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Buried Waste Integrated Demonstration Stakeholder Involvement Model

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Buried Waste Integrated Demonstration Stakeholder Involvement Model

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ABSTRACT

The Buried Waste Integrated Demonstration (BWID) is a program funded by the U.S. Department of Energy (DOE) Office of Technology Development. BWID supports the applied research, development, demonstration, and evaluation of a suite of advanced technologies that together form a comprehensive remediation system for the effective and efficient remediation of buried waste. Stakeholder participation in the DOE Environmental Management decisionmaking process is critical to remediation efforts. Appropriate mechanisms for communication with the public, private sector, regulators, elected officials, and others are being aggressively pursued by BWID to permit informed participation. This document summarizes public outreach efforts during FY-93 and presents a strategy for expanded stakeholder involvement during FY-94.

SUMMARY

The Buried Waste Integrated Demonstration (BWID) is a program funded by the U.S. Department of Energy (DOE) Office of Technology Development. The Idaho National Engineering Laboratory (INEL) is the coordinating laboratory for BWID. The program supports the development and demonstration of a suite of technologies that when integrated with commercially available baseline technologies form a comprehensive system for the effective and efficient remediation of buried waste throughout the DOE complex.

The policy of BWID is to make fair and open decisions by providing stakeholders with timely and accurate information for early and substantive involvement in the technology development and demonstration process. This will allow BWID to consider stakeholder input in making the required decisions.

Since its inception, BWID has worked to identify appropriate mechanisms for communication, address roadblocks within the current system, and identify the "windows of opportunity" for in-house communication. BWID has arranged tours of demonstration sites for media, industry, academia, and other laboratory personnel; distributed fact sheets on technologies; encouraged Environmental Restoration and Waste Management (ER/WM) participation; and conducted video teleconferences and informal lunch-time seminars.

A technology Exhibition and Equipment Display was held on July 29-30, 1993, with presentations, posters, and INEL facility tours available to participants. A U.S. Environmental Protection Agency (EPA)/DOE/private sector meeting was held in Seattle, Washington, on December 7-8, 1993. The meeting was very successful in bringing private industry, BWID, and the EPA together to share ideas. Planned activities for FY-94 include a midyear review meeting, a Southeastern U.S. technology transfer/public involvement meeting, a technology exhibition, a stakeholder roundtable conference, and an end-of-the year public review/comment meeting.

The BWID Management Team, consisting of representatives from DOE Headquarters, DOE Idaho Operations Office, and EG&G Idaho, Inc., has the formal charge of implementing the public involvement program. Stakeholders are encouraged to participate as fully as possible in BWID. The Program Planning Group (PPG) consists of representatives of bona fide stakeholders who are charged with soliciting and recommending public participation activities to the BWID Management Team. The BWID Technical Academic Review Group (TARG) will provide independent expert peer review of BWID technology. The Technical Support Group will maximize collaborative opportunities for technology development.

The Western governors; the Secretaries of Energy, Defense, and Interior; and the Administrator of the EPA have established the Federal Advisory Committee to Develop On-Site Innovative Technologies (DOIT Committee) to advise the Federal Government on better ways and opportunities for contaminated site cleanup. The DOIT Committee will add value to BWID by facilitating early and effective stakeholder involvement to ensure acceptance of demonstrated technologies and expedite permitting decisions; promoting coordinated involvement of Federal, State, and local

regulators; overcoming commercialization barriers; and promoting regional economic development by designating selected sites as long-term testing facilities. To date three BWID technologies have been selected by the DOIT Committee's working group on mixed radioactive/hazardous waste; the Rapid Transuranic Monitoring Laboratory, the Dig-face Characterization System, and the Radiological Hazardous Materials Measurement System.

BWID is initiating an effort with the Medical Center of South Carolina to develop a risk-based decision analysis methodology. This evaluation will include the quantification of the various risks associated with various remedial actions. These risks will include not only exposure to hazardous chemicals and radionuclides, but also the risk from the operation and construction of the remediation system, as well as the subsequent transportation of the removed and treated waste where appropriate. Two specific areas where much attention will be given are the health effects from various chemical and radiological exposures and how to communicate the complex and misunderstood world of risk to the various parties.

To facilitate the acceptance of innovative technologies, BWID has developed a collaborative project with EPA Region 10 and the State of Idaho. This relationship will foster collaboration among Federal and State agencies, encourage the use of innovative technologies at cleanup sites, and disseminate information about innovative technologies to stakeholders. A goal of this effort is to expedite the transition from research to implementation.

By fulfilling the objectives set forth in this plan, BWID will meet its commitment to provide meaningful stakeholder participation. BWID's ability to demonstrate that its decisions address and incorporate the views and concerns of stakeholders will be evidence of the plan's and the program's success.

