated degradation of containers; dissolution characteristics of the matrices; and the effects of microbes on fuel packages; long-term storage and deterioration of fuel/canisters of spent nuclear fuel.
- Characterization of water clarity of basins.
- Development of alternative spent nuclear fuel processes, waste forms, alternative disposal processes, and mixed oxide fuels.
- Development of methods to remove moisture without damage to fuel elements.

The spent fuel directed research portfolio is concentrated in analytical chemistry and instrumentation, engineering science, inorganic chemistry and, separations chemistry

Health, Ecology, and Risk

Health, ecology, and risk is a crosscutting problem area, therefore, the research investment will impact cleanup work across the Department of Energy (DOE) complex. There is scientific uncertainty about the levels of risk to human health and the environment at the end stages of the DOE cleanup effort. Accurate risk analyses require thorough knowledge of contaminant characteristics, basic ecological processes and principles, rates at which contaminants move through ecosystems, and health and ecological effects. In particular, better knowledge of radionuclide and toxic chemical transport dynamics and the potential effects of long-term exposure to low levels of radionuclides, in combination with other contaminants, is needed to assist the DOE in its efforts to protect the public, workers, and the environment. This research would also improve the understanding of threatened and damaged ecosystems and processes to restore their viability and quality. For a better understanding of the Focus Area specific health, ecology, and risk related needs, visit the Focus Area Web sites.

6.10 Future Solicitations

It is anticipated that EMSP budget levels will remain stable throughout the budget years covered by this MYPP. Funding available for future solicitations is dependent upon both annual funding appropriations and the funding required to cover the annual "mortgage" of ongoing research awards. The FY 2000 solicitation will be designed to support maturing some of the current EMSP basic research towards more applied research. As funding for applied research and exploratory development increases within the Focus Areas, solicitations will concentrate on open calls for targeted fundamental research. Estimated funding levels are provided in Figure 1.2 and general topics of research have been outlined in Section 6.9. Anticipated areas for future research include:

- **FY 2000: General.** It is anticipated that the FY 2000 solicitation will be a general call similar to the FY 1996 and FY 1997 calls for proposals. Currently it is planned that the FY 2000 call will be a limited eligibility call focused on taking basic research performed under 1996 and 1997 calls and advancing this research toward more applied research in targeted areas of interest that will be identified in the solicitation.
- **FY 2001: High Level Waste.** This will also be an open eligibility call. The EMSP will work with the appropriate Focus Area personnel to ensure that current research needs are clearly identified in the solicitation.
- **FY 2002: Subsurface Contamination/Mixed Waste/Nuclear Materials.** It is anticipated that this call for proposals will be an open call focused on targeted fundamental research within the subject area.
- **FY 2003: Long Term Stewardship.** This call will focus on targeted fundamental research that supports the issue of long term stewardship of DOE cleanup and closure sites.
- **FY 2004: Deactivation and Decommissioning/High Level Waste.** This call will be for targeted fundamental research in the aforementioned cleanup subject areas.

APPENDIX A: EMSP KEY PERSONNEL/ORGANIZATION

EM Science Program – Headquarters

Provide policy and programmatic support of the EM Science Program, including leading Request for Applications of research needs, ensuring research has application to DOE clean-up problems, and ensuring results are communicated to clean-up personal.

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EM Science Program - INEEL EM Science Program - INEEL

Provides assistance to the EM Science Program in conducting needs analysis, financial management and procurement, and serves as interface with Focus Areas, Crosscutting Programs, and other DOE field offices.

