The Air Force Center for Engineering and the Environment Environmental Restoration Program Optimization

FY 2009 Semi-Annual Report AFCEE TDV

2009 ERP-O Program --- Streamlining and Enhancing Cleanup Outcomes

The Environmental Restoration Program Optimization (ERP-O) effort is targeting the challenges most frequently faced by Air Force cleanup managers by providing customized technical input, disseminating best practices, and intensifying its focus on protective cleanup outcomes and cost-avoidance. ERP-O reviews are on an increasingly aggressive schedule through 2010 and ensure that technical assistance, efficiency drivers, and expedited support for protective but accelerated close-out strategies are available to all USAF bases where environmental remediation is ongoing.

What is ERP-O and How Does it Work?

ERP-O is an overarching and systematic evaluation of an installation's past, current and planned cleanup activities whose goal is to ensure protection of human health and the environment over the entire restoration life-cycle at minimal risks and optimal costs. It is made up of three key components processes implemented through technical assistance visits.

- Investigation Process Optimization
  - Pre-Remedy-in-Place (RIP) and may involve the coordinated collection of samples using Triad
- Remedial Process Optimization
  - Evaluates existing treatment systems and Long-Term Monitoring
- Post-Closure Care
  - Recommend actions to finalize site closeout and other issues impacting program objectives

Investigation Process Optimization is an iterative/ systematic planning approach for evaluating remedial study programs with the goal of improving overall study program effectiveness, time and cost to achieve site RIP milestones and timely feedback to decision-makers. While the majority of sites reviewed over the last 6 months have achieved RIP, 53 percent of ERP-O recommendations are geared towards meeting RIP, demonstrating the program's focus on attaining this objective.

Remedial Process Optimization is an iterative/ systematic approach for evaluating existing and proposed remedial processes with the objective of improving overall control effectiveness, site cleanup time and costs, and timely feedback to decision-makers, including AFCEE R-PMO personnel.

ERP-O Technical Assistance Visits systematically address the approach for resolution of regulatory, technical, contractual and programmatic issues including conceptual site models and exit strategies, decision documents, contractual strategies, decision logic and background studies to advance protective and cost-efficient site closeout and post-closure care.

continued on pg. 2

RPMO Champions ERP-O

The AFCEE Restoration Program Management Office (R-PMO) continues its leadership of ERP-O by providing critical input to, and oversight of, the ERP-O program. Through R-PMO's vision and commitment, the ERP-O program serves as a technical and informational bridge in optimizing the Air Force cleanup program. This has the added benefit of assisting RPMO staff expand both the breadth and depth of their knowledge about their assigned bases by communicating ERA program site status between the Major Commands and R-PMO. In doing so, ERP-O efforts raise key questions about the operating assumptions, key technologies and paths forward for discussion between bases and R-PMO. The crucial partnership between R-PMO staff and base cleanup managers is exemplified during the follow-through on the cost-effective technical recommendations made by ERP-O teams. This involves careful planning and coordination of revisions to remedial approaches and efforts and often results in protective paths to millions in cost-avoidance, reduction of uncertainty,

and time savings. The ERP-O program assists bases by evaluating cleanup efforts across the nation to ensure they are efficient, protective, timely and that decision-makers are informed. They accelerate the closure of sites entering the last stages of remediation by up to an average of five years and advance a range of other community, management, health and risk reduction benefits.

continued from pg. 1

ERP-O provides a comprehensive set of tools and resources to manage risk and meet cleanup goals. Its focused and intensive reviews are conducted in partnership with base cleanup leaders to provide a "fresh set of eyes" on remedial programs and achieve broader USAF objectives. ERP-O achieves this while addressing state and federal regulations while incorporating sustainability efforts aimed at 21st century challenges such as water conservation and climate change.

As the vast majority of Air Force sites are now on track to meet Maj. General Del Eulberg's "Remedy-in-Place" goal by 2012 the program is transitioning from a cleanup implementation focus to a closeout orientation. To facilitate this transition, ERP-O teams are leaving base officials with sample Conceptual Site Models and Exit Strategies as fundamental decision aids for the work ahead and to assure attainment of RIP by 2012. For example, at Vandenberg AFB, 30 of 31 recommendations were geared towards pre-RIP actions to jumpstart RIP attainment. In addition, the ERP-O program is streamlining its own operations by shortening the time lag between pre-visit information gathering exercises and the intensive base visits to leverage the cost-effectiveness of the ERP-O team's time on base.

October 2008-March 2009 ERP-O Program Highlights

The Environmental Restoration Program Optimization effort continues to deliver carefully tailored technical assistance that can be leveraged for considerable cost-savings. For the 12 ERP-O visits that were accomplished over the last 6 months the reviews resulted in recommendations with an estimated cost of $8,073,000 to implement, with a projected cost avoidance of over $87,393,000 once they are complete. This results in a return on investment (ROI) ratio of 11 to 1. In some cases the ROI was substantially higher, such as at Hanscom AFB, where plans to transition to monitored natural attenuation as the ultimate base-wide remedy and the development of individual and base-wide exit strategies is likely to lead to an estimated cost-avoidance of $34,300,000 with a ROI of 41 to 1.