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ACRONYMS

ANL	Argonne National Laboratory
BWID	Buried Waste Integrated Demonstration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMSTIP	Characterization Monitoring Sensor Technology Integrated Program
DCS	Dig-face Characterization System
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy Headquarters
DOE-ID	U.S. Department of Energy Idaho Operations Office
EM	Office of Environmental Restoration and Waste Management
EPA	U.S. Environmental Protection Agency
ER/WM	Environmental Restoration and Waste Management
FMPC	Fernald Materials Processing Center
GJPO	Grand Junction Project Office
GTCC	Greater-Than-Class-C
INEL	Idaho National Engineering Laboratory
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LLW	low-level radioactive waste
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratory
OTD	Office of Technology Development
PPG	Program Planning Group
RHMMS	Radiological and Hazardous Material Measurement System
RTML	Rapid Transuranic Monitoring Laboratory
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SNL	Sandia National Laboratories
SRS	Savannah River Site
TRU	transuranic
WGA	Western Governors' Association
WHC	Westinghouse Hanford Company

Buried Waste Integrated Demonstration Stakeholder Involvement Model

1. INTRODUCTION

1.1 Need for Public Participation Policy

The Buried Waste Integrated Demonstration (BWID) is a program funded by the U.S. Department of Energy (DOE) Office of Technology Development. BWID supports the applied research, development, demonstration, and evaluation of a suite of advanced technologies that together form a comprehensive remediation system for the effective and efficient remediation of buried waste.

Public participation in the DOE environmental management decisionmaking process is critical to remediation efforts. Appropriate mechanisms for communication with the public, private sector, regulators, elected officials, and others are being aggressively pursued to permit informed participation. By involving these individuals and groups early in the process and by forming a teaming relationship, the likelihood of a technology's acceptability will be greatly enhanced.

Public participation or stakeholder involvement includes, but is not limited to, internal customers such as EM-30, EM-40, and EM-60; external customers such as citizens, local and state elected officials, and industry; state and local regulators; the U.S. Environmental Protection Agency (EPA); other government agencies; and special interest groups.

1.2 Program Description

BWID carries out an aggressive national program of applied research to focus, manage, and accelerate the development and implementation of new and existing technologies to meet specific Environmental Restoration and Waste Management (ER/WM) program requirements. The objective of BWID is to respond to ER/WM program needs by developing and demonstrating technologies to (a) facilitate compliance with applicable laws, regulations, and agreements; (b) minimize the generation of wastes; and (c) clean up DOE sites at less cost than baseline technologies. BWID has a broad national technology development program to meet this immense challenge of converting research into application to solve DOE problems.

BWID is keenly aware that budget and resource limitations dictate that its development and demonstration program be conducted in a collaborative manner. Stakeholder involvement will also be a key factor in the determination of a technology's acceptability, and therefore, transferability or implementation. A program at one site should consider similar technology, regulatory, and stakeholder needs at other sites and integrate these needs with its own. This collaboration ensures that a related technology developed for one site can be implemented at other sites by meeting the needs of multiple sites. Mechanisms to support technology integration and technology development have been established to communicate development needs within the DOE complex to industry and convey results to other sites with related needs.

Although BWID is a technology development program, the life-cycle for a technology also includes commercialization, implementation, and site restoration. Therefore, BWID strives to establish a seamless organization including private industry, DOE environmental restoration and waste management programs, regulators, and other stakeholders.

1.3 Background

Within the DOE complex, large quantities of high-level waste, low-level radioactive waste (LLW), and transuranic (TRU) waste have been buried or stored. The DOE predecessor agencies operated numerous facilities throughout the United States for research, development, and production in the areas of defense and nuclear energy. Waste generated as a result of these and other operations was buried in the ground or stored (for future disposal) at numerous locations throughout the DOE complex. Over 57 million cubic feet of buried waste is located throughout the DOE complex. These locations include the Idaho National Engineering Laboratory (INEL), Hanford Site, Oak Ridge National Laboratory (ORNL), Savannah River Site (SRS), Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratories (SNL), Fernald Materials Processing Center (FMPC), and Nevada Test Site (NTS).

Early disposal practices allowed the commingling of various types of wastes. As a result, much of the buried waste throughout the DOE complex contains both hazardous and radioactive constituents. This buried waste is classified as TRU waste, LLW, hazardous waste per 40 CFR 261, mixed TRU waste, Greater-Than-Class-C (GTCC) classification (10 CFR 61.55), and mixed LLW. In addition, many of the original containers have degraded significantly, resulting in contamination of the immediately surrounding soil.

Risk assessments, in general, are showing the need for remediation of buried TRU waste. The INEL contains a significant volume (approximately 30%) of the DOE complex's buried TRU waste. The majority of buried waste at the INEL is located at the Radioactive Waste Management Complex (RWMC). The RWMC was established in 1952 as a controlled area for disposal of waste resulting from INEL operations; beginning in 1954 TRU waste generated at the Rocky Flats Plant weapons complex was also disposed of at the RWMC's Subsurface Disposal Area (SDA).

The SDA is a 96-acre tract of land with numerous pits, trenches, soil vaults, and an abovegrade pad where radioactive and organic waste was buried or stored. The waste and site characteristics of the SDA are generally representative of other DOE buried waste sites. These representative characteristics provide confidence that demonstrations of remediation technologies to be performed at the SDA will be useful for potential applications at other sites.

1.4 Technical Objectives

Available technology is inadequate to cost-effectively solve the problems at hand. Assay procedures to distinguish LLW and TRU waste in retrievable stored drums are slow, have low sensitivity, and poorly define the quantity of TRU waste. Currently, solid organics and hazardous waste metals cannot be identified in intact drums. Real-time monitoring and control of incineration effluent to preclude undesirable environmental releases are needed. In addition, methods are not

available to exhume buried TRU waste without risking the release of airborne plutonium particles. Safer waste excavation technologies are needed.

BWID was organized to support research, development, demonstration, testing, and evaluation of emerging technologies that offer promising solutions to the problems with the environmental restoration of buried waste. BWID addresses difficult remediation problems associated with DOE complex-wide buried waste. A systems approach to problem characterization, need identification, and technology development was established to advance the understanding of potential technologies for remediation of these buried wastes. This approach involves engineering and scientific expertise from throughout the DOE complex, universities, private sector, and international communities.