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APPENDIX B: STCG NEEDS/MULTI-YEAR FUNDING RESPONSE TABLE

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
DDFA	AL-09-01-02-DD-S	Radiological Air Monitoring Needs for Current D&D / ER Operations	AL009			60163	0	310	0	0	0	0	0
DDFA	AL-09-01-04-DD-S	Methodology for Effective D&D of Large Environmental Sites	AL009			54893	575	0	300	0	0	0	0
DDFA	AL-09-01-04-DD-S	Methodology for Effective D&D of Large Environmental Sites	AL009			64912	0	0	136	70	224	140	0
DDFA	ID-S.2.05	Understanding the Physics and Chemistry of Concrete Decontamination	ID-ER-110	DD-02/DD-08	Fuel Storage Pool and Associated Facilities D&D/Separation Process Facilities D&D	54860	784	0	0	0	0	0	0
DDFA	ID-S.2.05	Understanding the Physics and Chemistry of Concrete Decontamination	ID-ER-110	DD-02/DD-08	Fuel Storage Pool and Associated Facilities D&D/Separation Process Facilities D&D	55396	40	507	460	380	0	0	0
DDFA	ID-S.2.05	Understanding the Physics and Chemistry of Concrete Decontamination	ID-ER-110	DD-02/DD-08	Fuel Storage Pool and Associated Facilities D&D/Separation Process Facilities D&D	64896	0	0	195	100	321	200	0
DDFA	ID-S.2.05	Understanding the Physics and Chemistry of Concrete Decontamination	ID-ER-110	DD-02/DD-08	Fuel Storage Pool and Associated Facilities D&D/Separation Process Facilities D&D	65004	0	0	600	0	0	0	0
DDFA	ID-S.2.06	Understanding the Physics and Chemistry of Metal Decontamination	ID-ER-110			64946	0	0	301	125	474	250	0
DDFA	RL-DD022-S	Photon Assisted Decontamination Chemistry	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54914	423	271	271	248	0	0	0
DDFA	RL-DD022-S	Photon Assisted Decontamination Chemistry	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	55205	630	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54571	330	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54595	500	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54679	50	600	600	550	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54770	36	410	523	244	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54791	350	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54856	980	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54864	775	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	54926	360	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	55146	610	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	55185	749	0	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	59977	0	302	0	0	0	0	0
DDFA	RL-DD026-S	Contaminant Binding Science Need	RL-ER05/RL-ER06	DD-08	Separation Process Facilities D&D	60370	0	14	124	135	133	0	0
MWFA	AL-07-06-01-MW	Advanced Methods For Destruction Of 1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB) High Explosive.	AL015	MW-08	Facilitating Deployment for Unique Wastes	54122	327	0	0	0	0	0	0
MWFA	AL-07-06-01-MW	Advanced Methods For Destruction Of 1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB) High Explosive.	AL015	MW-08	Facilitating Deployment for Unique Wastes	55033	39	464	464	426	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
MWFA	AL-08-06-04-MW	Enzyme-Based Method for Destruction of 1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB) and 2,4,6-Trinitrophenylmethylnitramine (Tetryl) Bulk High Explosive	AL015	MW-08	Facilitating Deployment for Unique Wastes	54122	327	0	0	0	0	0	0
MWFA	AL-08-06-04-MW	Enzyme-Based Method for Destruction of 1,3,5-Triamino-2,4,6-Trinitrobenzene (TATB) and 2,4,6-Trinitrophenylmethylnitramine (Tetryl) Bulk High Explosive	AL015	MW-08	Facilitating Deployment for Unique Wastes	55033	39	464	464	426	0	0	0
MWFA	AL-09-01-21-SNF-S	Chemical Passivation of Spent Fuel Elements After Transfer from Wet to Dry Storage to Mitigate Future Corrosion in a Long-term Dry Storage Environment	AL013	None	None	60392	0	183	224	244	240	0	0
MWFA	AL-09-01-24-MW-S	Radioassay of Remote-Handled Transuranic (RH-TRU) Waste Containers to Meet WIPP Data Quality	AL013	None	None	54751	120	300	175	150	0	0	0
MWFA	AL-09-01-24-MW-S	Radioassay of Remote-Handled Transuranic (RH-TRU) Waste Containers to Meet WIPP Data Quality	AL013	None	None	65015	0	0	125	125	250	250	0
MWFA	AL-09-01-25-MW-S	Radioassay of Very Large Containers of Low-Level Contact-Handled Transuranic (CH-TRU) Waste to Meet WIPP Data Quality Assurance Objectives	AL013	None	None	54751	120	300	175	150	0	0	0
MWFA	AL-09-01-25-MW-S	Radioassay of Very Large Containers of Low-Level Contact-Handled Transuranic (CH-TRU) Waste to Meet WIPP Data Quality Assurance Objectives	AL013	None	None	65015	0	0	125	125	250	250	0
MWFA	ID-3.1.33	Develop In-Situ Hydrogen and Volatile organic Compound (VOC) Reduction	ID-WM-103	MW-05	Payload Enhancement for Transporting TRU Waste within Restrictive Regulatory Limits	55146	610	0	0	0	0	0	0
MWFA	ID-S.1.02	Continuous Emissions Monitors for Offgas Analysis	ID-HLW-101/ID-WM-101	None/MW-06	None/Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60070	0	538	0	0	0	0	0
MWFA	ID-S.1.05	Nondestructive Assay (NDA) Capability for Remote-Handled Transuranic Waste	ID-WM-103	MW-01	Nondestructive Characterization for Treatment, Transportation, and Disposal of MLL and MTRU Waste.	65015	0	0	125	125	250	250	0
MWFA	ID-S.2.02	Nondestructive Assay (NDA) for Resource Conservation and Recovery Act Metal and Chlorine in Incinerator Feed	ID-WM-101/ID-WM-103	None/MW-01	None/Nondestructive Characterization for Treatment, Transportation, and Disposal of MLL and MTRU Waste.	54751	120	300	175	150	0	0	0
MWFA	ID-S.2.02	Nondestructive Assay (NDA) for Resource Conservation and Recovery Act Metal and Chlorine in Incinerator Feed	ID-WM-101/ID-WM-103	None/MW-01	None/Nondestructive Characterization for Treatment, Transportation, and Disposal of MLL and MTRU Waste.	65015	0	0	125	125	250	250	0
MWFA	ID-S.2.04	Physics and Chemistry of Plasma Processing	ID-HLW-101/ID-HLW-103	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	54893	575	0	300	0	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
MWFA	ID-S.2.04	Physics and Chemistry of Plasma Processing	ID-HLW-101/ID-HLW-103	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60319	0	30	275	300	295	0	0
MWFA	ID-S.2.04	Physics and Chemistry of Plasma Processing	ID-HLW-101/ID-HLW-103	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60363	0	40	367	400	393	0	0
MWFA	ID-S.2.04	Physics and Chemistry of Plasma Processing	ID-HLW-101/ID-HLW-103	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	65422	0	0	251	113	287	225	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	54674	850	0	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	55205	630	0	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	59981	0	22	200	218	215	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60040	0	403	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60070	0	538	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60197	0	21	188	205	202	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60231	0	549	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	60247	0	482	0	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	64982	0	0	207	0	264	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	65001	0	0	650	0	0	0	0
MWFA	ORWM-13	Metals Monitoring of Gaseous Emissions	OR-411	MW-06	Monitoring and Removing Hazardous and Radioactive Contaminants from Off Gas Streams	65421	0	0	471	0	599	0	0
MWFA	SR99-2049-S	Technetium Chemistry Under Waste Removal Conditions	SR-HL03			59990	0	24	223	243	239	0	0
MWFA	SR99-2049-S	Technetium Chemistry Under Waste Removal Conditions	SR-HL03			60296	0	30	280	300	290	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
MMFA	SR99-2049-S	Technetium Chemistry Under Waste Removal Conditions	SR-HL03			65409	0	0	325	223	575	445	0
NMFA	AL-09-01-23-Pu-S	Selective Aqueous Non-invasive Extractions of Low and Medium Fired PuO2 from High Level Wastes, Residues, and Concentrates	AL008	Pu-03	Packaging and Storage	54735	450	50	50	50	0	0	0
NMFA	AL-09-01-23-Pu-S	Selective Aqueous Non-invasive Extractions of Low and Medium Fired PuO2 from High Level Wastes, Residues, and Concentrates	AL008	Pu-03	Packaging and Storage	55416	56	640	690	614	0	0	0
NMFA	AL-09-01-23-Pu-S	Selective Aqueous Non-invasive Extractions of Low and Medium Fired PuO2 from High Level Wastes, Residues, and Concentrates	AL008	Pu-03	Packaging and Storage	65352	0	0	468	57	227	113	0
SNF	AL-09-01-26-SNF-S	Determination of the Fissile Content of Spent Nuclear Fuel Stored at DOE Facilities	AL012/AL013			54751	120	300	175	150	0	0	0
SNF	ID-1.1.02	Microbiologically Induced Corrosion in Dry Storage Containers	ID-SNF-102			60401	0	404	115	90	40	0	0
SNF	ID-1.1.02	Microbiologically Induced Corrosion in Dry Storage Containers	ID-SNF-102			64931	0	0	345	167	561	333	0
SNF	ID-1.1.13	Stabilize U-Mo Fuel Metal Matrix	ID-SNF-102			59960	0	637	46	50	49	0	0
SNF	ID-S.1.06	Detect and Mitigate Microbiologically Induced Corrosion in Spent Nuclear Fuel Dry Storage Containers	ID-SNF-102			64931	0	0	345	167	561	333	0
SCFA	AL-07-01-01-SC	High Explosives (HE) & Barium (Ba) Remediation Of Soils, Surface Water And Groundwater	AL009/AL030	SS-06/SS-07/SS-08/Pu-02- Stabilization	Biological Treatment Systems/Vadose Zone Treatment Systems/Saturated Zone Treatment Systems/Miscellaneous Pu Residue Stabilization and Disposition	54122	327	0	0	0	0	0	0
SCFA	AL-07-01-01-SC	High Explosives (HE) & Barium (Ba) Remediation Of Soils, Surface Water And Groundwater	AL009/AL030	SS-06/SS-07/SS-08/Pu-02- Stabilization	Biological Treatment Systems/Vadose Zone Treatment Systems/Saturated Zone Treatment Systems/Miscellaneous Pu Residue Stabilization and Disposition	59786	0	800	0	0	0	0	0
SCFA	AL-07-02-03-SC	Low-Level Radioactive Waste Landfill Cap Design, Tritium Treatment/Removal Technology, In-Situ Vitrification, Pressure Grouting, and Real-Time Tritium Monitor	AL018	SS-03/SS-04/SS-11	Stabilization Technologies/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70069	0	0	0	50	100	150	150
SCFA	AL-07-02-03-SC	Low-Level Radioactive Waste Landfill Cap Design, Tritium Treatment/Removal Technology, In-Situ Vitrification, Pressure Grouting, and Real-Time Tritium Monitor	AL018	SS-03/SS-04/SS-11	Stabilization Technologies/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70135	0	0	0	280	0	420	0
SCFA	AL-07-02-03-SC	Low-Level Radioactive Waste Landfill Cap Design, Tritium Treatment/Removal Technology, In-Situ Vitrification, Pressure Grouting, and Real-Time Tritium Monitor	AL018	SS-03/SS-04/SS-11	Stabilization Technologies/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70187	0	0	0	67	133	200	200

