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COST AVOIDANCE REALIZED THROUGH TRANSPORTATION AND DISPOSAL OF FERNALD MIXED LOW LEVEL WASTE

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TECHNICAL PAPER

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ABSTRACT

Currently, Department of Energy (DOE) facilities are undergoing a transformation from shipping radiologically contaminated waste within the DOE structure for disposal to now include Mixed Low Level Waste (MLLW) shipments to a permitted commercial disposal facility (PCDF) for final disposition. Implementing this change can be confusing and is perceived as being more difficult than it actually is. Lack of experience and disposal capacity, sometimes conflicting and/or confusing regulatory guidance, and expense of transportation and disposal of MLLW are contributing factors to many DOE facilities opting to simply store their MLLW. Fernald Environmental Restoration Management Company (FERMCO) established itself as a leader in addressing MLLW transportation and disposal by being one of the first DOE facilities to ship mixed waste to a PCDF (Envirocare of Utah) for disposal. FERMCO's proactive approach in establishing a MLLW Disposal Program produces long-term cost savings while generating interim mixed waste storage space to support FERMCO's cleanup mission. FERMCO's goal for all MLLW shipments was to develop a cost efficient system to accurately characterize, sample and analyze the waste, prepare containers and shipping paperwork, and achieve regulatory compliance while satisfying disposal facility waste acceptance criteria (WAC). This goal required the ability to evolve with the regulations, to address waste streams of varying matrices and contaminants, and to learn from each MLLW shipment campaign. These efforts have produced a successful MLLW Disposal Program at the Fernald Environmental Management Project (FEMP). FERMCO has amassed lessons learned from development of this fledgling program which may be applied complex-wide to ultimately save facilities time and money traditionally wasted by maintaining the status quo.

INTRODUCTION

We all recognize the ability exists within the DOE-Complex to remediate, perform Decontamination and Decommissioning (D&D), and treat MLLW. However, what we do with the resultant waste has been a conundrum many within the DOE Complex are not prepared or willing to address. Traditionally, DOE facilities have concentrated efforts on shipping radiologically contaminated waste within the DOE structure for disposal or sometimes even on-site storage. Pre-existing as well as newly generated MLLW resulting from closure activities have been sent to on-site storage facilities awaiting treatment and/or viable disposal options. Even when disposal options have become available, MLLW was, and continues to be, sent to storage. Transportation and disposal of MLLW has typically been neglected due to several factors including: lack of experience and disposal capacity; perceived regulatory inconsistencies; cost; programmatic complications; and stakeholder issues. In short, the DOE-Complex has exercised the path of least resistance when it comes to waste disposition, shipping LLW for disposal, and storing MLLW for future treatment and disposal.

Currently, Envirocare of Utah, Inc., is the only licensed PCDF qualified to receive MLLW for treatment and disposal. The definition of MLLW, a low-level radioactive waste, as defined in 10 CFR 61, and a hazardous waste, as defined in 40 CFR 261, can result in conflicts and incompatibilities between the Atomic Energy Act (AEA) and Resource Conservation and Recovery Act (RCRA). Issuance of a joint guidance document by the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) identified that radionuclide jurisdiction is to the NRC, while EPA governs the hazardous portion of the MLLW– in essence, dual regulations for the same waste. Since the regulations do not address MLLW specifically, both the hazardous and radioactive components must be fully considered in determining the applicable Department of Transportation (DOT) regulations governing its transportation. These confusing regulations may easily be misconstrued, leading to financial and sometimes legal repercussions. The legal implications alone are one reason many Waste Management departments have specifically not pursued transportation and disposal of MLLW. Also, additional regulatory requirements are ultimately viewed as increasing cost of transporting MLLW, further compounding the complex-wide problem. The point to remember is that those costs up front pale in comparison to later treatment and disposal costs.

BUSINESS AS USUAL

The standard course of action has been to store MLLW until disposal capacity becomes available. Often storage is performed while facilities, or organizations within facilities, study varied treatment technologies. These treatment methods are comprised of both new and existing technologies. More often than not, several of these waste streams could be directly land disposed. Simply storing MLLW for future treatment will only escalate treatment cost

in the future. This storage action, or lack thereof, has created another concern - storage capacity. On-site storage capacity has become a premium. With decommissioning of several DOE sites in full swing, and additional wastes being generated daily, storage capacity is a growing interest. These wastes require storage until treatment and/or disposal can be performed. Even with commercial disposal capacity of MLLW now available, many sites continue to focus on LLW disposal. As MLLW continues to be ignored, costs for treatment and disposal continue to escalate.

