EFCOG Best Practice #103

07/07/2011

Title: Working with Offsite High-Level Waste (HLW) Samples

Facility: Savannah River Site, South Carolina

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Brief Description of the Best Practice:

SRNL has developed a five step process for integrating different regulatory requirements (DOE, DOT, RCRA) resulting from the processing of HLW samples from other DOE facilities.

SRNL has received three HLW samples (total 3.5 L) from WRPS (Hanford) for use in a series of Treatability Studies; two samples were received in September 2010 and the third sample was received in February 2011. Each sample is processed through the same treatment method, with various byproducts (e.g., condensate) being retained along with the product. These materials are then analyzed by SRNL for a variety of parameters, which produces various solid and liquid residues. There are a variety of regulatory (RCRA, DOT) issues involved with this effort, which led to the development of the five step process.

Why the Best Practice was used:

Based on the recent research experience, the best practice was developed to aid future work by any DOE laboratory that is receiving HLW samples from a different DOE site. SRNL is continuing the research on the samples and may add issues to the process after the project is complete.

What are the benefits of the best practice?

The best practice provides a check list of potential issues that personnel may encounter when HLW samples are transferred between DOE sites. Sites other than SRS may use the SRS process to establish a site specific process. The actual issues will differ from site to site based on the specific sample parameters, planned research activities, and specific DOE site requirements.

What problems/issues were associated with the best practice?

Numerous problems, especially for HLW samples, arise from the transfer of material or waste from site to site. The problems/issues arise from coordination/communication between sites and regulators, establishing the proper characterization of the material/waste, ensuring the appropriate hazards have been identified, and proper packaging and transportation of the material/waste.

How the success of the best practice was measured:

Success of the best practice is measured by using less resources (manpower, cost) to receive, evaluate, transfer, transport and disposition offsite samples of HLW.

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Description of process experience using the best practice:

The following best practice is divided into 5 categories: Sample Packaging; Sample Shipment Planning; Determining Environmental Regulatory Impacts; Sample, Residue & JCW Management and Disposition; and Waste Shipment Planning.

1. Sample Packaging
    a. Packaging used by shipping (sample origin) site may not be familiar to receiving site. Receiving site may need to view sample packaging evolution so package opening can occur when the sample is received. If viewing is not practical, effective communication and exchange of information (e.g., sketches, radcon surveys, photos, etc) is a good alternative.
    b. Packaging may need to be opened remotely (e.g., high dose rate samples opened in shielded cells using manipulators), which is further complicated by the use of unfamiliar packaging. For these instances, viewing of the sample packaging evolution is highly encouraged. Special procedures for package receipt and unpacking may be needed.
    c. For situations requiring remote operations or special handling, consider performing a dry run of both the loading and unloading activities with the actual shipping container. Use the actual shielded or special function facility/equipment or a representative mock-up. Use this opportunity to plan and implement chemical and radiological ALARA provisions.
    d. The type of packaging and level of preparation and planning should follow a graded approach and be commensurate with the hazards involved (e.g., Type B, Type A, and Exempt Quantity in decreasing order of radiological hazard)
2. Sample Shipment Planning
    a. Shipment dates may be determined by upper management or external sources (e.g., DOE) without regard for technical needs or regulatory requirements (e.g., 1-year treatability study limit). It is preferred that shipment dates be determined based on actual technical and regulatory requirements (e.g., don't receive the sample until it is needed, ensure requirements for regulatory notification are met prior to shipping the sample).
    b. Samples may be required to be shipped Exclusive Use or Dedicated Use, as defined by DOT or requested by the Shipper. The shipment type and any special requirements should be communicated with the receiving facility (if different from laboratory – e.g., samples sent to SRNL are received at SRS Receiving (N-Area), not at SRNL (A-Area)). The type of shipment should be selected with consideration of the hazards associated with the shipment, bearing in mind that DOE must be prepared to respond in the unlikely event of an accident involving the release of radioactive material. This information also applies to the shipment of residues and wastes.
    c. Ensure the receipt schedule is acceptable to the receiving facility (e.g., if receipt date is Sunday, verify that the receiving facility can receive the shipment on this day). This information also applies to the shipment of residues and wastes.