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	AL-07-02-03-SC	Low-Level Radioactive Waste Landfill Cap Design, Tritium Treatment/Removal Technology, In-Situ Vitrification, Pressure Grouting, and Real-Time Tritium Monitor	AL018	SS-03	Stabilization Technologies	70219	0	0	0	147	303	417	343
SCFA	AL-07-02-03-SC	Low-Level Radioactive Waste Landfill Cap Design, Tritium Treatment/Removal Technology, In-Situ Vitrification, Pressure Grouting, and Real-Time Tritium Monitor	AL018	SS-03/SS-04/SS-11	Stabilization Technologies/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70267	0	0	0	270	100	485	150
SCFA	AL-07-04-01-SC	Non-Intrusive Removal of Polychlorinated Biphenols (PCBs) from Soil Both Above and Below the Water Table Underneath Buildings	AL007	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54548	557	0	0	0	0	0	0
SCFA	AL-07-04-01-SC	Non-Intrusive Removal of Polychlorinated Biphenols (PCBs) from Soil Both Above and Below the Water Table Underneath Buildings	AL007	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54889	651	0	0	0	0	0	0
SCFA	AL-07-04-01-SC	Non-Intrusive Removal of Polychlorinated Biphenols (PCBs) from Soil Both Above and Below the Water Table Underneath Buildings	AL007	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55396	40	507	460	380	0	0	0
SCFA	AL-07-04-01-SC	Non-Intrusive Removal of Polychlorinated Biphenols (PCBs) from Soil Both Above and Below the Water Table Underneath Buildings	AL007	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55416	56	640	690	614	0	0	0
SCFA	AL-07-04-01-SC	Non-Intrusive Removal of Polychlorinated Biphenols (PCBs) from Soil Both Above and Below the Water Table Underneath Buildings	AL007	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	60069	0	373	5	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54661	317	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54681	57	678	901	400	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54790	502	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54837	825	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	54860	784	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55013	26	350	350	224	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55033	39	464	464	426	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55041	483	0	0	0	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55061	380	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55097	325	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55105	196	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55211	478	0	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55267	34	390	411	400	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55343	15	180	185	170	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55396	40	507	460	380	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	55416	56	640	690	614	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	59786	0	800	0	0	0	0	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70035	0	0	0	219	78	392	117
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70054	0	0	0	300	0	450	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70063	0	0	0	300	0	450	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70081	0	0	0	477	220	276	167
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70121	0	0	0	179	410	481	230
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70126	0	0	0	250	39	399	59
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70135	0	0	0	280	0	420	0
SCFA	AL-07-06-04-SC	In Situ Remediation Of HE, Solvents, VOCs, SVOCs, Heavy Metals, And Landfill Materials	AL014/AL015	SS-06/SS-07	Biological Treatment Systems/Vadose Zone Treatment Systems	70165	0	0	0	144	308	381	217
SCFA	AL-09-01-01-SC-S	Transport of HE and Metals in Fractured Rock and Surface Alluvial Systems	AL009			55036	31	310	400	359	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	AL-09-01-01-SC-S	Transport of HE and Metals in Fractured Rock and Surface Alluvial Systems	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-03-SC-S	Succession and Long-Term Performance of Landfill Covers	AL009			54793	962	0	0	0	0	0	0
SCFA	AL-09-01-03-SC-S	Succession and Long-Term Performance of Landfill Covers	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-03-SC-S	Succession and Long-Term Performance of Landfill Covers	AL009			55011	30	363	363	332	0	0	0
SCFA	AL-09-01-03-SC-S	Succession and Long-Term Performance of Landfill Covers	AL009			60015	0	30	670	100	100	0	0
SCFA	AL-09-01-03-SC-S	Succession and Long-Term Performance of Landfill Covers	AL009			60231	0	549	0	0	0	0	0
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70012	0	0	0	200	0	310	0
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70045	0	0	0	240	0	360	0
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70108	0	0	0	83	167	250	250
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70115	0	0	0	372	0	0	0
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70165	0	0	0	144	308	381	217
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70187	0	0	0	67	133	200	200
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70220	0	0	0	92	199	240	125
SCFA	AL-09-01-05-SC-S	Decision Support Assistance for Remediation and Assessment Design	AL009			70267	0	0	0	270	100	485	150
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			54680	582	0	0	0	0	0	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			54793	962	0	0	0	0	0	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			55109	612	0	0	0	0	0	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			55395	35	425	415	370	0	0	0