Public participation activities are mandated by several laws and regulations. Involving public groups and stakeholders in the decision-making process requires educating the interested parties to understand technical and general information regarding MLLW treatment and transportation issues. This action often requires additional time and money, as well as the potential to encounter great opposition. Rather than initiate open public dialogue, many choose to procrastinate. Again, neglecting to involve public interest groups or incorporate their input in the decision-making process could cause greater problems in the future.

FERMCO - MLLW TRANSPORTATION and DISPOSAL LEADERS

The MLLW dilemma has been described as a situation in which "EPA and the state authorities, via RCRA and the LDRs, are in the position of requiring DOE and the other mixed waste generators to do something that everyone acknowledges is impossible and then makes the same generators subject to fines and penalties for not doing the impossible."(1) In 1992, Congress passed the Federal Facilities Compliance Act (FFCAct) requiring DOE's compliance with Land Disposal Restriction (LDRs) requirements for mixed waste within three years. The FFCAct, however, does not impose any similar requirements for disposal of treated wastes. FERMCO chose a more progressive approach for the disposal of FEMP *legacy* MLLW and meeting applicable LDRs. Legacy waste is waste previously generated and containerized during past site operations. For the past three years, FERMCO has tackled development of a compliant Disposal Program for legacy MLLW while actually performing shipments to a commercial disposal facility. In developing a successful MLLW Disposal Program, the FEMP has had to address a myriad of regulatory and logistical issues while actually performing waste shipments.

FERMCO's goal was to establish a fledgling program to provide a cost-efficient system for accurate characterization, sampling and analysis, container and shipping paperwork preparation, while satisfying regulatory requirements and stakeholder interests for all MLLW shipments to a PCDF.

Programmatic requirements differ in many regards from a LLW Disposal Program to a MLLW Disposal Program. Additional sampling and analysis, container preparation, health and safety, and paperwork requirements all add to the increase in cost of disposing MLLW. Initializing the MLLW Disposal Program involved projectizing waste streams into shipment campaigns. This projectizing effort includes segregating waste containers into shipments based waste matrix, and EPA hazardous waste codes. FEMP MLLW has been characterized using Process Knowledge and sampling and analysis results in accordance with site procedure EW-0001, "Initializing Waste Characterization Activities Using the Material Evaluation Form", the Waste Characterization Manual, and the FEMP Waste Analysis Plan. The waste characterization methodologies specified by EW-0001 are consistent with USEPA and Ohio EPA hazardous waste regulations. Containers of legacy MLLW are characterized prior to treatment or disposal; however, due to the heterogeneity of waste materials with in many waste streams, some waste containers may contain materials which differ from the MEF visual characterization. Visual descriptions of containerized waste are not one hundred percent accurate. Properly characterized waste streams can be comprised of a variety of waste matrixes. These include both debris and non-debris material. During waste segregation operations, these anomalies will be identified and transferred to the appropriate treatment process or disposal campaign.

The first step in waste segregation was removal of debris from non-debris material. Segregated materials were placed into one of the following projects "The Debris Project", "Non-LDR/F-Listed Below Treatment Standard Project", or "Chemical Treatment Project". Initial projects within the Disposal Program included "The Debris Project" and the "Non-LDR/F-Listed Below Treatment Standard Project". "The Chemical Treatment Project" consisted of waste which exceeded LDRs or disposal facility Waste Acceptance Criteria (WAC). The Debris Project was performed under a renewed extension to a case-by-case capacity variance, while the Non-LDR/F-Listed Below Treatment Standard Project was performed while compliance to established LDRs was delayed. This proved to be a critical step in prioritizing shipment campaigns based on regulatory guidelines (i.e., renewed an extension to the case-by-case capacity variance and delayed LDR compliance dates).