The goal of BWID is to determine the threshold of capability for emerging technology. Technologies will be identified, screened for applicability to the identified needs and requirements, selected for demonstration, and evaluated based on prescribed performance objectives. This effort will determine implementability, effectiveness, potential schedule reduction, and cost savings associated with emerging technologies. The process will shape remediation plans and expedite implementation of the environmental restoration of buried waste.

Long-term key objectives of BWID are to improve environmental remediation processes, enhance waste management practices for buried wastes, reduce personnel hazards of remediation activities, ensure long-term safety of the public and environment, reduce remediation costs, accelerate technology development, and promote technology commercialization. Public participation will assist in realizing these goals.

1.5 Information Status

Technology development, waste management, and environmental restoration programs are information-intensive undertakings. High quality information is essential in making critical decisions regarding resource allocation, risk determination and management, future land-use requirements, needs identification, prioritization, and performance standards. The following describes the information undertakings that BWID has addressed thus far with various environmental restoration and waste management organizations:

- BWID has performed an assessment relative to the nature and magnitude of the buried waste problem at DOE sites, currently available technologies, and technological gaps that exist.
- BWID has evaluated the regulations currently applicable to the DOE buried waste problem. Additionally, BWID monitors evolving regulations.
- BWID has evaluated the requirements of various interagency agreements that DOE operations officers have entered into with various EPA regional offices and appropriate status.

Requirements and regulations are, however, evolving and currently there are gaps—waste acceptance criteria, de minimus levels, how clean is clean, land use criteria, and siting issues. There is a need for public participation to help clarify and close the gaps in the requirements and regulations.

2. BWID PUBLIC PARTICIPATION POLICY

2.1 Goals

The BWID policy on public participation is derived from the Office of Policy and Program Information (EM-4) in the Office of Environmental Restoration and Waste Management (EM), which has established a stakeholder participation policy and guidance. Additionally, a DOE-wide public participation policy is forthcoming. Both efforts focus on increasing the role of stakeholders in DOE's decisionmaking processes. The goal of increased stakeholder participation in EM activities is to create an open, visible, and fair process that is responsive to local community and national interests.

To reflect the national policy of open and fair decisionmaking, BWID adopts the following policy:

"The policy of the Buried Waste Integrated Demonstration is to make fair and open decisions by providing stakeholders with timely and accurate information and meaningful predecisional opportunities for early and substantive involvement in the technology development and demonstration process which will allow the BWID program to consider stakeholder input in making the decisions required."

2.2 Objectives

This BWID/INEL Stakeholder Involvement Model will accomplish the following objectives to meet the goal of obtaining the effective involvement of the stakeholders in the decisionmaking process:

- Provide open, candid communication and full disclosure to BWID stakeholders.
- Identify the issues that affect BWID and present understandable, consistent, and factual information to interested parties in a timely manner.
- Identify the key decisions to be made and the mechanisms for how stakeholder input will be gathered and addressed.
- Establish and maintain communication with the stakeholders through activities such as workshops, working groups, and person-to-person contacts at both the national and site-specific level.
- Address stakeholder issues and focus efforts on resolving those issues by demonstrating responsiveness in explaining how stakeholder input was or was not incorporated into BWID decisions.
- Include independent groups for verification of risk-based analyses and innovative technology assessments.

2.3 Measures of Success

BWID has identified five measures of success for stakeholder involvement:

- 1. Agreement with stakeholders as to how they will be involved throughout the process.**
- 2. Consensus with stakeholders on the nature and scope of BWID.**
- 3. Agreement with stakeholders on the process for program execution.**
- 4. Achievement of BWID management objectives through joint DOE/university or industry ventures.**
- 5. Implementation and commercialization of BWID developed and demonstrated innovative technologies.**

3. STAKEHOLDER INVOLVEMENT APPROACH

3.1 Past Stakeholder Involvement

Since its inception, BWID has worked to identify appropriate mechanisms for communication, to address roadblocks within the current system, and to identify the "windows of opportunity" for in-house communication. BWID has arranged tours of demonstration sites for media, industry, academia, and other laboratory personnel; distributed fact sheets on technologies; encouraged ER/WM participation in BWID video teleconferences; and conducted informal lunch-time seminars. Specific details of BWID community presentations and other presentations are listed in Appendix A.

A Technology Exhibition and Equipment Display was held on July 29-30, 1993, with presentations, posters, and INEL facility tours available to participants (see Figure 1). During the morning session, five technologies demonstrated during a core system demonstration at the INEL Cold Test Pit were presented along with a summary of treatment technology activities accomplished during FY-93. During the afternoon session, 16 technologies were shown during a poster session. Equipment used during the core system demonstration was on display, allowing the public to view equipment as well as participate in short demonstrations of capabilities.

An EPA/DOE/private sector meeting was held in Seattle, Washington, on December 7-8, 1993 (see Figures 2 and 3). The meeting was very successful in bringing private industry, BWID, and EPA together to share ideas. Over 50 private industry companies attended the meeting. One-on-one

Figure 1. BWID sponsored a Technology Exhibition and Equipment Display in Idaho Falls in 1993 and plans a similar program in 1994.

Figure 2. Audience members listen to technology presentations and ask questions at the EPA/DOE/private sector meeting in Seattle, Washington.

