

## **BOTTOMS-UP SOLUTIONS TO TOP DOWN CHALLENGES: R & D LABORATORY WORKING GROUP (RADWG) APPROACH TO THE DOE SHIPPING MORATORIUM AND OTHER WASTE MANAGEMENT ISSUES**

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### **ABSTRACT**

The R&D Laboratory Working Group (RADWG) was formed within the last year to address waste management issues common to the DOE R&D laboratories. The RADWG is made up of staff from 14 DOE laboratories and some of their associated DOE Field Office personnel who specialize in the areas of waste management, health physics, analytical chemistry, QA, and training. Rather than being DOE Headquarters directed, the RADWG is laboratory driven, with coordination assistance from the DOE Chicago Field Office. The group uses an integrated, bottoms-up approach to addressing and solving waste management issues relevant to the laboratories. One of these issues, which is of primary concern, is the DOE waste shipping moratorium.

### **INTRODUCTION**

In the spring of 1992, the DOE Chicago Field Office Waste Management and Technology Development Division (CH-WMTD) suggested and facilitated formation of a Research and Development (R&D) Laboratory Working Group (RADWG) with the following objectives: 1) share and exchange waste management related information among DOE R&D laboratories; 2) develop a commonly shared waste assessment program based on a core set of standardized, auditable health physics and analytical chemistry procedures, criteria and methods for radioactive and mixed wastes; 3) provide peer review of laboratory procedures; and 4) assist the smaller laboratories in improving their programs.

The RADWG evolved from an informal group of DOE Chicago laboratories waste management personnel who met periodically to discuss selected waste management issues. The initial impetus for formalizing the group and inviting other DOE R&D laboratories to join was an effort to solve issues related to the DOE hazardous waste shipping moratorium. RADWG members work in the areas of waste management, health physics, analytical chemistry, quality assurance and training.

The group is made up almost entirely of R&D laboratory staff, with a few members from associated DOE Field and Area Offices. Participating laboratories include:

- DOE Chicago Field Office Laboratories
  - Ames Laboratory (IA)
  - Argonne National Laboratory East (IL)
  - Argonne National Laboratory West (ID)
  - Battelle Columbus Laboratories (OH)
  - Brookhaven National Laboratory (NY)
  - Fermi National Accelerator Laboratory (IL)
  - New Brunswick Laboratory (IL)
  - Princeton Plasma Physics Laboratory (NJ)
- DOE San Francisco Field Office Laboratories
  - Lawrence Berkeley Laboratory (CA)
  - Lawrence Livermore National Laboratory (CA)
  - Stanford Linear Accelerator Center (CA)
- DOE Richland Field Office Laboratory

- Battelle Pacific Northwest Laboratory (WA)
- DOE Golden Field Office Laboratory
- National Renewable Energy Laboratory (CO)
- Superconducting Super Collider Project Office (TX)

### **THE RADWG APPROACH**

R&D laboratory waste management issues and problems diverge from those associated with production facilities and large cleanup sites. R&D activities at the laboratories generally produce a relatively large number of diverse waste streams, each consisting of small quantities of waste. Also, the predictability of types and quantities of future waste streams is less certain at R&D laboratories because research activities change over the years.

The RADWG focuses on sharing the expertise of laboratory staff and their common understanding of these unique issues and problems. A primary RADWG goal is to address issues as they arise and to find timely and practical solutions.

The RADWG is also unique in that it was initiated by the laboratories, at the suggestion of CH-WMTD, and is maintained with a laboratory/field oriented, bottoms-up approach to solving waste management related issues. DOE Headquarters Program Office staff, such as Energy Research (ER), Environmental Restoration and Waste Management (EM), and Environment, Safety and Health (EH), are informed about the group's activities, but the group is not directed by these Offices. However, ER has formally endorsed the RADWG and the group is actively interacting and coordinating with ER, EM, and EH on various waste management issues. The CH-WMTD acts as a facilitator to assist the RADWG with coordination among the entire group and with developing realistic, goal directed schedules. CH-WMTD also helps the group to interface with DOE Headquarters.