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SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70045	0	0	0	240	0	360	0
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70069	0	0	0	50	100	150	150
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70149	0	0	0	67	133	200	200
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70219	0	0	0	147	303	417	343
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70220	0	0	0	92	199	240	125
SCFA	AL-09-01-06-SC-S	Issue of Scale in Flow Prediction and Contaminant Remediation in Porous Media	AL009			70267	0	0	0	270	100	485	150
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			54823	359	0	0	0	0	0	0
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			54860	784	0	0	0	0	0	0
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			70070	0	0	0	373	87	130	130
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			70163	0	0	0	123	259	342	250
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			70176	0	0	0	83	167	250	250
SCFA	AL-09-01-07-SC-S	Integration of Reactive Chemistry into Field-Scale Transport Models	AL009			70206	0	0	0	127	274	332	175
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			54576	384	0	304	158	0	0	0
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			54680	582	0	0	0	0	0	0
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			70069	0	0	0	50	100	150	150
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			70088	0	0	0	387	113	170	170
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			70187	0	0	0	67	133	200	200
SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsatrated Systems	AL009			70219	0	0	0	147	303	417	343

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SCFA	AL-09-01-08-SC-S	Differences Between Saturated and Unsaturated Systems	AL009			70267	0	0	0	270	100	485	150
SCFA	AL-09-01-09-SC-S	Quantifying Uncertainty in Predictions of Remediation Performance	AL009			70063	0	0	0	300	0	450	0
SCFA	AL-09-01-09-SC-S	Quantifying Uncertainty in Predictions of Remediation Performance	AL009			70165	0	0	0	144	308	381	217
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			54680	582	0	0	0	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			54793	962	0	0	0	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			55109	612	0	0	0	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			55395	35	425	415	370	0	0	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			70135	0	0	0	280	0	420	0
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			70149	0	0	0	67	133	200	200
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			70187	0	0	0	67	133	200	200
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			70219	0	0	0	147	303	417	343
SCFA	AL-09-01-10-SC-S	Physics of Fracture Flow and Transport in the Vadose Zone	AL009			70267	0	0	0	270	100	485	150
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			54680	582	0	0	0	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			54793	962	0	0	0	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			55109	612	0	0	0	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			55395	35	425	415	370	0	0	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			70045	0	0	0	240	0	360	0
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			70121	0	0	0	179	410	481	230
SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			70193	0	0	0	105	217	295	233