ERP-O teams focused on key regulatory findings at these bases as well. For example, at Hickam AFB the team reviewed the pipeline network and determined that discharges are to a marine, not freshwater, environment. As a result, the applicable regulatory cleanup standards may now be 100-fold more relaxed, warranting reconsideration of whether continuing remediation is even necessary.

Other reviews focus in on long-term monitoring (LTM) programs such as the one at Vandenberg AFB where using land-use controls to address dispersed PCBs is indicated. The use of new statistically-based tools to optimize LTM will result in a projected cost avoidance of $23,143,000. LTM optimization continues to be carefully examined by ERP-O teams and some bases were found to be proactively taking steps. At others, ERP-O teams offered specific advice on statistical approaches and strategic well locations to ramp up optimization in an effort to disseminate best practices.

At Edwards AFB performing stable isotope analysis on samples of nitrate-bearing source material and groundwater will allow managers to distinguish between sources. This will also support nitrate monitored natural attenuation remedies by demonstrating denitrification. This and other measures will allow for the shutdown of the groundwater extraction and treatment system creating nearly $26 million in estimated cost-avoidance after approximately $3.7 million in implementation costs. In addition, all 33 ERP-O recommendations focused on pre-RIP actions to aid the base in achieving that milestone.

At 4 bases recommendations will result in reduced risks to human health and the environment. Both at Charleston AFB and Vandenberg AFB, 4 of the 5 tracked technical recommendations would reduce risk. This would be achieved through a combination of refining decision-documents, performance monitoring plans and at Vandenberg, the use of Land Use Controls for dispersed PCB contamination.

ERP-O teams found examples of innovation and sustainable practices at a number of bases as well. At Kirtland AFB, cleanup managers had constructed a "pump-and-use" remedy where the removal of nitrate was then used to irrigate and fertilize the golf course on base. The nitrate loading to the golf course was carefully calculated and managed to prevent the spread of nitrate at unacceptable levels.

Strategic communications continues to be a focus of the current ERP-O program to raise awareness among Air Force personnel and the communities around bases about the value independent ERP-O reviews provide to the service's and the public's view of ongoing cleanup efforts. During the last 6 months, 8 articles were published or accepted for publication highlighting ERP-O findings in base

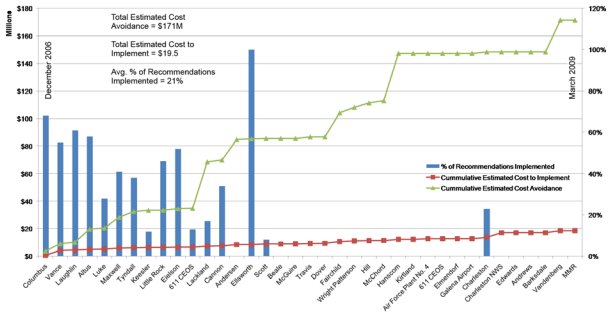
newsletters, AFCEE's *Centerviews*, and Travis AFB *The Guardian*. The articles have shared bylines that include base cleanup managers, AFCEE RPMO managers and TDV leaders to reflect the agreement of these cleanup partners on the findings and future directions for each base.

In addition, ERP-O team leaders and supporting consultants are publishing in the scholarly literature. An article by Dr. Javier Santillan and an ERP-O consultant on conducting mass balances at remedial sites appeared in the peer-reviewed *Remediation Journal*. Another article is in press in that journal as well as one in *Land Contamination and Reclamation* in addition to several others well into the peer review process.

While there is some normal lag time between when ERP-O recommendations are solidified and when action is taken to address them, the Figure below identifies long-term trends in the cost-avoidance and implementation of recommendations. Through March of 2009 ERP-O reviews have led to an estimated cost avoidance of $171 million with a cost to implement of $19.5 million.

ITRC – Remediation Risk Management

The ITRC RRM Team met April 22-24, 2009 to discuss the content of the upcoming RRM "Technical Regulation" (TechReg). The document will highlight



identification and quantification of uncertainties related to remedy selection, implementation, and completion of cleanups at contaminated sites. The final document is anticipated to be completed by the end of the year after a thorough review by ITRC member states, federal and industry partners, and other external reviewers.

The team also identified several trainers for the anticipated internet training being developed on a parallel track. This training will reflect the content of the TechReg document and will follow the ITRC evaluation and approval process. Members from the team presented a workshop based on RRM principles and solicited audience input at the annual March 11 West Coast Association for Environmental Health and Sciences conference in San Diego, CA.

EDITT -- Environmental Decision Information Tracking Tool

The EDITT tool has incorporated several new elements including the R2TM

tracking matrix and a Land Use Control (LUC)/ institutional controls (ICs) inventory module. It is important to the USAF, surrounding communities, regulators and other stakeholders to carefully track

LUCs/ICs, which are constraints placed on certain uses of land to ensure protectiveness. EDITT now has the capability to link its site inventory module with decision documents and other information. This allows a "site summary" write-up to be accessed to support the identification of various types of LUCs/ ICs, and for tracking the completion of inspections and reporting.

