

CONSENSUS IMPLEMENTATION OF A GROUNDWATER REMEDIATION PROJECT AT THE IDAHO NATIONAL ENGINEERING LABORATORY

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INTRODUCTION

While public interests have always been a factor in implementation of Federal programs, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) required public input in environmental cleanup decision making. The Department of Energy (DOE) has emphasized input of stakeholders in cleanup programs and formal opportunities for input have been created through public meetings and Site Specific Advisory Boards.

Environmental Protection Agency (EPA) and the state of Idaho Department of Health and Welfare (IDHW) involvement in the Idaho National Engineering Laboratory (INEL) environmental restoration program provides key stakeholder input to maximize responsiveness to cleanup needs.

While the greatest interaction among DOE and stakeholders is prior to the cleanup decisions which are documented in Records of Decision (ROD), the INEL FFA/CO approach has been to continue the active involvement of all parties in implementation activities. The effect is to avoid adversarial relationships and increase the emphasis of EPA and IDHW as true "partners in cleanup." The shift results in a greater focus on the cleanup goals of the program, thereby yielding shortened timeframes and facilitating cost effective implementation decisions.

The remediation of the contaminated plume at the Test Area North (TAN) has taken this partnership an additional step. Because of significant characterization uncertainties existing when the ROD was signed and the unfavorable national reputation of groundwater pump and treat remediation projects, the TAN groundwater ROD includes the evaluation of five emerging technologies that show potential for treating the organic contamination in situ or reducing the toxicity of contaminants above ground. Treatability studies will be conducted to ascertain whether any may be suitable for implementation at TAN to yield more timely or cost effective restoration of the aquifer. The implementation approach established for the TAN groundwater project is a consensus approach, maximizing a partnership relationship with constant, iterative implementation decision making.

HISTORY

INEL and TAN History

The INEL is a 890 sq. mi. Federal facility operated by the Idaho Operations Office (ID) of the DOE. The TAN complex is located approximately 50 miles northwest of Idaho Falls, Idaho, and is in the northern portion of the INEL and extends over an area of approximately 12 square miles. The Technical Support Facility is centrally located within TAN and consists of several experimental and

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support facilities that are for conducting research and development activities. The TSF-05 Injection Well is located in the southwest corner of TSF. Other major facilities in the TAN area include the Specific Manufacturing Capability located in the former Loss-of-Fluid Test (LOFT) Facility, the Initial Engine Test (IET), and the Water Reactor Research Test Facility (WRRTF).

The principal source of groundwater contamination at TAN is the TSF-05 Injection Well which was used from 1953 to 1972 to dispose of TAN liquid wastes into the fractured basalt of the Snake River Plain Aquifer. These wastes included organic, inorganic, and low-level radioactive waste waters added to industrial and sanitary wastewater. Activities generating these wastes included efforts to develop a nuclear-powered aircraft and tests simulating accidents involving loss of coolant from nuclear reactors.

National Priority Listing and the Federal Facilities Agreement/Consent Order

In November 1989 the INEL was included on the National Priorities List (NPL) of hazardous waste sites, in part based on the contaminated groundwater at TAN. Under CERCLA the risks posed by hazardous substances at such sites must be evaluated and, if necessary, appropriate remediation methods must be selected and implemented to reduce risks. Once listed on the NPL a Federal Facilities Agreement/Consent Order (FFA/CO) was negotiated with the EPA Region 10 and the IDHW. The FFA/CO and Action Plan for implementation furnished a framework for investigation and remediation of each area of contamination, called an Operable Unit (OU). These documents describe procedures, processes, and schedules to investigate and remediate the contaminated areas at the INEL. The FFA/CO was signed on December 9, 1991.

The Action Plan included as a CERCLA Interim Action (IA), work on the TSF-05 Injection Well. Contamination above drinking water standards had been discovered in the wells at TAN and employees were furnished bottled water for drinking. The Interim Action was conducted as a performance based contract with a vendor fabricating a treatment plant for short-term use at TSF-05 with payment based on volume of treated water and the vendor retaining ownership of the plant, with a commitment to remove it from the INEL upon completion of work. During operation of the Groundwater Treatment Facility (GWTF) continuous operations was never achieved. The characterization of contaminants upon which the IA GWTF design was based was significantly different than observed upon GWTF startup. Operation never achieved greater than batch mode operation.