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SCFA	AL-09-01-11-SC-S	Water Fluxes and Solute Transport in Arid and Semiarid Environments	AL009			70206	0	0	0	127	274	332	175
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			54680	582	0	0	0	0	0	0
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			54793	962	0	0	0	0	0	0
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			55109	612	0	0	0	0	0	0
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			55359	40	893	917	857	0	0	0
SCFA	AL-09-01-12-SC-S	Groundwater-Surface Water Interactions	AL009			55395	35	425	415	370	0	0	0
SCFA	AL-09-01-13-SC-S	Low-Frequency Stress-Wave Stimulation for Enhanced Transport of NAPL Groundwater Contaminants	AL009			55395	35	425	415	370	0	0	0
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			54950	33	400	400	367	0	0	0
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			55395	35	425	415	370	0	0	0
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			70069	0	0	0	50	100	150	150
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			70108	0	0	0	83	167	250	250
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			70149	0	0	0	67	133	200	200
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			70219	0	0	0	147	303	417	343
SCFA	AL-09-01-14-SC-S	Vadose Zone Flux Rates	AL009			70267	0	0	0	270	100	485	150
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			54661	317	0	0	0	0	0	0
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			59996	0	25	229	250	246	0	0
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			64912	0	0	136	70	224	140	0
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			70070	0	0	0	373	87	130	130
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			70081	0	0	0	477	220	276	167

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SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			70132	0	0	0	313	67	520	100
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			70135	0	0	0	280	0	420	0
SCFA	AL-09-01-15-SC-S	Separation of Metals and Radionuclides from Uncontaminated Soils; Transport of Metals and Radionuclides in Sediments and Surface Alluvial Systems	AL009			70206	0	0	0	127	274	332	175
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	54584	506	0	0	0	0	0	0
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	54931	433	0	216	0	0	0	0
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	55031	28	285	360	349	0	0	0
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	55100	751	0	0	0	0	0	0
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	59918	0	863	0	0	0	0	0
SCFA	AL-09-01-16-Risk-S	Extrapolation Bias and Uncertainty from using Biomarkers and Numerical Models to Predict Real Ecological Effects	AL009/AL030	None/Pu-02-Stabilization	None/Miscellaneous Pu Residue Stabilization and Disposition	60037	0	21	189	206	203	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			54639	690	0	0	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			54674	850	0	0	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			55205	630	0	0	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			60141	0	551	230	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			60197	0	21	188	205	202	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			60231	0	549	0	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			60474	0	314	295	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			65001	0	0	650	0	0	0	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			70010	0	0	0	304	89	523	133