Figure 3. A panel discussion was held at an EPA/DOE/private sector meeting in December 1993 in Seattle, Washington.

networking sessions gave an opportunity to have industry representatives meet with BWID representatives to exchange information and ideas. A panel discussion also was held, allowing an interchange between the audience and panel members comprised of representatives from DOE, EPA, and the Western Governors' Association (WGA). The meeting resulted in numerous idea and information exchanges as well as new relationships with private industry, EPA, and BWID. A license agreement is being pursued between the INEL and Enseco, Inc., as a result of this meeting.

A DOE Technology Development Exhibition was held in 1993 at the Rayburn House Office Building on September 23, at the Hart Senate Building on September 27, at the DOE Forrestal Building on November 29-30; and at DOE Germantown on December 2. BWID was one of the 36 institutions that participated. The exhibition allowed politicians and DOE employees an opportunity to learn about new technology development advances.

BWID has worked extensively with INEL Public Affairs and Community Outreach Offices. Draft media releases for the INEL Public Affairs Office have been issued, including still photos and information about technologies. BWID management personnel from the DOE Idaho Operations Office (DOE-ID) and EG&G Idaho, Inc., were interviewed by reporters from national publications as well as the Idaho Falls Post Register during a media tour of the core system demonstration in June 1993. BWID speakers were scheduled to appear before a variety of civic and educational groups by the INEL Speakers Bureau (see Appendix A). Personnel from BWID serve as supplemental tour guides for the INEL Tour Group and provide updates on BWID activities to Public Affairs personnel. Articles about BWID activities have been prepared for the INEL Reporter, a publication for general distribution, and the INEL Update, a publication distributed to Idaho elected officials and others who are interested in the INEL.

A regularly updated, poster/table-top display has been viewed at conferences and public meetings across the nation (see Figure 4). A model of the core system demonstration has been completed and displayed at public meetings in Idaho. Other displays of individual technologies have been made available to DOE Headquarters (DOE-HQ). Technology briefings have been included by the Environmental Restoration Public Outreach program during an open house prior to public meetings and workshops on INEL documents such as Site Specific Plan updates and Community Relations Plan updates.

Communication has been enhanced with various DOE offices through frequent use of the video teleconference capabilities at the INEL and DOE-HQ (Forrestal and Trevion). In the future, multipoint conferences will also include personnel at other DOE national laboratories.

3.2 Future Stakeholder Involvement

In order to execute a technology development program that yields technologies acceptable by the public, interested groups and organizations must be involved at every phase of BWID activities. To facilitate early and continuous involvement, BWID will use a teaming relationship with stakeholders. The team concept encourages continuous feedback and communication of needs and strategies.

Figure 4. BWID shares its research with the public through displays and presentations at national conferences and meetings.

For instance, EM-30, EM-40, and EM-60 have established the need for innovative technologies and advancements that will assist them in their efforts to meet enforceable schedules and milestones. It is in the wake of these programs that the technology development process must take its shape and direction. Early involvement and teaming will be critical elements to the process.

There is also a need for BWID to be involved with the regulators to understand the impact of the regulations on the development activities. That involvement will go through EM-30, EM-40, and EM-60 to ensure that BWID is following environmental restoration compliance and cleanup strategies. The same is true for the citizen groups (national and local) and other government entities that may seek to be included in the environmental restoration and technology development process. BWID will take its direction based on EM-30, EM-40, and EM-60 established strategies.

BWID will broaden its reach in terms of public participation. In the past, most activities have been concentrated in Idaho. However, in addition to continuing efforts in Idaho, BWID will expand its efforts to other regions. This involvement will be coordinated with the EM-30 and EM-40 branches at Savannah River. Also, EPA Region 4, the South Carolina Department of Health and Environment, and Savannah River DOE officials will be part of the public involvement team. BWID intends to sponsor additional technology transfer fairs similar to the Seattle meeting previously described. An industry/stakeholder workshop in the Southeast is tentatively scheduled for the third quarter of FY-94.

BWID has produced a summary videotape that provides an overview of the program, the buried waste situation within the DOE complex, programmatic objectives, a review of certain key technology demonstrations, and a preview of technology currently under development. This videotape will be distributed to interested parties as a way of introducing the program and the innovative technologies being developed by BWID.

BWID intends to publish a quarterly newsletter. This newsletter will disseminate the latest information about the program. Topics each quarter will include accomplishments of selected innovative technologies under development, a review of various DOE buried waste sites, technology transfer activities, announcements, and results of stakeholder meetings. This newsletter, like the videotape, will be distributed to all interested parties to keep them up to date on BWID developments.

The tentative schedule for specific stakeholder events occurring during FY-94 is as follows:

- The Office of Technology Development will conduct a midyear review March 8–9, 1994, in Washington, D.C.
- A technology transfer/public involvement meeting is tentatively scheduled for June 1994 in the Southeast.
- A technology exposition is scheduled for August in Idaho Falls.
- The Program Planning Group (PPG) may meet during the year to assess the progress being made based on the information derived from the scheduled activities.
- Near the end of the fiscal year, another public meeting will be held to close the year's activities. This meeting will offer the public an opportunity for further comment on the year's activities. The meeting may also provide an opportunity for BWID to address issues that were raised throughout the year.
- A fiscal year closure meeting of the PPG will assess the year's activities. If the timing allows, this meeting will also double as the next fiscal year's kickoff meeting.

