CAPITALIZING ON POLICY SYSTEMS AND CORPORATE STRENGTHS TO APPLY REGULATORY AND TECHNICAL ADVANTAGES IN DISPOSITIONING HAZARDOUS LOW LEVEL WASTES

L. T. Blackford; R. R. Connolly; J. L. Westcott
Fluor Hanford, Inc.
PO Box 1000 Richland, Washington 99352

J. M. Atwood; G. J. Borden;
Bechtel Hanford, Inc.
3350 George Washington Way, Richland, Washington 99352

R. F. Guercia; O. Robertson, Jr.
US DOE Richland Operations Office
PO Box 550 Richland, Washington 99352

ABSTRACT

In the spring of 2002, senior management representatives of the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) formed a committee, called the Cleanup, Constraints, and Challenge Team (C3T), to review and suggest "breakthrough" opportunities in accelerating cleanup on the Hanford Site. The team commissioned by this committee identified a potential opportunity with a waste stream stored at the Central Waste Storage Complex (CWC). The waste was originally generated as a part of a Resource Conservation and Recovery Act (RCRA) closure action and consisted of ~3900 m^3 (~12,000 containers) of mixed radioactive and hazardous waste. This waste was the subject of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal action, commenced in August of 2002, involving development of an Environmental Engineering/Cost Analysis (EE/CA) and issuance of an Action Memorandum. This effort resulted in regulatory approval to undertake RCRA equivalent treatment and disposal, which commenced in July of 2003. The result of this action has produced a disposed volume of approximately 1,270 cubic meters (~4,000 85 gallon drums) to date, and will result in a 3 year reduction in project length, as well as a savings to taxpayers of approximately eight million dollars.

BACKGROUND

During the period of 1986 – 1996, a series of concrete basins located on the U.S. DOE Hanford Site, were the subject of a remedial action for closure under RCRA. The basins had initially been used in support of the 183-H Water Treatment Facility for treatment of raw river water prior to use as coolant in the 100-H reactor. In 1973, four basins were designated to treat chemical wastes generated during the fabrication of nuclear fuel. Very small quantities of compatible chemical wastes (e.g., unused inorganic laboratory chemicals) were also discharged into the basins on a non-routine basis. The basin treatment process consisted of natural solar evaporation to achieve volume reduction, with the resultant concentrated sludge remaining within the basins. This sludge was designated as a hazardous waste carrying both characteristic ("D") and listed ("U" and "P") waste codes.

The cleanup of the basins was begun under a RCRA closure plan that involved removal of basin chemical wastes, sediment, and debris, followed by sandblasting the basin walls to remove contaminated concrete. The wastes from this effort were stabilized, packaged, and then sent to the CWC for storage pending final treatment and disposal at a future date. At that time, the Hanford Site lacked the capacity for treatment

and disposal of these mixed low level (e.g, radioactive and hazardous) wastes (MLLW). The resulting volume of these wastes was approximately 12,235 drums and 48 boxes (~3900 cubic meters).

The final cleanup activities for the basins, such as bulk concrete and soils, were completed during 1996 as a CERCLA removal action with the wastes being disposed in the Hanford Site Environmental Restoration Disposal Facility (ERDF).

The packaged wastes remained in storage at the CWC awaiting two primary actions to occur: 1) development of waste treatment capacity for the Hanford Site and 2) operation of the Hanford Site Mixed Waste Disposal Facility. The disposal facility began operation in 1997 and consists of two RCRA-compliant Subtitle C disposal trenches with a capacity of approximately 30,000 cubic meters. However, permitting for these two trenches was limited and did not include the ability to accept "U" and "P"-coded hazardous waste for disposal since delisting for treatment of the leachates was not yet completed. This delisting effort commenced in 1998, and is not yet approved. Treatment capacity was also slow in developing due to funding constraints and difficulties experienced in establishing commercial capability. Actual sustained commercial treatment and disposal operations commenced in 1998 and continue to date. However, the vast majority of the treatment of stored wastes has been limited to non-thermal debris treatment (macroencapsulation) and has been challenged each year by funding constraints and treatment capacity. The estimate for treatment and disposal of the 183-H basin wastes at the Hanford Site Mixed Waste Disposal Facility under original planning (commercial treatment) was approximately $12 million dollars and six years to complete.