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			70050	0	0	0	214	89	388	133
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			70052	0	0	0	260	0	388	0
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			70179	0	0	0	107	226	292	200
SCFA	AL-09-01-27-SC-S	Long-term Monitoring Sensor Technology	AL018			70220	0	0	0	92	199	240	125
SCFA	AL-09-01-29-SC-S	Natural Attenuation Confirmatory Data for Supporting Protocol Development	AL018			55031	28	285	360	349	0	0	0
SCFA	AL-09-01-29-SC-S	Natural Attenuation Confirmatory Data for Supporting Protocol Development	AL018			70063	0	0	0	300	0	450	0
SCFA	AL-09-01-29-SC-S	Natural Attenuation Confirmatory Data for Supporting Protocol Development	AL018			70165	0	0	0	144	308	381	217
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	54735	450	50	50	50	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	54790	502	0	0	0	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	54823	359	0	0	0	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	54860	784	0	0	0	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	55185	749	0	0	0	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	60041	0	422	117	0	0	0	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	65351	0	0	274	4	9	9	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70070	0	0	0	373	87	130	130
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70081	0	0	0	477	220	276	167
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70088	0	0	0	387	113	170	170
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70121	0	0	0	179	410	481	230
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70135	0	0	0	280	0	420	0
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70163	0	0	0	123	259	342	250
SCFA	CH-SS01-99	Remediation of Strontium-90 Contaminated Groundwater	CH-BRNLRA	SS-08	Saturated Zone Treatment Systems	70206	0	0	0	127	274	332	175
SCFA	CH-SS03-99	Treatment of Radioactive Contaminated Soils	CH-BRNLRA	SS-10	Hot Spot Removal	54860	784	0	0	0	0	0	0
SCFA	CH-SS03-99	Treatment of Radioactive Contaminated Soils	CH-BRNLRA	SS-10	Hot Spot Removal	55071	356	0	0	0	0	0	0
SCFA	CH-SS03-99	Treatment of Radioactive Contaminated Soils	CH-BRNLRA	SS-10	Hot Spot Removal	55267	34	390	411	400	0	0	0
SCFA	CH-SS03-99	Treatment of Radioactive Contaminated Soils	CH-BRNLRA	SS-10	Hot Spot Removal	60355	0	42	382	417	410	0	0
SCFA	ID-6.1.01	In-Situ Debris Characterization for Partial Retrieval	ID-ER-106	SS-01/SS-10	Characterization, Monitoring, Modeling and Analysis/Hot Spot Removal	54751	120	300	175	150	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ID-6.1.01	In-Situ Debris Characterization for Partial Retrieval	ID-ER-106	SS-01/SS-10	Characterization, Monitoring, Modeling and Analysis/Hot Spot Removal	60141	0	551	230	0	0	0	0
SCFA	ID-6.1.01	In-Situ Debris Characterization for Partial Retrieval	ID-ER-106	SS-01/SS-10	Characterization, Monitoring, Modeling and Analysis/Hot Spot Removal	65015	0	0	125	125	250	250	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55036	31	310	400	359	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55061	380	0	0	0	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55105	196	0	0	0	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55351	21	254	254	233	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55374	41	490	490	449	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	55416	56	640	690	614	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	59786	0	800	0	0	0	0	0
SCFA	ID-6.1.04	In-situ Treatment of VOC Contaminated Groundwater in Deep Fractured Rock	ID-ER-101	SS-08	Saturated Zone Treatment Systems	70063	0	0	0	300	0	450	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			54681	57	678	901	400	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			54741	29	338	463	71	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			54793	962	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			54860	784	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55014	362	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55033	39	464	464	426	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55071	356	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55115	390	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55267	34	390	411	400	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55284	500	0	0	0	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			55416	56	640	690	614	0	0	0
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			70070	0	0	0	373	87	130	130
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			70126	0	0	0	250	39	399	59
SCFA	ID-S.1.01	Microbial Alteration of Heavy Metal and Radionuclide Partitioning at Mineral Surfaces	ID-ER-101/ID-ER-106/ID-ER-108			70165	0	0	0	144	308	381	217
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			54639	690	0	0	0	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			54857	638	0	0	0	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			54950	33	400	400	367	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			55011	30	363	363	332	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			55300	710	0	0	0	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			55332	56	750	650	568	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			55411	58	387	400	427	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			60199	0	630	0	0	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			60328	0	27	249	272	267	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70010	0	0	0	304	89	523	133

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SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70012	0	0	0	200	0	310	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70050	0	0	0	214	89	388	133
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70052	0	0	0	260	0	388	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70115	0	0	0	372	0	0	0
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70179	0	0	0	107	226	292	200
SCFA	ID-S.1.04	Real-time Field Instrumentation for Characterization and Monitoring Soils and Groundwater.	ID-ER-101/ID-ER-102/ID-ER-104/ID-ER-106			70220	0	0	0	92	199	240	125
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			54681	57	678	901	400	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			54741	29	338	463	71	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			54860	784	0	0	0	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			54888	451	0	0	0	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			54950	33	400	400	367	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			55014	362	0	0	0	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			55036	31	310	400	359	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			55359	40	893	917	857	0	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			59996	0	25	229	250	246	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			60015	0	30	670	100	100	0	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			70088	0	0	0	387	113	170	170
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			70135	0	0	0	280	0	420	0
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			70163	0	0	0	123	259	342	250
SCFA	ID-S.1.07	Facilitated Transport at DOE Disposal Sites	ID-ER-103/ID-ER-106			70176	0	0	0	83	167	250	250

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			54950	33	400	400	367	0	0	0
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			55036	31	310	400	359	0	0	0
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			55332	56	750	650	568	0	0	0
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			55351	21	254	254	233	0	0	0
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			55359	40	893	917	857	0	0	0
SCFA	ID-S.1.08	Contaminant Transport in a Fractured Rock Vadose Zone	ID-ER-106			55396	40	507	460	380	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			54698	19	225	225	206	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55011	30	363	363	332	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55108	30	360	360	330	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55152	607	0	0	0	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55332	56	750	650	568	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55351	21	254	254	233	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			55416	56	640	690	614	0	0	0
SCFA	ID-S.2.01	Definition of 'Biologically Active Zones' in Fractured Rock Environments	ID-ER-101/ID-ER-108			70165	0	0	0	144	308	381	217
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54576	384	0	304	158	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54635	40	483	644	283	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54683	650	45	53	75	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54741	29	338	463	71	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54793	962	0	0	0	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54823	359	0	0	0	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			54860	784	0	0	0	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			55014	362	0	0	0	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			55249	40	368	377	345	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			55284	500	0	0	0	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			55396	40	507	460	380	0	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			59996	0	25	229	250	246	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			60355	0	42	382	417	410	0	0
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			70070	0	0	0	373	87	130	130
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			70081	0	0	0	477	220	276	167
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			70163	0	0	0	123	259	342	250