d. It is recommended that the shipping container be inspected (i.e. surveyed, opened, visual inspection) as soon as practical after receipt. The purpose is to verify that the inner sample container has not been breached or leaked and to note any visible characteristics or changes that could have occurred during transport. Ideally the shipping container should be opened and receipt radiation and contamination surveys performed within 4 hours of delivery or if delivered after normal working hours, within 4 hrs of the start of the next business day.

e. Shipment of Type A or Type B quantities requires notification to DOE by the Shipper. This information also applies to the shipment of residues and wastes.

3. Determining Environmental Regulatory Impacts

   a. The scope of the activity is vital to understanding the regulatory impacts of the work (e.g. is the work a RCRA treatability study, is sample characterization being performed, is the stack monitoring/sampling system adequate for the increased source term, has NEPA been addressed, etc.).

   b. Different states interpret and therefore implement regulations differently, which may lead to conflicting requirements (e.g., treatability study "residue" definition).

   c. Clear communications between DOE sites and their state regulatory agencies may need to occur at an early stage, well before samples are shipped. A clear, written agreement between parties may help to address many regulatory requirements before they become issues (i.e. detail the regulatory requirements, who is responsible for what, and how sample returns and residue/waste management will be handled)

   d. Project planning needs to include management of samples, residues, and wastes to ensure RCRA compliance based on the governing state's requirements while being managed at one site versus the requirements of the state to which the sample/residues/wastes are returned.

4. Sample, Residue & JCW Management & Disposition

   a. Archiving and disposition of excess sample and products should be discussed during planning stages and regulatory impacts should be evaluated as to the disposition capabilities of each site.

   b. Samples and products may be returned under the RCRA "sample exclusion" and as "samples" for DOT compliance. However, if a treatability study is involved, compliance with the associated time-limit for sample exclusion must be maintained.

   c. Analytical samples may need to be run in "batch" mode to prevent cross-contamination of the analytical instrument and instrument effluent (if applicable) between "onsite" and "offsite" samples.

   d. Analytical residues collected from the "batch" mode for offsite samples should be collected separately from onsite sample residues. The offsite sample residues should be labeled, tracked, combined if applicable, and packaged for shipment. Based on the governing state's RCRA requirements, the residues are either shipped with the excess sample and product as part of the treatability study returns or shipped as waste to the appropriate TSD. Return

of residues is an area of interpretive difference between states. Management of residues should be discussed during the planning phase.

e. Job-control waste (JCW) generated during treatability study tasks and analytical testing should be managed based on the RCRA codes and radiological characterization of the waste.

f. All activities that will generate samples, residues, and JCW should be deliberately planned and controlled to ensure proper segregation of wastes and to minimize the volume and hazards associated with the wastes.

5. Waste Shipment Planning

   a. The "Shipper of Record" determination (i.e., which site is the "Shipper") for waste shipment DOT compliance may impact the packaging requirements (e.g., "Shipper of Record" site may require shipping packages to be procured by their site, as well as use of specific packaging procedures). Therefore, the "Shipper of Record" should be determined during project planning.

   b. The "Shipper of Record" site should have a contract with the commercial TSD that will receive the waste, if applicable. Alternatively (or in addition), the waste may be shipped to the DOE TSD at the sample origin site.

   c. The "Shipper of Record" maintains responsibility for waste characterization and manifesting. However, if the "Shipper of Record" did not actually generate the waste, technical assistance may be needed from the research site (e.g., sample origin site acts as "Shipper of Record" for waste generated at receiving site as part of the treatability study; receiving site provides data to sample origin site regarding physical, chemical, and radiological characteristics). The detail needed to support waste characterization and manifesting, as well as special procedures or other documentation, should be determined during project planning.

   d. See additional applicable information under "Sample Shipment Planning".

ISM Core Function 2: Analysis of hazards