During the formation of the C3T teams, the DOE and regulatory agencies reviewed several waste streams on the Hanford Site and noted that the "183-H Basin Waste" stream appeared to be a very probable candidate for accelerated cleanup actions by disposal in the ERDF. The ERDF was fully operational and a portion of the cleanup actions for the 183-H basins had already been disposed there as a CERCLA action. The team decided to make the 183-H Basin Wastes the pilot for an accelerated initiative. However, this approach was complicated by the fact that the ERDF facility was operated under contract to the DOE by Bechtel Hanford, Inc. (BHI), and the CWC and Mixed Waste Treatment Programs were operated under contract by Fluor Hanford (FH). Further complicating the situation was the fact that EPA was the lead regulatory authority for ERDF and the authority for CWC and Mixed Waste Treatment was under Ecology jurisdiction. Clearly, mutual cooperation and a commitment to success, as well as, development of unique relationships would be necessary to assure the initiative could move forward.

The DOE approached BHI and FH in July of 2002 to review the initiative and allow the contractors an opportunity to suggest the most effective path forward and offer an assessment of the possibility of success. BHI and FH representatives from their respective waste management programs determined that the project offered a good opportunity for success and felt that cooperation could be fostered and gained within the framework of the law and the participants. The path determined to be the most viable was to address the 183-H Basin Wastes as a CERCLA removal action using an EE/CA and Action Memorandum combined with a treatability variance for the waste allowing existing on-site treatment capacity to be used. FH and BHI obtained approval to proceed from the DOE in August of 2002.

PROCESS

EE/CA Development

BHI and FH began the development of the EE/CA under a contractual arrangement that would take advantage of each contractor's corporate knowledge and experience to the maximum extent. FH contracted BHI to develop and manage the EE/CA. This was determined to be the most expeditious method for a quality program since BHI was very experienced in CERCLA actions and had a proven

record in developing EE/CAs and gaining approval from regulatory authorities for CERCLA actions . FH provided all technical information and supported in the EE/CA development based on its extensive experience in managing the waste and its experience in the characterization efforts on the wastes.

FH, BHI and the DOE also determined that it was imperative to understand the needs and issues perceived by regulatory authorities as necessary to be answered in order to support the action for the wastes. A series of development meetings were held with the EPA and Ecology to identify these needs and issues and to work through them in an expeditious fashion. It was apparent from initial meetings that while savings in time and cost were of importance to all parties, several influential members of the process were skeptical of the intent of the project and did not understand or necessarily agree with the goals of the C3T team.

From these reviews, BHI, FH and the DOE were able to discern the most important points that the EE/CA would have to address in order for the project to have a reasonable chance at success. Those main points to be addressed were determined to be as follows:

1. Show that CERCLA provides clear authority over all aspects of the waste, including all hazardous waste constituents as well as radionuclides. Use of the CERCLA process was consistent with the previous CERCLA removal action used to disposition the non RCRA regulated Low Level Waste (LLW) from the 183-H Basins. Additionally, the 183-H wastes originated from Operable Units covered under CERCLA as part of the Hanford Site 100 Area National Priorities List site.

2. Demonstrate that characterization data from the 183-H Basin Wastes was adequate to meet disposal acceptance criteria for the ERDF and, from that data, clearly demonstrate that disposal and treatment of the wastes at ERDF were evaluated against, and shown to meet, all the substantive requirements of applicable federal and state laws.

3. Demonstrate through the EE/CA that a clear reduction in risk to the environment and the public would be accomplished through the CERCLA process, and that the technology applied for treatment and disposal provides for protection to the environment and the public is "equivalent" to that achieved under RCRA.

4. From the demonstration of the above items, show that the actual work process can be accomplished safely and will result in benefit, both financially and in risk reduction, to the environment and the public.