3.3 Risk-Based Decisions

DOE's initial evaluation of a contaminated site typically follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance specified in the Risk Assessment Guidance for Superfund Sites. This effort determines the risk to human health and the environment under a "leave-as-is" scenario. This information is then used by the risk managers to determine the need to clean up the site. The feasibility study aspect of the CERCLA process then evaluates various remedial alternatives against the following criteria:

- Threshold criteria
 - Overall protection of human health and the environment
 - Compliance with applicable or relevant and appropriate requirements (ARARs)

- **Balancing criteria**
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume through treatment
 - Short-term effectiveness
 - Implementability
 - Cost
- **Modifying criteria**
 - Agency/government acceptance
 - Community acceptance.

A decision is then reached based on the comparative performance of the proposed alternatives against these criteria.

Historically, it is presumed that if the governing safety requirements are met, then the risk level for that activity is acceptable. For example, if Occupational Safety and Health Administration (OSHA) requirements are met, then the risk to the worker from standard industrial hazards is acceptable. This would apply as well to transportation risks where Department of Transportation (DOT) regulations would apply. Additionally, the risk from exposure to radiation is assumed to be acceptable if kept below DOE exposure limits to workers and the public under both accident and normal conditions.

The problem with this approach is that while it would meet all appropriate safety regulations, it does not capture and quantify the incremental risk to workers and the public from the planned remedial actions. Without this critical information, decisions made on which technology to choose would definitely not be optimized with respect to overall risk and may even result in risks that are greater than those posed by no action at all.

Due to the high number of potential variables associated with the various contaminated sites, BWID is initiating an effort with the Medical Center of South Carolina to develop a risk-based decision analysis tool. This methodology will develop a standard buried waste situation/problem. This standard problem will select the major contaminants of concern associated with TRU waste and their chemical and physical form, and distribute them in a typical arid and/or humid environment. A baseline risk assessment will be conducted to establish the baseline risk posed by this particular problem. Various remediation systems will then be evaluated against this standard situation. This evaluation will include the quantification of various risks associated with the remedial action. These risks will include not only exposure to hazardous chemicals and radionuclides but also the risk from the operation and construction of the remediation system, as well as the subsequent transportation of the removed and treated waste where appropriate. This analysis will also include the risk from potential accidents. Finally, the risk to human health and the environment from any remaining waste will be determined for each of the technologies.

From these various analyses, it will then be possible to determine an overall risk performance indicator by subtracting the residual risk from the initial baseline risk and dividing by the risk from the remediation process itself as shown below:

$$\text{overall risk performance indicator} = \frac{\text{baseline risk} - \text{residual risk}}{\text{risk from remediation}}$$

As can be readily seen, this expression would indicate that the larger the indicator, the better from an overall risk perspective. Remedial actions should strive for a greater reduction in the baseline risk and less risk from remediation. As the ratio approaches 1 or less, the appropriateness of the action would come into play.

It is important to note that there is much involved in these calculations. Many simplifying assumptions will need to be made. For example, certain information on system performance will be unavailable and best estimates using similar equipment or professional judgment will be necessary. It is critical that any assumptions made do not unfairly bias a particular technology or approach over another. Consistency between the various methodologies, CERCLA and DOE Order 5430.23 for example, will need to be achieved. Consistency in the treatment of the varying degrees of uncertainty will also need to happen. Two specific areas where much attention will be given are the resultant health effects from the various chemical and radiological exposures and how to communicate the complex and misunderstood world of risk to the various parties. Stakeholder involvement throughout this process will be critical, not only in establishing the governing assumptions but in disseminating the results as well.

The development of this risk-based methodology and its application to a standard problem will allow not only a screening evaluation to be used for potential technologies but will also allow an objective evaluation of specific real world situations. Realistic health effects information and the ability to communicate the results are critical aspects of the success of this methodology.

3.4 Innovative Technology Acceptance

To facilitate the acceptance of innovative technologies, BWID has developed a collaborative project with EPA Region 10 and the State of Idaho. This relationship will foster collaboration among Federal and State agencies, encourage the use of innovative technologies at cleanup sites, and disseminate information about innovative technologies to stakeholders. A goal of this effort is to expedite the transition from research to implementation.

To support this technology transition, technology fact sheets will be developed for BWID's innovative technologies. These fact sheets will be generated to ensure that the testing and evaluation of innovative technologies adequately addresses the needs of the regulators and other stakeholders. This will integrate public interests into the development process.

To enhance innovative technology implementation across the DOE complex, this effort will be expanded to other DOE sites in other EPA regions. This effort has already been initiated with EPA Region 4 and the DOE Savannah River Site. As this relationship develops, BWID intends to sponsor

an industry/stakeholder workshop, similar to the Seattle meeting previously described, in the Southeast. This meeting is tentatively scheduled for the third quarter of FY-94.

3.5 Western Governors' Association (WGA)

The Western governors; the Secretaries of Energy, Defense, and Interior; and the Administrator of the Environmental Protection Agency have established the Federal Advisory Committee to Develop On-Site Innovative Technologies (DOIT Committee) to advise the Federal Government on better ways and opportunities for contaminated site cleanup. The DOIT Committee established four working groups (mixed radioactive/hazardous waste, abandoned mine waste, military munitions, and waste contaminants at military bases) to identify common waste stream problems and shortcomings in technology development, stakeholder involvement, regulatory review, and technology commercialization.