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ID-S.2.03	Aqueous Transport of Soluble Radionuclides and Heavy Metals: Evaluation of Non-Equilibrium Processes and Native Surfaces in Porous Media	ID-ER-101/ID-ER-106/ID-ER-108			70176	0	0	0	83	167	250	250
SCFA	ID-S.2.07	Accurate, Representative Downhole Moisture Measurements in Unconsolidated, Consolidated, and Bedrock Materials	ID-ER-106			54793	962	0	0	0	0	0	0
SCFA	ID-S.2.07	Accurate, Representative Downhole Moisture Measurements in Unconsolidated, Consolidated, and Bedrock Materials	ID-ER-106			54857	638	0	0	0	0	0	0
SCFA	ID-S.2.07	Accurate, Representative Downhole Moisture Measurements in Unconsolidated, Consolidated, and Bedrock Materials	ID-ER-106			60247	0	482	0	0	0	0	0
SCFA	ID-S.2.07	Accurate, Representative Downhole Moisture Measurements in Unconsolidated, Consolidated, and Bedrock Materials	ID-ER-106			70220	0	0	0	92	199	240	125
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	55247	42	500	500	458	0	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	55328	300	80	80	80	0	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	59978	0	20	180	197	193	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	59981	0	22	200	218	215	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	60197	0	21	188	205	202	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	60218	0	20	183	200	197	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	60231	0	549	0	0	0	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	60247	0	482	0	0	0	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	65421	0	0	471	0	599	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70115	0	0	0	372	0	0	0
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70179	0	0	0	107	226	292	200
SCFA	NV18-9903-04S	Long-Term Monitoring of Moisture Content as a Precursor to Radionuclide Transport in the Vadose Zone and Closure Caps	NV370	SS-01/SS-04/SS-11	Characterization, Monitoring, Modeling and Analysis/Long-Lived Caps/Validation, Verification, & Long-Term Monitoring of Containment & Treatment	70220	0	0	0	92	199	240	125
SCFA	OK99-05	Separation of Tritium from VOC in Groundwater	OK-001	SS-08	Saturated Zone Treatment Systems	55103	38	451	451	414	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			54571	330	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			54724	33	370	484	232	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			54791	350	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			54837	825	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55012	333	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55071	356	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55118	455	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55185	749	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55267	34	390	411	400	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			55278	578	0	0	0	0	0	0
SCFA	ORHG-15	Mercury Remediation of Groundwater and Surface Water	OR-221			70054	0	0	0	300	0	450	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54122	327	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54585	351	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54655	921	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54680	582	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54683	650	45	53	75	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54699	486	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54741	29	338	463	71	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54793	962	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54860	784	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54889	651	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54908	777	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	54950	33	400	400	367	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55011	30	363	363	332	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55036	31	310	400	359	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55061	380	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55109	612	0	0	0	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55115	390	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55196	617	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55216	600	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55300	710	0	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55332	56	750	650	568	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55351	21	254	254	233	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55359	40	893	917	857	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	55395	35	425	415	370	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	60069	0	373	5	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	60144	0	1077	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	60199	0	630	0	0	0	0	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	70012	0	0	0	200	0	310	0
SCFA	ORHY-01a	Dense Non-Aqueous Phase Liquid (DNAPL) Source Characterization, Containment, and Treatment	OR-623	SS-01	Characterization, Monitoring, Modeling and Analysis	70052	0	0	0	260	0	388	0
SCFA	ORHY-06	Fractured Media Flow Characterization	OR-221/OR-321/OR-423	SS-01	Characterization, Monitoring, Modeling and Analysis	70069	0	0	0	50	100	150	150
SCFA	ORHY-06	Fractured Media Flow Characterization	OR-221/OR-321/OR-423	SS-01	Characterization, Monitoring, Modeling and Analysis	70108	0	0	0	83	167	250	250
SCFA	ORHY-06	Fractured Media Flow Characterization	OR-221/OR-321/OR-423	SS-01	Characterization, Monitoring, Modeling and Analysis	70219	0	0	0	147	303	417	343
SCFA	ORHY-06	Fractured Media Flow Characterization	OR-221/OR-321/OR-423	SS-01	Characterization, Monitoring, Modeling and Analysis	70267	0	0	0	270	100	485	150
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54122	327	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54635	40	483	644	283	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54790	502	0	0	0	0	0	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54837	825	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54860	784	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54888	451	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54889	651	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	54950	33	400	400	367	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55012	333	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55033	39	464	464	426	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55041	483	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55118	455	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55148	43	490	580	450	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55164	427	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55249	40	368	377	345	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55267	34	390	411	400	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55284	500	0	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55359	40	893	917	857	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	55416	56	640	690	614	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	59786	0	800	0	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	60041	0	422	117	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	60050	0	367	153	167	164	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	60069	0	373	5	0	0	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	60355	0	42	382	417	410	0	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	70063	0	0	0	300	0	450	0
SCFA	ORHY-12a	Active In Situ Dissolved Phase Treatment Systems	OR-623	SS-08	Saturated Zone Treatment Systems	70165	0	0	0	144	308	381	217
SCFA	RL-SS01	Cost-effective, In Situ Remediation of Carbon Tetrachloride in the Vadose Zone and Groundwater	RL-ER08	SS-07/SS-08/SS-11	Vadose Zone Treatment Systems/Saturated Zone Treatment Systems/Validation,Verification, & Long-Term Monitoring of Containment & Treatment	70035	0	0	0	219	78	392	117
SCFA	RL-SS01	Cost-effective, In Situ Remediation of Carbon Tetrachloride in the Vadose Zone and Groundwater	RL-ER08	SS-07/SS-08/SS-11	Vadose Zone Treatment Systems/Saturated Zone Treatment Systems/Validation,Verification, & Long-Term Monitoring of Containment & Treatment	70063	0	0	0	300	0	450	0