The first major technical issue tackled was a detailed review of the basin waste characterization data to demonstrate that the waste could be managed at the ERDF and meet all the requirements for treatment and disposal. While this process was the most difficult of the EE/CA, it was essential to demonstrate that the conclusion of the EE/CA could be supported from a technical and regulatory standpoint. Several meetings were held with Ecology and EPA to walk through the data and assure that the data was of sufficient quality and rigor to support a treatment and disposal conclusion. Questions arising from the regulators regarding the quality of the documentation were addressed, sometime at separate breakout sessions from the main meetings. This analytical data, including radiological and physical information, was presented in the EE/CA in such a manner to demonstrate that all information was of sufficient quality to clearly show that the content of the wastes was fully understood and that the conclusions of the EE/CA could be supported.

Once the technical data issues were addressed, and it was concluded by all parties that the wastes were adequately characterized, the next phase of the EE/CA was begun. In this phase, the EE/CA evaluated the

applicable or relevant and appropriate regulatory requirements for treatment and disposal of the wastes. The key point in this activity was to demonstrate that any alternative identified would still comply with all substantive requirements of the regulations and result in protection of the environment and the public. Since a RCRA treatability variance was being evaluated as an option in the EE/CA, a significant effort was required to show that the proposed alternate treatment standard was appropriate in lieu of the identified standard (i.e., thermal treatment). Additionally, care had to be taken to ensure that the public did not perceive the ERDF as a less protective facility than a RCRA permitted facility. The ERDF is a highly engineered disposal facility, constructed and operated under CERCLA authority, and designed to meet RCRA technological requirements for landfills, including standards for a dual liner system, a leachate collection system, leak detection, final cap, and groundwater monitoring. Further, the review also ensured that the ERDF could demonstrate compliance with applicable DOE Orders and, based on characterization data, that the wastes would not challenge those requirements for management of radionuclides.

Since the options identified in the EE/CA could clearly be demonstrated as equivalent to the RCRA requirements, the next phase of the EE/CA was begun. In this phase the focus was to develop alternatives for management of the wastes at ERDF, the relative ability to implement those alternatives, the technical basis and regulatory compliance basis for the alternatives, and the costs associated with the alternatives. This is a standard requirement of the EE/CA process, but is important in that the alternatives require development to show that they can meet the requirements for risk reduction, are implementable, are cost-effective, and result in protection of human health and the environment.

The three alternatives determined to be applicable for consideration under the EE/CA were as follows:

A. No action (Continued Long-Term Storage at the CWC). This action would result in increased risk to workers and the environment due to the active management of the waste. This would also result in incremental costs for continued storage. Further, the original high cost and extended schedule for the management of the wastes would continue unabated.

B. Treatment followed by disposal at the Environmental Restoration Disposal Facility (ERDF). This alternative involved the treating (chemical reduction and stabilization) of the fraction of 183-H Basin Waste that exhibited the characteristic of ignitability or the TCLP characteristic for metals and then disposing the treated wastes in the ERDF. This alternative included a treatability variance for the listed waste codes. The balance of the wastes would be disposed in the ERDF without treatment. The total estimated cost of container preparation and shipment, treatment, and disposal at the ERDF was approximately $3.7 million.

C. No Treatment/ERDF Disposal. This alternative involved the disposal of all of the wastes in the ERDF without treatment. The estimated cost for this alternative was $2.1 million.

While the "no action" alternative was clearly not the intent of this initiative, the alternative was evaluated to ensure that the EE/CA process has adequately encompassed the entire range of alternatives and that the risk is a real factor that warrants action. Continued storage of the 183-H Basins wastes was demonstrated to have inherent risk, primarily to workers required to manage the wastes on a daily basis. Continued needs to address deteriorating containers in storage, as well as exposures to radiological hazards, were determined to be unacceptable and would not reduce any risk to the environment.

The No Treatment/ERDF Disposal action would clearly be an option of great interest. This option evaluated complete removal of the wastes with minimal exposure of hazards to the workers in both the storage and disposal operations. However, the EE/CA concluded that this alternative would not satisfy LDR treatment standards for disposal, and a treatability variance for all of the waste codes could not

likely be justified. It had been noted during characterization activities that about 5,700 containers showed nitrate levels of up to 143,500 ppm nitrates (expressed as nitrogen), and hence the wastes were considered "ignitable" hazardous wastes under RCRA. Additionally, approximately 1,300 drums were designated as TCLP characteristic due to the presence of heavy metals.