The DOIT Committee will add value to BWID by facilitating early and effective stakeholder involvement to ensure acceptance of demonstrated technologies and expedite permitting decisions; promoting coordinated involvement of Federal, State, and local regulators; overcoming commercialization barriers; and promoting regional economic development by designating selected sites as long-term testing facilities. BWID shares these goals and strongly supports this initiative.

Each working group is conducting a review of innovative technologies relative to their specific problem. To date three BWID technologies have been selected by the DOIT Committee's working group on mixed radioactive/hazardous waste. Additional BWID technologies may be selected by other DOIT Committee working groups in the future. The technologies currently selected by the DOIT Committee are the Rapid Transuranic Monitoring Laboratory, the Dig-face Characterization System, and the Radiological Hazardous Materials Measurement System.

The **Rapid Transuranic Monitoring Laboratory (RTML)** consists of a collection of monitoring devices that measure loose surface and airborne contamination at a retrieval site. This system, contained in a mobile trailer, includes a large area alpha spectrometer and an U-L-shell x-ray spectrometer, a large area ionization chamber, and alpha continuous air monitors. The system is designed to control contaminants at the source of operation by early detection of airborne and loose surface contamination, thereby reducing potential escape of the contaminants and exposure to the public. The unique feature of this unit is that it provides lower levels of detection in the shorter time as compared to conventional techniques. This technology has shortened the processing time for detection of loose surface contaminations from 24 hours for 1 pCi/g to approximately 10 minutes for 10-40 pCi/g. Airborne detection limits have been lowered from approximately 8 derived air concentrations (DAC) per hour to less than one DAC concentration per hour.

The **Dig-Face Characterization System (DCS)** will provide nonintrusive characterization capability at the dig-face to support retrieval of buried wastes. The use of characterization technologies at a retrieval dig-face will reduce environmental and safety risks during cleanup of buried waste sites and improve retrieval operation efficiencies. Dig-face sensors will include radiation, chemical, and geophysical sensing technology. These sensors will be employed simultaneously, in concert with retrieval operations. As buried objects and contaminants become nearer to the dig-face, the sensors will provide progressively closer viewpoints. Information provided by the sensors will

guide decisions on retrieval rates and operating modes to minimize risks. Proof-of-principle testing is under way at the INEL. Integrated system testing will continue in 1994.

The Radiological and Hazardous Material Measurement System (RHMMS) is an integrated, multiple-measurement-cell, nondestructive assay system to increase the resolution, accuracy, and confidence in a characterization task by integrating all available information, as well as improving individual measurement specifications. Significant improvements in individual measurements in both passive gamma assay (PGA) and passive/active neutron result. PGA improvements stem from advanced data integrity techniques while the active neutron measurement is greatly enhanced by the addition of a high-flux neutron generation subsystem. The neutron generator is based on the use of a proton linear accelerator (linac) and the ${}^7\text{Li}(p,n){}^7\text{Be}$ interaction, and produce an interrogating neutron flux 1,000–10,000 times conventional neutron sources.

As previously discussed, the DOIT Committee will help facilitate early and effective demonstration of these technologies and expedite permitting. The current BWID demonstration schedule for these technologies is as follows:

- RTML 8/93—complete cold test demonstration at the INEL
4/94—initiate commercial operator training tests at the INEL
6/94—initiate commercially-operated hot demonstration (candidate sites INEL, Hanford, Mound)
- DCS 9/93—complete initial proof of concept test at the INEL
9/94—complete integrated system cold demonstration at the INEL
3/95—initiate small-scale hot demonstration
7/95—initiate full-scale integrated system cold demonstration at the INEL
6/96—initiate full-scale integrated system hot demonstration (candidate sites INEL, SRS, Hanford)
- RHMMS 9/94—complete hot demonstration of digital radiography/computer tomography system at Idaho State University
9/94—complete excavated waste assay cold demonstration at the INEL
9/95—complete hot demonstration of excavated waste assay system at the INEL
9/95—complete cold demonstration of assay components at Idaho State University, INEL, LANL, LLNL
6/96—initiate full-scale integrated hot demonstration at the INEL Stored Waste Examination Pilot Plant.

3.6 Decisionmaking Mechanisms

BWID has developed a process for decisionmaking as it pertains to implementation of stakeholder involvement activities, identification of stakeholders, deliberation, and review of recommendations. DOE-HQ, DOE operations offices, DOE contractors, other government agencies, universities, and private citizens will be involved with the execution of this public participation plan.

3.6.1 Organization

The BWID Management Team has the formal charge of implementing the program. The management team consists of representatives from DOE-HQ, DOE-ID, and EG&G Idaho. The Program Planning Group (PPG) includes representatives of bona fide stakeholders including EM-30, EM-40, EPA, State of Idaho, WGA, and Site Advisory Boards. One of the roles of the PPG is to solicit and recommend stakeholder involvement activities to the BWID Management Team. The PPG brings consistency to BWID's involvement of key stakeholders. They will also provide feedback and recommendations to the BWID Management Team. Stakeholders, by definition, are groups and individuals who have a bona fide stake in the remediation process, and represent a number of differing objectives. Some of the stakeholders, such as EM-40, may have specific needs (stakes), and as such, serve as customers/users. Regulators are another type of stakeholder, as well as the public who is interested in the remediation process. The Technical Academic Review Group will provide expert peer review of technology proposals. The Technical Support Group will maximize collaborative opportunities for technology proposals. Through the close interaction of these groups, BWID intends to provide for meaningful and active participation of the stakeholders. Figure 5 depicts the organizational structure and the interaction of the groups.