The RADWG has formed specific committees to find short- and long-term solutions to pressing waste management issues faced by the laboratories. Each committee consists of experts in a particular topic or issue area, such as health physics or analytical chemistry. The entire RADWG has met twice in the last eight months and expects to meet about twice per year in the future.

In the interim between major meetings, members on each committee share information and continue to work toward

solutions to problems in their issue area. At the biannual meeting of the entire RADWG, the committee chairs report the status of their progress and decide upon their scope for the next six months.

The emphasis of the RADWG is to be active and dynamic. At the biannual meeting, the RADWG decides whether to add or delete committees, or change their focus, depending on progress and new issues. The progress of any committee is totally dependent upon active participation by its members. The daily demands of every member's job at his or her laboratory competes with the time that can be devoted to working on a RADWG committee. If a particular issue is not pressing enough to warrant the extra effort needed to work collaboratively, the committee will not make much progress. For the most part, members recognize the benefits of working together as a group, and remain enthusiastically involved.

The RADWG understands that the group cannot operate in isolation from DOE policy makers. Therefore, the group has made strong efforts to interact with DOE Field and Headquarters staff who are working on many of the same issues. These staff have been invited to the biannual meetings to present on the policy and direction taken, and on the work completed and anticipated by DOE. Open and frank discussion at the meetings is typical, and dialogue established between the RADWG and DOE staff has fostered a cooperative relationship which should result in very productive future efforts.

The success of the RADWG over the next year or two remains to be seen. Members agree that it has provided a valuable mechanism for information exchange among the laboratories. Like many professional societies, RADWG members are becoming more aware of individuals at other DOE laboratories who are experts in the same area and deal with similar daily issues. These counterpart individuals can now call upon each other for experienced technical advice and lessons learned when needed.

Success will also be measured by how well the RADWG can communicate its ideas to DOE to effect improvements in DOE waste management operations. To a large degree, the RADWG can offer DOE Headquarters the expertise and experience of its laboratory personnel as technical advisors and peer reviewers. The CH-WMTD can assist this interaction by continuing to act as a channel for exchanging position documents, procedures, etc. between the RADWG and DOE Headquarters, as well as coordinating with other associated DOE Field Offices on these efforts.

#### COMMITTEE PROGRESS

Currently, the RADWG has maintained the following 12 committees:

- Health Physics Procedures
- Analytical Chemistry Lab Procedures
- Process Knowledge Certification
- Quality Assurance (QA)
- Training
- Release Criteria
- Interlaboratory Analytical Capabilities
- Hanford Liaison Committee
- Commercial Disposal/Treatment
- Bar Code Systems/Waste Tracking

- Electronic Communications
- Integrating Reporting Databases

The first six were formed primarily in response to the DOE waste shipping moratorium, although the QA and Training committees also deal with broader waste management issues. The remaining six focus more on general waste management issues at the laboratories. While all of the committees have an objective of sharing information among the laboratories, some also have specific products, such as procedures, as their goal.

To understand the purpose of several of the RADWG committees, a brief discussion of the DOE waste shipping moratorium is necessary. The initial trigger for instituting the moratorium was some widely publicized evidence that a DOE site had shipped hazardous waste, which contained a small amount of radioactivity, to a non-NRC licensed commercial hazardous waste incinerator.

DOE's response was to impose a moratorium on shipment of hazardous waste generated from a DOE site Radioactive Materials Management Area (RMMA) to any non-NRC licensed commercial treatment, storage or disposal facility until the site implements a DOE Headquarters approved, completely documented waste handling, testing and shipping program. This program will ensure that each waste shipment contains no radioactivity that was added by activities at the DOE site. This restriction was later expanded to all waste streams generated from a RMMA except those already under permits, such as the Clean Air or Clean Water Acts. Until a complete and approved program is in place, DOE Headquarters must review and approve, on a case-by-case basis, each individual shipment of waste from a RMMA.