In evaluating the Treatment/ERDF Disposal alternative, BHI and FH examined alternatives for treatment that would be effective and cost efficient, but would not create costs or risks that were unacceptable and which would comply with all Applicable or Relevant and Appropriate Requirements (ARARs). It had been demonstrated that the ERDF met the requirements for disposal management based on design and operation. Treatment alternatives were many, but the goal was to make the treatment as simple and effective as possible without compromising ARAR compliance. Not only did the waste require treatment to deactivate the ignitability characteristic, but some also exhibited toxic metals which also require stabilization to meet LDR standards for disposal.

The chosen approach was to perform a "bulk" treatment process at the ERDF facility combined with a treatability variance for the listed waste codes. This technology involves the dumping of wastes into a large container, addition of a stabilization agent and a reducing agent that deactivates the nitrates, mixing with water utilizing a back-hoe and removal for disposal. Confidence in this application of technology is high as this is a proven system routinely used throughout the DOE and commercial sectors for waste treatment and disposal of similar waste forms.

While this alternative was more expensive and involved higher risk in implementation than the No Treatment option, the alternative satisfied the ARARs; the risks were manageable given the experience of ERDF personnel on the application of the technology and proven success in doing so. As such, the recommended alternative of the EE/CA was the Treatment/ERDF Disposal.

Review and Approval

Upon completion of the technical portions of the EE/CA, the final development of the draft document proved relatively easy to complete. However, once the draft was completed, the real work of the process began in reviewing the final product with the regulatory authorities. While the development of all the relevant technical requirements had been accomplished with each of the parties as part of work teams, the final product still had to gain agreement from all parties as a complete and final product that could be supported in a public review venue.

Public involvement was begun utilizing a group created as part of the Tri-Party Agreement. This group, known as the Hanford Advisory Board (HAB), received initial briefings on the project, the EE/CA, and relevant technical and regulatory requirements. The board is represented by members of the local community, labor groups, special interest groups, and state and federal officials. While the board was receptive of the concept, it is always difficult to ascertain what reaction the general public will have to such an initiative. It was considered most important that strong support be gained from all parties to better ensure that public involvement could be adequately addressed in a knowledgeable and sensitive fashion.

It was apparent upon issuance of the draft document that an incomplete job of communicating with the regulatory agencies on the expectations and goals of the EE/CA had been done in some cases. This resulted in a delay of the final document and created potentially fatal impasses. Unfortunately, while it was recognized early in the process that this could become an issue, it was a failing of the project that this potential had not been more actively pursued. The resulting delay and actions required to revive the process, resulted in frustration and concern on all sides that should have been avoided. Senior management involvement in the matter was required and eventually accomplished. However, by that

time over two months of schedule slippage in the project had occurred and several revisions had occurred that affected the project's ability to begin operation.

In bringing in the additional focus of management personnel on the EE/CA and the project, a series of working meetings were held to address concerns and issues between the parties. Fortunately, most of the issues were matters of perception and a lack of adequate information. Once these meetings were held, the final document was completed and approved for a public comment period within a few weeks. The public comment period began in March of 2003.

While review and approval of the document was somewhat problematic, the final product was properly crafted, reflected the needs of each party, and was defensible from a technical and regulatory compliance standpoint. The review period of 45 days resulted in two sets of comments. Both comments were supportive in nature and agreed that the proposed alternative of the EE/CA was compliant and was protective of the environment and the public.

Upon disposition of comments by the EPA (the lead regulatory agency for the CERCLA action) a CERCLA Action Memorandum was signed authorizing the removal action for the 183-H Basin Wastes. Actual waste removal was initiated in July of 2003.

RESULTS

As a result of the efforts of the C3T team, regulators, and contractors, permanent disposal of approximately half of the stored volume of radioactive mixed wastes at the Central Waste Complex has begun. This legacy of wastes has long been a subject of debate and interest by many parties in the federal, state and public arenas for the Hanford Site. While efforts have been pursued for years to address this matter, it is a fact of current times that costs are a factor in addressing such issues and will continually be a subject of debate and concern.

Through the efforts and commitment of several parties, a technically viable solution was created that meets regulatory requirements and assures a cost effective reduction of risk to the environment and public. Further, using a CERCLA action for wastes traditionally managed under the requirements of RCRA has clearly demonstrated that a proactive utilization of policies and systems of this alternative process can achieve protection of human health and the environment in a manner that results in great gains for the public.