Completing these shipment campaigns with in the established regulatory windows was critical in reducing MLLW inventory requiring treatment and disposal costs. The segregation effort employed Real Time Radiography (RTR), a non-intrusive x-ray technology used to view the contents of containers; historical visual inspections forms; analytical data; and process knowledge to properly complete the segregation efforts. Information from this action was utilized to segregate debris from non-debris material and full from partially full containers. The debris segregation effort helped FERMCO minimize debris waste streams to achieve the

least disposal cost available. Partially full containers of like wastes were consolidated. This effort generated full containers of waste while reducing the number of containers requiring disposal. The result was a reduction in true disposal costs. The PCDF capable of receiving MLLW charged disposal fees based on the entire container volume full or empty.

Once consolidated, the next step in the process, sampling and analysis, could be implemented. Traditionally, sampling and analysis is an expensive process utilized to verify waste meets LDRs and disposal facility WAC. By reducing the number of *unqualified* containers sampled and analyzed, developing an aggressive sampling and analysis plan (SAP), and involving Waste Characterization group in determining containers requiring sampling and analysis, immediate cost savings could be realized. The larger the shipping campaign, the larger the savings.

With limited disposal capacity for FEMP MLLW available – at present only Envirocare of Utah – developing a SAP which would satisfy characterization, closure actions, LDR determinations, and disposal facility WAC could be accomplished. By involving the Waste Characterization group in determining which waste streams would qualify as MLLW up front, again excess sampling and analysis could be avoided. The establishment of a multi-purpose SAP virtually eliminates duplicate, and in some cases even triplicate, sampling efforts, again realizing time and cost savings.

Additionally, FERMCO was able to lessen traditional site standard Analytical Support Levels (ASLs). This change enabled customized QA requirements, reduced level of effort required by the FEMP site laboratory, as well as eliminated data validation requirements which is a duplication and paperwork. Once analytical data was returned from the laboratory, information was forwarded directly to the project team instead of Data Validation. FERMCO was able to bypass Data Validation due to the utilization of a Utah certified laboratory. The Utah certified laboratories employ approved Quality Assurance and Quality Control measures and methods assuring accurate results. Bypassing Data Validation enabled the project team to sort and sift through analytical results, extracting relevant LDR and disposal facility WAC information, summarize the information in a spreadsheet packaged with the full analytical data support packages, and forward the information to the disposal facility months before Data Validation would normally review and deliver analytical data. This analytical data summary effort reduced confusion and paper work review time at the disposal site. In turn, FEMP waste acceptance at the PCDF was expedited enabling FERMCO to dispose waste within established regulatory variances and exemptions time frames. Again, waste disposed prior to regulatory compliance deadlines, without prior treatment, produced savings in the hundreds of thousands of dollars.

CONCLUSION

Without delving into the long-term task of trying to overcome political and regulatory barriers, the first step for DOE facilities is to projectize and qualify waste for off-site disposal. This effort will reduce risk and liability while freeing up storage space, and save millions of dollars complex-wide. While FERMCO's MLLW Disposal Program has completed several successful shipping campaigns, these successes did not come without experiencing some difficulty. Many of the difficulties occurred as a result of executing shipping campaigns while developing the program. These difficulties were learning experiences which most facilities will encounter as a result of altering the old philosophy of "That is the way we have always done it". In making that same transition, FERMCO uncovered the following key elements in developing a time and cost-efficient MLLW Disposal Program:

- Be pro-active in establishing a MLLW Disposal Program. MLLW disposition is a time-critical operation for regulatory compliance and cost efficiency. The longer you wait, the greater the cost!
- Invest the time up front in segregating and projectizing MLLW waste shipments. Know your waste and be cognizant to regulatory drivers and deadlines.
- Consolidate partially full containers to minimize disposal cost.
- Achieve regulatory compliance and ship. Avoid pursuing convoluted treatment technologies trying to achieve greater than regulatory compliance. Meet LDRs and disposal facility WAC, then ship it.
- Minimize Sampling and Analysis efforts; try to satisfy several requirements with one SAP. Develop open end waste stream profiles enabling future wastes to be disposed under a limited number of waste profiles. This will reduce sampling, analysis and paperwork requirements.
- Develop your own ASL levels and data validation requirements. Remember, characterization requires a greater ASL and data validation level for analytical results than necessary to satisfy disposal facility WAC and LDRs.

Employing these strategies are necessary in developing a successful MLLW Disposal Program for current and future waste inventories.

REFERENCES

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