Either of two methods can be used to certify that waste from a RMMA has "no DOE added" radioactivity: (1) process knowledge and (2) direct radiological survey or sampling and analysis (radioassay). Process knowledge means that the waste generator must certify whether any potential for radioactive contamination of a material exists, based on his knowledge of the origin, storage, use, and potential exposures of the waste material. This certification is usually accomplished by completing a form and surveying the surface of the material for possible contamination. If the waste generator knows or is uncertain that the material is radioactively contaminated or activated based on process knowledge, then the radioactive status must be established by appropriate survey and/or sampling and analysis (radioassay).

The initial driver for formalizing the RADWG was the frustration with the slow pace, on an individual laboratory basis, toward completing acceptable procedures packages for lifting the DOE waste shipping moratorium. A new joint laboratory approach toward developing procedures packages seemed more promising. As a group, experts in waste management, health physics, analytical chemistry, QA, and training from all of the laboratories could produce an integrated, consensus based, peer reviewed set of procedures and approach that could be shared by all of the laboratories. Waste management programs built on this approach will likely be an improvement over existing programs and will be more likely to stand the test of audits.

Real buy-in by any individual laboratory to change its current program will also be more likely using this bottoms-up approach to program development by an expert peer group. In addition, many of the procedures and elements developed

by the RADWG will be applicable to other sites in the DOE system and can be shared. DOE Headquarters EM is also interested in adopting the RADWG recommended procedures and approach as criteria for reviewing packages to lift the moratorium.

Following is a brief summary of the status, as of January 1993, of the RADWG committees and their anticipated progress over the next six months. Committees whose objectives are associated mainly with the DOE shipping moratorium are discussed first.

#### Health Physics Procedures

RADWG's Health Physics Procedures (HP) committee is developing a specific implementing guidance document that can be used for writing a site specific procedure for measuring radioactive surface contamination. A draft has already been written and is being reviewed (along with background documentation) by the committee, and a revised draft guidance document is expected by the end of March 1993.

Concurrent with developing the implementing guidance, the HP committee has also been developing a protocol for controlled testing of radiation detection instruments for their ability to detect surface contamination at or below allowable release criteria. The committee decided to conduct these tests because little documented experimental data have been collected to serve as a defensible basis for demonstrating the sensitivities of currently used instruments to detect fixed surface contamination. Using isotopes with a range of emission energies that appear in laboratory generated wastes, instrument detection capabilities will be assessed looking at several parameters. These parameters include source strength and distribution, probe speed, instrument response time, and detector geometry (height and angle from source). Results of the testing will be shared with other DOE facilities and used to finalize the implementing guidance document.

Independent of the controlled tests of radiation detection instruments, a new program is being implemented to determine what levels of radiation are detected under field conditions with current personnel, procedures, and equipment. Under this field intercomparison program, large metal plates with known fixed contamination (alpha and/or beta) will be shipped to participating laboratories for survey under field conditions by in-house personnel. Objectives are to determine: 1) levels of contamination activity which can be detected, 2) how accurately detected contamination is measured, and 3) how measurements are interpreted and reported.

The field intercomparison program is intended to improve the laboratories' waste management programs without fear of punishment. Each laboratory will be given its results for internal feedback, but results from individual laboratories will be kept confidential. Results from all laboratories will be summarized and shared without individual identification. Summary information will be examined for trends that raise issues that should be addressed by the group.

The field intercomparison program can serve several useful purposes for the laboratories. It can be used for an internal self-assessment of current procedures and practices. If conducted periodically (e.g., annually), it can be a measure of any changes over time resulting from institution of new procedures, instruments, and personnel. It can also be used as part of performance based testing of the training and skills of new personnel.

A pilot study of the field intercomparison program with one laboratory has been completed to finalize the protocol for shipping, handling, instructions, etc., and the survey questionnaire is under review by the RADWG laboratories for finalization. Several laboratories are already interested in participating, and the full program should begin soon.