The FFA/CO was negotiated to provide a framework for achieving environmental cleanup. The Project Manager representatives from each of the agencies interact continually and view themselves as partners in the cleanup of INEL. The Action Plan prescribes that each agency will designate a representative for each specific cleanup project. These counterparts are responsible for completing the assessment and implementing cleanup as determined necessary. The entire team meets annually in a retreat to assure common understanding, and the emphasis on cost effective cleanup decisions.

Contractor Team

In 1994 ID selected a new management and operating (M&O) contractor, Lockheed Idaho Technologies Company (LITCO), replacing the set of M&O's which had been at INEL for over fifteen years. As a part of the Request for

Proposal, LITCO was required to have a separate and independent Remedial Design/Remedial Action subcontractor. The LITCO subcontractor was Parsons Environmental Services. (In 1996 LITCO became Lockheed Martin Idaho Technologies Company, LMITCO.) In January 1995 ID, LITCO, and Parsons spent a full day in a facilitated retreat developing a "Partnership Charter" which recognized that all parties to the INEL Environmental Restoration Program were essential to success. Specifically, the Charter iterates a series of Shared Values and Responsibilities, one of which is: "Recognize EPA and IDHW Counterparts as Essential Partners in Reaching the Partnership Goal." The stage was set for consensus implementation of the TAN groundwater remediation project.

PROJECT CHALLENGES

Technical Challenges

The TSF-05 Injection Well is the source of contaminants in the contaminated portion of the aquifer. The ROD specifically addressed the volatile organic compounds (VOCs) and acknowledged that radionuclide contamination was also present and should be addressed in the cleanup project. The geology of the Snake River Plain is layering of fractured basalt with intermediate zones of alluvium. At TAN it is approximately 200 feet from ground surface to the top of the aquifer and the contaminated portion extends to an interbed approximately an additional 200 feet down. This interbed between layers of basalt has served as a barrier to downward movement of contaminants. The primary VOCs are trichloroethene (TCE), tetrachloroethene (PCE), and 1,2-dichloroethene (DCE). A TCE plume map is included. Prior to the IA, sludges were bailed from the Injection Well. During surges of pumping during the IA, sludges were again produced, creating a significant solids

management problem. Because of the fractured basalt environment and the fact that the secondary source is not well characterized, it is uncertain that the project will be successful in removing or destroying all contaminants.

The treatability studies prescribed in the ROD include in situ oxidation, ex situ zero valent iron oxidation, grouting to establish a containment curtain, enhanced bioremediation, and natural attenuation. The status of development of each of these technologies varies and the suitability of the technologies for the TAN groundwater remediation is uncertain. If any of the technologies is to make a contribution to the project, it must be more cost effective than the pump and treat technology prescribed in the ROD. Evaluations of the technologies and possible contributions to all or part of the project will be extremely complex to assure that the optimum remediation system is installed for the final, extended operation and maintenance period.

Cost Containment

While the overall INEL environmental restoration program has a strong theme of cost effectiveness, the FFA/CO project managers have committed among themselves that the ROD cost estimate of \$30M (present worth) will be a firm cost ceiling for the TAN groundwater remediation project. Initial cost estimates developed by LMITCO indicate that maintaining this ceiling will be a significant challenge. Several cost savings actions have been identified by the project team; however, performing the remediation over a thirty year period within the cost ceiling will require continual attention to all cost elements and implementation of only those for which value exceeds cost.

External Interests/Influences

Because of the technical difficulty of treating the hot spot surrounding TSF-05, the project is of great interest to those with science and research and development orientation. Several programs within DOE have funding to perform research at TAN, and a system of coordinating researchers is being established to assure that research performed contributes to the cleanup of TAN groundwater in a timely manner, or is conducted such that it does not interfere with the project and project schedules. The SSAB was supportive at the time the ROD was signed in 1995 and remains interested in the project as it progresses. Other interest groups remain interested, particularly in the approach taken to radionuclide removal, and must be recognized and kept informed. Performance based contracting is being emphasized in DOE and the relevant features of such contracting must be incorporated in the groundwater remediation contracting strategy. The recognition of and response to these various external interests will be an on-going challenge. Full project success must adequately address all these interests.

Relationships

While the Partnership Charter sets the stage for broad, team-type implementation of the project, the intensity of decision making presents a continuing challenge to the commitment to partner. Balancing the requirements for progress in surging and stressing TSF-05 to remove source material with the needs for additional characterization data with the evaluation of alternative technologies creates a sense of urgency to all decision making. Schedule demands force expedited consideration of certain issues that must be reconsidered when additional information becomes available. The commitment to managing by consensus is vital and must remain strong, particularly when problems develop or

actions on one part appear to be inconsiderate. The trust among the partners that each shares the same goal is key to success.