Disposal operations commenced in July of 2003, with a current reduction of legacy wastes by almost 1510 cubic meters. This has led to an increased storage capacity to manage other wastes on the Hanford Site in an accelerated fashion to meet regulatory goals and milestones for transuranic waste retrieval, certification and shipment to the Waste Isolation Pilot Plant (WIPP). It has also created an improved opportunity for treatment and disposal of legacy wastes to meet regulatory commitments negotiated under the Tri-Party Agreement.

Perhaps of more importance is the general consideration of "success breeds success". While the process to address the 183-H Basins Wastes was difficult, it has created a willingness on the part of the DOE, EPA, and Ecology to acknowledge that a common goal and commitment to reach that goal can result in demonstrable progress in cleanup actions on a large DOE site. The success of the 183-H project has resulted in renewed actions by the C3T team to look at larger volumes of wastes at the Hanford Site and actively pursue regulatory alternatives that could result in expedited management of wastes for disposal.

The results of the 183-H action has also led to improved communication and willingness to listen and understand needs, constraints, and impediments to cleanup progress experienced by the DOE and its

contractors. While this improvement is encouraging, it is apparent to all parties that it will require constant vigilance to assure that this communication continues into the future to allow for more opportunities and successes in cleanup options.

Another success that cannot be overlooked was the demonstrated ability of competing contractors showing the leadership to take advantage of each other's abilities and corporate skills. By actively teaming to reach a common goal, both contractors benefited in increasing their experience, as well as obtaining opportunities to increase their ability to meet client expectations with the attendant rewards.

LESSONS

While the technical and demonstrable progress of the 183-H Basin Waste Project is evident, several lessons were learned that should be considered by any project attempting to take a radical shift in policy and capability to a perceived logical conclusion. While the intent and scope of any process may seem "self-evident" there are always unseen factors that must be addressed, as well as foreseen issues that require more management than may have been anticipated. The
183-H EE/CA is a case in point.

Any project requires a clear goal and message of commitment by management to meet that goal. While it was assumed that every party was aware of the goal and had received a clear message to that effect, the difficulties in obtaining approval of the EE/CA clearly showed that this was not the case. During initial development of the EE/CA and it scope, the project should have developed a goal statement that was approved by each party to serve as the guiding principle for completion of the project.

Another area noted for improvement was the lack of a clear process flow system that would have defined roles, responsibility and authority for the process. In working with such a diverse group, with diverse interests, on a process that is completely new, the assumption that everyone understands who is doing what can be a roadblock to progress when it is discovered that these aspects are not clear. As with any group, some felt complete control, commitment and authority to make the project happen, while others felt that they did not necessarily have such authority and were wary of the results; either good or bad. This led to delays in resolution of issues and distrust among team members that took greater effort to resolve.

A clear issue that created problems during the process was a lack of complete communication. In this case, as with most cases, the clear commitment to sit down, face to face, and have meaningful interactions to address issues was not fully utilized. Resolution of comments was attempted using email, memos, etc., which led to widespread confusion on what was meant by the written comments. Without the direct interface, parties assumed responses were complete, or misinterpreted intent and scope of the comment, or simply missed the comment. Once a renewed commitment was made by senior management to ensure people were available to support the effort, comments were more effectively addressed, discussed and resolved in more real time fashion. A contributing factor to the resolution was the need for parties to assure that resources were committed to the project and were available to participate in the process. Had this been accomplished throughout the process, less time would have been necessary to gain regulator approval of the EE/CA and issues could have been resolved in an immediate fashion.

CONCLUSION

The 183-H Basin Waste CERCLA removal action project was a valuable process and learning experience for regulators, the DOE, and its contractors in how to apply policies and systems in an innovative and effective manner that is outside traditional areas for responsibility and authority. While the process was

difficult, a commitment to leadership and implementation of effective change to improve cleanup progress can result in uncommon successes.

Through the efforts of this project, a successful chapter in cleanup progress was initiated that has already led to effective results, and will result in a radical increase in waste disposition, reduction in risk, and use of cost effective approaches to cleanup for the taxpayer.