#### Analytical Chemistry Lab Procedures

The Analytical Chemistry Lab Procedures (AL) committee is reviewing and compiling existing methods for sample preparation and analysis of liquid hazardous waste that is potentially contaminated with isotopes expected in the laboratory waste streams. The AL committee expects to produce a methods manual that should be sufficient to address hazardous wastes under the DOE shipping moratorium.

The AL committee is also coordinating with the DOE Headquarters EM Laboratory Management Division's more long-term work to compile a methods compendium for radiological and chemical waste sampling and analysis, in an effort to provide a uniform set of procedures for DOE. The AL committee has procedures to handle wastes contained in oil, aqueous, and solvent matrices, and expects to obtain methods for soil matrix preparation from the EM compendium.

#### Process Knowledge Certification

Several laboratories have already developed site specific process knowledge certification forms. However, little written guidance is available regarding the information and underlying assumptions that are minimally necessary to sufficiently document, by process knowledge, that waste material is radiologically uncontaminated. This leaves all sites open to second-guessing by future auditors or outside examiners about whether process knowledge has been sufficiently documented. The Process Knowledge Certification (PKC) committee was formed to develop recommended guidance on this issue.

The PKC committee has reviewed PKC forms being used at the laboratories and has discussed, from a programmatic and auditing perspective, what elements are necessary for the PKC form and backup documentation. A final recommended guidance document is expected by April 1993.

#### Quality Assurance

In addition to exchanging information, the Quality Assurance (QA) committee is currently concerned with two other issues over the six month period following January 1993: (1) the DOE shipping moratorium and (2) joint audits of treatment, storage and disposal facilities (TSDs). The QA committee plans to develop a QA programmatic approach for developing a procedures package that satisfies the criteria under the moratorium. The committee will also develop recommended QA implementation strategies regarding the types of QA related activities that should occur at the laboratories in preparation for follow-up audits by DOE Headquarters to assess the implementation of moratorium procedures packages.

Many of the laboratories would like to develop a system for joint assessments/audits of commercial TSDs to replace the practice of each laboratory conducting its own assessments. The QA committee will be investigating the legal implications of sharing TSD audit results with participating laboratories and providing guidelines to mitigate liabilities.

The committee will also analyze the costs and benefits of coordinating TSD audits.

### Training

The Training committee has mostly been concerned with sharing information because many of the laboratories have limited training staff. Often, the technical staff must also act as trainers because they are most knowledgeable about technical material. One focus of this committee is on training of waste generators in the performance objectives of the DOE shipping moratorium and associated process knowledge certification.

### Release Criteria

One of the root causes of the DOE shipping moratorium is the lack of a widely accepted radioactive release standard, sometimes referred to as a "below regulatory concern" or "de minimis" level. Most of the laboratories in the RADWG feel that one of the most difficult problems with the DOE shipping moratorium is implementation of the "no DOE added" radioactivity performance objective. How to measure zero (above background) radioactivity has been the subject of much debate among health physicists and analytical chemists.

The Release Criteria (RC) committee advocates establishing risk-based radioactive release levels based on already accepted risk levels and methods. The RC committee has done some initial pathway analyses for solids using the RESRAD model, but the RADWG is too limited by funding to perform its own extensive pathway modeling. RC committee members have more recently been focusing on facilitating any work by DOE Headquarters or other organizations (e.g., NCRP) toward establishing release levels. This facilitation includes offering expert review of analyses and documents produced by DOE or other organizations, and providing real data on laboratory waste streams for pathway modeling by DOE.

### Interlaboratory Analytical Capabilities

This committee is assessing the capability and capacity of the RADWG laboratories analytical chemistry labs to analyze samples for other laboratories. Because of the diversity of waste streams produced by the DOE laboratories, sharing their analytic capabilities may be more cost effective than using commercial laboratories, especially for some of the more unique wastes.