3.6.2 Roles and Responsibilities

BWID Management Team

Members: DOE-HQ Program Manager, the DOE-ID Program Manager, and the Integrated Demonstration Coordinator.

Responsibilities: To take full authority and responsibility for final decisions for BWID content and the implementation and direction of the program.

To review all recommendations from the PPG and direct them accordingly.

To participate in all of BWID and other BWID-related stakeholder involvement activities (e.g., activities sponsored by EM-30, EM-40, EM-60).

To act as liaison for DOE-HQ and assist in the coordination of stakeholder activities for other parts of EM and other agencies.

To provide coordination with other stakeholder activities sponsored by other EM elements and other government entities in the field that have buried waste as a concern. The coordination of these activities are to ensure that, wherever possible, BWID receives valuable input from stakeholders.

Figure 5. Organizational structure.

Stakeholders

- Members:** These individuals and groups are the reason this stakeholder involvement model exists. The specific set of stakeholders may vary from site to site; however, they could be all or any of the following: elected officials, national environmental groups, local environmental groups, private industry, universities, private groups, and individuals.
- Responsibilities:** The responsibility of the stakeholder is to participate fully in the activities to ensure that the input given to BWID is meaningful and can be constructively incorporated into the technology development process. While BWID must find ways for the stakeholders to participate and make the stakeholders aware, those who are interested must take full advantage of the opportunity. BWID will endeavor to make the activities and programs it will plan attractive to the identified public; conducive to constructive exchange of information, ideas, and concerns; and supportive of and in line with the EM-30, EM-40, and EM-60 environmental and regulatory strategies.

BWID Program Planning Group (PPG)

- Members:** DOE-HQ Program Manager, the DOE-ID Program Manager, the Integrated Demonstration Coordinator, EM-30 Headquarter Northwest Representative, EM-40 Headquarter Northwest Representative, Region 10 EPA Representative, WGA, and Site Advisory Board Chairman.
- Responsibilities:** To develop the detailed coordinated/integrated strategies of the public participation activities.
- To plan and execute the public participation activities and meetings.
- To identify and represent the appropriate stakeholders.
- To participate in all of BWID and BWID-related public participation activities.
- To review the input from the stakeholders, and make recommendations based on their deliberations and input.
- To provide support to BWID in coordinating with other public participation activities sponsored by other EM elements and other government entities in the field which have buried waste as a concern. The coordination of these activities ensured that, wherever possible, BWID receives valuable input from stakeholders.

BWID Technical Academic Review Group

- Members:** University of Arizona, South Dakota School of Mines and Technologies, Colorado School of Mines, University of Texas at Austin, Alfred University, University of New Mexico, U.S. Bureau of Mines.

Responsibilities: To serve as an independent review and technical oversight committee for BWID to ensure that the technical quality control is throughout the program.

To maintain the technical integrity of the program throughout the technology selection and development life-cycle.

To ensure project resources are used to gain the maximum benefit for BWID customers.

To ensure that the technical direction of the program is validated through non-DOE expertise.

BWID Technical Support Group

Members: INEL, SRS, ORNL, WHC, Grand Junction Project Office, Characterization Monitoring Sensor Technology Integrated Program (Ames Laboratory), Robotic Technology Integrated Program, Argonne National Laboratory.

Responsibilities: To provide technical expertise to BWID so that strong scientific principles are integral to BWID's technology selection and development.

To maintain technology development consistent with the program's objectives (i.e., environmental restoration and waste management needs).

To maximize collaborative opportunities for technology development.

To ensure that integration between developing technologies and operational implementation is maximized.

To ensure that technology commercialization is accomplished.

Appendix A

BWID Presentations

Appendix A

BWID Presentations

BWID community presentations during FY-93.

Date	Organization	Number attending
Oct. 8	West Jefferson High School Senior Debate Team, Terreton, Idaho	14
Oct. 14	Ricks College Natural Resources Management and Ecology classes (2), Rexburg, Idaho	48
Oct. 21	Bannock Civitans Club, Pocatello, Idaho	13
Nov. 5	Eastside Exchange Club, Idaho Falls, Idaho	14
Nov. 18	Idaho Falls Rotary Club, Idaho Falls, Idaho	100
Nov. 19	Kiwanis Club, Idaho Falls, Idaho	30
Dec. 1	College of Southern Idaho technology faculty, Twin Falls, Idaho	20
Dec. 15	Achievers' Lead Club, Idaho Falls, Idaho	12
Jan. 14	Washington Elementary School honors science classes (3), Rexburg, Idaho	34
Jan. 27	Fruitland High School science classes (7), Fruitland, Idaho	128
Mar. 26	Skyline High School Career Day, Idaho Falls, Idaho	50
May 19	INEL Retired Employees Association Annual Meeting, Idaho Falls, Idaho	100

BWID presentations during FY-92, FY-93, and FY-94.