RPO Recommendation Tracking Matrix

The RPO Recommendation Tracking Matrix (R2TM) is a formal mechanism and process for tracking the status of ERP-O recommendations from delivery at the base through implementation. R2TM documents the value that is added from each recommendation from impact on human health risk, time to site closure, and cost avoidance. The matrix is a transparent and living mechanism for following through on ERP-O findings and remedial milestones, Phase II follow-on steps, and discussions with the regulatory community. It also provides an "accounting" function, and the ERP-O team is currently examining options for ensuring that key data such as implementation rates and cost avoidance/cost to implement are maintained on in an "evergreen" manner. The R2TM provides AFCEE with a programmatic and coherent way for ensuring ERP-O recommendations have positive impacts on the cost, timeliness, and risk reduction aspects of the Air Force Restoration program.

ERP-O.Org

The web-based knowledge management system ERP-O.org (http://www.erp-o.org) has quickly become the focal point for ERP-O teams and managers to collaborate, plan, coordinate logistics, identify work processes, and track key work products. Scheduling and staffing are maintained in a calendar available to the entire team including RPMO, AFCEE TDV and the contractors that support them. ERP-O.org continues to significantly increase the efficiency of logistics and management for the entire effort.

The following processes are tracked in ERP-O.org

- Previsit and Planning
- Program Planning
- ERP-O visit
- Detailed Assessment

continued on pg. 4

continued from pg. 3

- Implementation of Recommendation
- Work Product Status
- R2TM
- Communications

Sustainable Remediation Tool

The Sustainable Remediation Tool (SRT) is designed to evaluate particular remediation technologies reviewed by ERP-O teams on the basis of sustainability metrics. This easy-to-use tool, using Microsoft Office Excel®, facilitates sustainability planning and evaluation. It is intended to aid environmental remediation professionals to achieve broad goals including those addressed in Environmental Remedial Process Optimization reviews and to comply with Executive Order 13423.

Remedial actions can have unintended environmental impacts such as large CO2 emissions and intensive water usage. Many responsible parties, ranging from the chemical industry to the DoD, are beginning to analyze sustainability factors as part of their selection criteria for new remediation systems, as well as for evaluating and optimizing existing systems. Executive Order 13423 calls on the DoD to operate in a sustainable manner, leaving government environmental restoration professionals with the need for tools to develop sustainable remediation practices. The SRT allows users to estimate sustainability metrics for specific technologies for soil and groundwater remediation. The current technology modules included in the SRT are: a) Excavation, b) Soil Vapor Extraction, c) Pump and Treat, and d) Enhanced Bioremediation. Additional technologies and metrics are under development as well. The next release of the SRT, due later in 2009, will include evaluations for Biowalls, In Situ Chemical Oxidation, Thermal, and Long-term Monitoring/Monitored Natural Attenuation (LTM/MNA). Future releases may also include a Sediment module among the other technologies currently being evaluated. As the nation and world come to grips with climate change and water scarcity, AFCEE is at the leading edge of refining tools and techniques for addressing these long-term and important concerns.

ERP-O Based on Four Substantial Pillars

When ERP-O teams evaluate a base's environmental restoration program they comprehensively analyze contractual, programmatic, technical and regulatory issues extending from the past well into the future. The programmatic review focuses on how the remediation program is managed, including the impact on the Air Force mission of the status of each individual site and the resources that may have been compromised. In evaluating contracting issues, the ERP-O team reviews the base's strategy for supporting program plans, meeting Air Force goals, with a particular focus on how they will move sites to closure. Specific remedial challenges raised by the base are also addressed as is the base's track record in conforming with Air Force guidance and best practices for maintaining records and databases.

The technical evaluation comprises a comprehensive and detailed review of site conditions and the performance of remedial technologies. In addition, significant focus is placed on key decision documents like conceptual site models, exit strategies, and plans for long-term monitoring optimization. Risk drivers and five-year review criteria are carefully assessed, as is the technical quality of remedial systems and their progress towards meeting cleanup requirements and goals. Using AFCEE RPO guidance, options analysis is a key component of the review with a focus on remedial system performance. The recommendations result in improvements to the cost, risk, and time-to-closure factors over the life-cycle of restoration activity taken as a whole.

ERP-O teams examine all critical aspects of the environmental restoration program and the regulatory frameworks that USAF bases operate under. Regardless of what combination of Superfund, waste, or storage tank statutes that apply, ERP-O evaluators mold their program, technical and regulatory recommendations for the appropriate frameworks. Any specific regulatory issues that have been identified by the base are addressed from the lessons learned through a decade of ERP-O reviews and support the base in proactively resolving those issues. At the request of base personnel, ERP-O representatives provide follow-up support by briefing regulators in appropriate forums and venues to provide technical support in gaining regulatory acceptance of ERP-O recommendations.