### Hanford Liaison Committee

The Hanford Liaison Committee (HLC) was formed to develop better communication between the laboratories and the DOE Hanford disposal facility operators. Most of the RADWG laboratories generate non-defense low level radioactive waste and do not have on site disposal capabilities. In the DOE system, this type of waste must be disposed at a DOE facility, primarily Hanford. The intent of the HLC is to find improved ways of doing business with Hanford and to resolve issues and problems (which are common to many of the laboratories) related to using Hanford as a disposal facility.

The HLC will try initially to meet with Hanford operators to discuss issues, as well as goals and objectives for solving those issues. At that meeting, the HLC and Hanford operators can decide jointly on the best mechanisms for solving problems and for improving their communication and future transactions.

### Commercial Disposal/Treatment

The cost of treatment and disposal of low level radioactive waste is a concern to the laboratories. Many feel that commercial facilities offer a more economic approach for R&D laboratory waste streams. The Commercial Disposal/Treatment committee is working with DOE Headquarters to consider this option.

Currently, DOE allows commercial, NRC-licensed treatment, such as incineration or smelting, of some materials contaminated by low level radioactivity, but the radioactive residue must be returned to the DOE site who generated the waste. The DOE site, in turn, ships the residue to a DOE disposal facility (e.g., Hanford). The Commercial Disposal/Treatment committee is proposing that commercial treatment facilities, such as SEG or DSSI in Tennessee, be reviewed so that DOE can approve them to ship radioactive residues directly to the DOE disposal facility. This has been done for waste generated by one of the Chicago Field Office facilities, but needs to be generalized to apply to other commercial treatment facilities and DOE sites.

The accelerator laboratories are also faced with the problem of what to do with large volumes of recyclable metals containing induced radioactivity. The committee is examining possible alternatives to disposing of the metals as low level radioactive or mixed waste, such as storing these metals for decay and then recycling.

### Bar Code Systems/Waste Tracking

Key to any laboratory's waste management operations is keeping track of the waste generated, handled, and shipped for disposal. DOE has required that its sites institute a standardized waste tracking system using bar coding. For this purpose, the Bar Code/Waste Tracking committee provides a means for consolidating input into development of any new DOE waste tracking and bar coding requirements. It has also provided a mechanism for sharing lessons learned from implementing the bar code system.

The Idaho National Engineering Laboratory (INEL) has developed a waste tracking system software for DOE that incorporates bar coding. This software is available to any DOE site. One of the RADWG laboratories has been among the first few sites to install the system and use it. Other laboratories that have received the software are also evaluating it and providing feedback through the committee to the other laboratories and to DOE for possible design improvements or modifications.

### Electronic Communication

The Electronic Communication committee has identified resources available to link the RADWG members electronically and provide for storage of waste management related procedures that can be shared among the laboratories. This will improve communication among the members and facilitate document preparation and review. The link will also aid in developing a network for sharing relevant information and lessons learned among the group. These connections will be made over the next few months.

### Integrating Reporting Databases

One of the common problems among the laboratories is the drain on limited staff time by reporting similar waste management information to DOE into multiple, mutually

incompatible databases. These databases have been established at various times by different DOE subcontractors for somewhat different purposes. However, they all generally require information on the types and quantities of wastes generated at the laboratories during the past couple of years, plus information on estimated wastes up to five years in the future.

For the laboratories, this type of reporting is particularly burdensome because of the diversity of their waste streams. Much larger DOE production sites can spend less time reporting because they have fewer, more established, and more predictable waste streams. The committee on Integrating Reporting Databases proposes that these multiple reporting

databases be consolidated into one. DOE has an EM Waste Management (EM-30) steering committee that is beginning to address this issue. Three RADWG members are also on this steering committee.

#### CONCLUSION

The RADWG is maturing rapidly and we expect that the group will be making recommendations on, or actually resolving, many of the issues it is addressing. Using its bottoms-up approach, RADWG solutions for DOE challenges will be based upon field expertise and first-hand experience, and will more likely be widely accepted by the DOE R&D laboratory system.