Focus Area	STCG No.	Technology Need	PBS No.	WP No.	WP Title	EMSP Project Number	FY96 (\$K)	FY97 (\$K)	FY98 (\$K)	FY99 (\$K)	FY00 (\$K)	FY01 (\$K)	FY02 (\$K)
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	54716	333	0	0	0	0	0	0
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	55087	53	640	640	587	0	0	0
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	60345	0	233	306	333	328	0	0
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	65339	0	0	232	100	368	200	0
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	65351	0	0	274	4	9	9	0
TFA	SR99-2034	Second Generation Salt Feed Preparation	SR-HL07/SR-HL13	TFA-3/WT-09-01	Alternative Paths to In-Tank Precipitation at SRS/Radionuclide Removal	65408	0	0	150	150	300	300	0
TOTAL							49757	57687	64697	58950	38723	31093	8596

APPENDIX C: PRIORITIZATION PROCESS

The mission of the EMSP is to identify and fund basic science research that results in transformational or breakthrough approaches to solving DOE's environmental problems. The EMSP identifies and funds basic research, which in turn may take years to impact actual clean-up. The EMSP looks at STCG needs from the basic science perspective and the probability that basic research will help mitigate the problem. Appendix B shows the relationship between STCG needs and DOE problems, as shown in the link from the needs to Project Baseline Summaries (PBS). The EMSP does not develop a response for and prioritize each need, as do the Focus Areas (FAs). The EMSP uses the FAs prioritization efforts to identify gaps in current EMSP research. The Focus Area prioritization of research needs forms the foundation for future EMSP solicitations. The EMSP also uses information gathered from other relevant sources, such as the Needs Management System and the Interim Data Management System to round out the gap analysis. Incorporating the FAs prioritization into EMSP solicitations ensures that EMSP research applies to current EM problems and is useful to the FAs. FAs then validate the gap analysis to ensure research gaps are correctly identified. The Focus Areas participate during the relevance review of new proposals and support prioritization of proposals for funding. The overall proposal selection and prioritization process shown in Figure C-1.

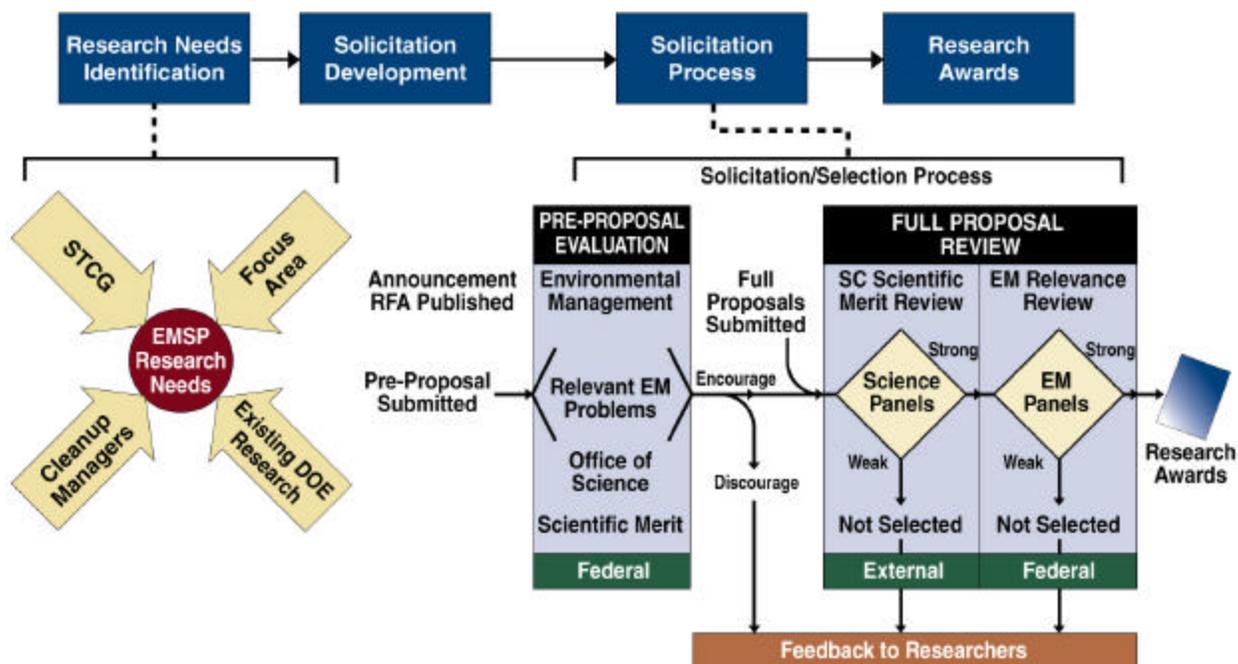


Figure C-1. EMSP Solicitation Process

APPENDIX D: MAJOR MILESTONES

Major Milestone Title	FY	Planned Date
EMSP National Workshop	2000	4/00
EMSP Call for Proposals	2001	12/00
EMSP Research Awards	2001	9/01
EMSP National Workshop	2002	10/01
EMSP Call for Proposals	2002	12/01
EMSP Research Awards	2002	9/02
EMSP Call for Proposals	2003	12/02
EMSP Research Awards	2003	9/03
EMSP National Workshop	2003	4/03
EMSP Call for Proposals	2004	12/03
EMSP Research Awards	2004	9/04