CONSENSUS IMPLEMENTATION

Team Approach

The TAN groundwater remediation project team includes strong representation from IDHW, EPA, and ID, and includes a strong team from LMITCO and Parsons. All share the goal of a cost effective remediation of the hot spot and the contaminated plume using the most appropriate technology available. The cost limitations for the project are a continual subject of discussion; each action discussed and each decision to be made are considered in terms of the cost implications. All parties operate from a position which respects all the other participants on the team. The result of continual communications is a working arrangement which maximizes the substance and minimizes the facade. Most discussions and decisions are documented in telecon meeting minutes, thus most of the decisions are made with all parties having an opportunity for input and an informal documentation system rather than the formal system established in the FFA/CO. Efforts can be devoted to project problems, rather than concentrating on features of a formal submittal. EPA and IDHW operate as "partners" rather than in the traditional confrontational role as a "regulator." Experience to date indicates that this style of cleanup management can work very effectively and maximizes the amount of progress that can be made within limited funding and time.

Challenges to Consensus Approach

The greatest challenge to continued use of the consensus approach to managing a project is the maintenance of the commitment to its use. It takes a great deal of work to allow all partners a

role in decision making; there is a sense of attraction to "getting away from everybody and just doing the job." But this is a short-sighted attraction and all parties on the TAN groundwater project realize that.

The mutual respect and trust that all partners share the same project goals and will act to serve that goal is difficult to build, but is an essential part of the process. Each of the partners brings special experience and skills to the problems of implementation. Each also brings methods of doing work and dealing with people. It is a continual challenge to focus on strengths and positive contributions and to ignore the less constructive aspects of interactions of a diverse, strong willed group of individuals.

Effective management of time available is a constant struggle. Everyone is very busy implementing aspects of the project and to schedule several hours of conference calls each week creates a real demand on patience. The team attempts to focus on the most significant issues, leaving the lesser ones to be resolved through routine implementation. But as C. Northcote Parkinson observed many decades ago, bureaucracies tend to spend lots of time on minor issues and little on the major ones, and this tendency at times afflicts the TAN groundwater project. Preparation of agendas for meetings and conference calls does help.

Constant Communication

It seems at times that we do indeed have "constant" communication because of all the conference calls and meetings. But in order for each of the team members to be prepared to provide meaningful input, most of the details of day-to-day activities and problems must be known by all. The team schedules two-hour conference calls twice per week at which current project status is reviewed and up-

coming issues are discussed and decisions made. Electronic communications among the parties facilitates transmission of written information, including minutes, issue papers, and reference papers. Status tracking is a continual effort to assure that agreements are kept and actions implemented as agreed. The calls at times are free-ranging and involve issues not directly related to current problems; however, in terms of teamwork and commitment to project goals, the discussions contribute to success.

The most significant operating benefit of consensus implementation is the ability to respond to changing conditions with flexibility and aggressiveness. When it became obvious that using only air stripping and carbon adsorption (the system in the existing GWTF and envisioned in the new GWTF) contributed to a very high life cycle cost for the project, the contractor team was promptly authorized to evaluate VOC destruction technologies such as advanced oxidation as a cost effective approach. Another benefit is faster project progress with actual progress determined by technical issues rather than administrative/regulatory issues. Certainly a sensitivity to the cost implications of actions results in more cost effective remediation and such sensitivity is very difficult to foster in any environment other than a team.

SUMMARY

The primary benefit of a consensus approach to remediation is the optimization of efforts based on timely and diverse inputs to the decision process. Each agency and team member has special experience and perspectives which contribute to the best implementation approach, all factors considered. This experience yields complementary inputs which result in the most cost effective implementation.

The routine involvement of all responsible parties leads to comprehensive understanding of

project goals and constraints, and provides a sound basis for flexibility and responsiveness when project implementation problems develop. Characterization of contaminants and hydrogeologic conditions is an on-going and at times dramatic process. Currency with all information is key to sound, timely decisions.

The primary challenge to the on-going, long term effectiveness of the use of consensus management is commitment. There is a significant amount of effort required to develop and maintain the consensus management focus and relationships. Despite political pressures to "assure stakeholder input to the decision process," reverting to an "us and them" approach may appear to be attractive, but is truly unacceptable if the goal is timely, responsive environmental restoration.