Date	Conference/Journal	Paper/Poster/Journal Article Title
11/91	AIChE 1991 Annual Meeting, Los Angeles, California	Paper—Ultrasonic Process for Detoxification of Groundwater
3/1-5/92	Waste Management '92, Tucson, Arizona	Paper—Cyrofracture as a Tool for Preprocessing Retrieved Buried and Stored Transuranic Waste Paper—BWID Overview Poster—BWID System Design Study
5/26-30/92	92nd American Society for Microbiology General Meeting, New Orleans, Louisiana	Paper—Denitrification of Nitrate Waste by Alkalophilic Halophiles
6/15/92	ASME World Conference, Washington, D.C.	Poster—Radiological and Hazardous Measurement Monitoring System
6/23/92	BWID Technology Workshop, Idaho Falls, Idaho	Presentation—BWID Overview; Retrieval Needs; and Treatment/Processing Needs
7/16/92	DOE Information Exchange Meeting on Characterization, Sensors, and Monitoring Technologies, Dallas, Texas	Paper/poster—Radiological and Hazardous Measurement Monitoring System
7/28-30/92	3rd DOE Industry/University/Lab Forum on Robotics for Environmental Restoration, Waste Management and Waste Minimization, Albuquerque, New Mexico	Presentations—BWID Requirements Associated with the Buried Waste Robotics Program; DOE Complex Buried Waste Needs
8/9/92	AIChE 1992 Summer Meeting, Minneapolis, Minnesota	Paper—Solving Technology Needs for Retrieval and Processing of Buried Waste Across the DOE Complex Presentation—Performance-Based Technology Selection Filter Demonstration
8/10-12/92	Transuranic Waste Characterization	Presentations—Overview of the RHMMS Systems; Passive Gamma Assay Results; Active Neutron Measurement Modeling; Active Neutron Measurement Results; Neutron Production with Low Energy Proton Accelerators
8/92	Environmental Process	Article—Ultrasonic Destruction of Chlorinated Compounds in Aqueous Solutions

BWID presentations during FY-92, FY-93, and FY-94. (continued)

Date	Conference/Journal	Paper/Poster/Journal Article Title
8/24-26/92	Spectrum '92, Boise	Poster/paper—Pad A Radioactively Contaminated Nitrate Salt Treatment Technologies and Technology Selection Efforts Poster—Buried Waste Integrated Demonstration Poster—Performance-Based Technology Selection Filter
9/2-4/92	National Technology Initiative Environmental Technology Workshop, Las Vegas, Nevada	Panel—Hazardous Waste Treatment and Remediation
10/92	DOE Public Participation Policy Meeting, Snowmass, Colorado	Panel—Buried Waste Integrated Demonstration
11/17-19/92	DOE Technology Information Exchange Workshop, Livermore, California	Presentation—Dig-Face Characterization Presentation—Thermal Coprocessing of INEL Nitrate Salts and Soils Poster—Buried Waste Integrated Demonstration
11/18-20/92	14th Annual DOE Low-Level Radioactive Waste Management Conference, Scottsdale, Arizona	Paper—BWID Regulatory Compliance
12/7-9/92	DOE/EPA Workshop—Establishing Links Between DOE and EPA R&D Program, Dallas, Texas	Presentation—BWID Overview Poster—Buried Waste Integrated Demonstration
2/93	Waste Management '93, Tucson, Arizona	Paper—Buried Transuranic Waste Retrieval Using Cryogenic Techniques Paper—Graphite Electrode DC Arc Furnace
3/11-12/93	Canadian Trade Mission, Idaho Falls, Idaho	Presentation—Buried Waste Integrated Demonstration
3/17/93	DOE/OTD Information Exchange, Houston, Texas	Paper—Transuranic Contamination Control at the INEL Presentation—Graphite Electrode DC Arc Melter
3/30/93	Workshop on Frozen Soil Barriers for Hazardous Waste Containment, Washington, D.C.	Presentation—Idaho Cryogenic Retrieval Demonstration

BWID presentations during FY-92, FY-93, and FY-94. (continued)

Date	Conference/Journal	Paper/Poster/Journal Article Title
4/18-22/93	Symposium on the Application of Geophysics to Engineering and Environmental Problems, San Diego, California	Paper—A New Application for Geophysics: Monitoring at the Dig-Face During Waste Site Excavation Paper—Rapid Geophysical Surveyor
4/21-24/93	American Ceramic Society's Annual Meeting and Exposition, Cincinnati, Ohio	Paper—Graphite Electrode DC Arc Furnace
5/93	Incineration '93 Conference, Knoxville, Tennessee	Paper—Latest Plasma Centrifugal Furnace Testing Results and Equipment Development at the Component Development and Integration Facility Paper—Graphite Electrode DC Arc Technology Development for Treatment of Buried Wastes
6/7/93	20th IEEE International Conference on Plasma Science, Vancouver, British Columbia	Presentation—Graphite Electrode DC Arc Melter
6/14-16/93	3rd International Congress on Toxic Combustion By-Products, Cambridge, Massachusetts	Presentation—Graphite Electrode DC Arc Melter
6/21-23/93	American Nuclear Society Annual Meeting, San Diego, California	Paper—Buried Waste Integrated Demonstration
7/29-30/93	BWID Technology Exhibition and Equipment Display, Idaho Falls, Idaho	Presentations and posters—BWID Technologies for FY-93
8/93	Second International Mixed Waste Symposium, Baltimore, Maryland	Poster—Buried Waste Integrated Demonstration Overview
8/93	ASME National Heat Transfer Conference	Paper (accepted)—Three-Dimensional Model of Heat Transport During In Situ Vitrification with Melting and Cool Down
10/93	International Atomic Energy Agency, Cooperative Research Program on Engineered Barriers, Cordoba, Spain	Presentation/paper—Innovative Technologies for Buried Waste Remediation
12/93	BWID/EPA/Private Sector Meeting, Seattle, Washington	Presentations, posters, and one-on-one sessions—BWID technologies for FY-94

DATE

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8/24/94

END