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WASTE MANAGEMENT ASPECTS OF DECONTAMINATION AND DECOMMISSIONING (D&D) PROJECTS

Bruce D. Becker

I. Introduction

History shows that waste management concepts have generally been overlooked during the planning stages of most projects and experiments. This is resulting in the generation of vast amounts of waste during the clean up or D&D of these facilities. Managers are not only being frustrated in their waste minimization efforts (a relatively new concept) but are also facing the prospect of not being able to dispose of the waste materials at all. At the least, managers are having to budget extraordinary amounts of time, money, and effort in defending their positions that the waste materials are not only humanly and environmentally safe, but that the waste materials are in fact what management says they are. The following discussion will attempt to provide some guidance to D&D managers to help them avoid many of the common pitfalls associated with the ultimate disposal of the materials generated during these projects.

II. Planning

Before any project that could generate any type of waste leaves the drawing board, PLAN. Projects and experiments are never a solitary function. Develop a team approach, or Total Quality Management (TQM) system if that is what you are familiar with. Bring together every possible group that could become involved, no matter how insignificant their role may appear to be (i.e., Engineering, Production, Maintenance, Analytical, Quality, Procurement, Safety/Health, Waste Management, Training, Transportation, Environmental Compliance, etc.). Each of these groups could have a significant contribution to make.

Ideally, this approach should be used at the front end of a project, while a facility is being designed; before the first step is taken to turn a concept into a reality. But in the real world, D&D projects are aimed at facilities whose first priority used to be "get the product out the door." That doesn't mean, however, that planning and the TQM approach cannot be effective. To the contrary, the old saying "better late than never" was never more appropriate than at the beginning stages of D&D, as the groups strive towards the goal of identification, characterization, and dispositioning of the waste generated during the project.

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III. Project Scope

As stated above, the first step is to gather the team. Not every team member will have to be involved in the day-to-day activities, but they should be involved in developing the scope of the project.

Project management should have a basic idea of the scope. As this is presented, each team member can delineate their areas of responsibility.

- Engineering should be able to provide historical drawings and specifications.
- Production should be able to provide process records, and batch, release, and material inventory reports.
- Maintenance may be able to provide information on facility modifications and equipment specification.
- Analytical groups can provide historical data on product analyses and can offer guidance for collecting new samples.
- Quality should provide independent oversight verification as required by any phases of the project.
- Procurement will be responsible for providing goods and services that meet the project's requirements.
- Safety/Health can provide expertise on personal protective measures.
- Training will provide assurances that all personnel associated with the project are fully trained.
- Transportation will make sure that shipments offsite are not in regulatory violation.
- Waste Management will be responsible for assuring that all waste generating activities follow the procedures established by the team, including waste segregation and packaging.
- Environmental Compliance can review analytical data for regulatory interpretations.

After the team has been formed, a "walk-through" of the D&D project should be performed by the team as a whole. This walk-through will serve several purposes.

- It will provide appropriate team members with an opportunity to identify the various waste types or materials that can be anticipated.

- Analytical personnel will have an opportunity to assess the amount and type of sampling and analytical work that will be involved.
- It will provide the safety and health professionals a chance to assess the types of Personal Protective Equipment that may be required.
- Engineering will be able to assess how up-to-date their drawings are.
- Procurement, with the help of Engineering, will be able to estimate what kind and how much containerization will be required.
- It will give those team members who normally are not familiar with production or D&D operations, an opportunity to see the project sight in person and ask questions.
- Waste Management and Environmental Compliance can make some preliminary determinations for waste segregation and control.

Only after everyone is totally familiar with the project can the scope of the project be finalized.

IV. Identification

The visual observations made during the project walk-through will allow the team to do some initial identification of potential waste materials found in the work area.

As the facility is walked through, team members should be observant. This is not your proverbial walk in the park, as decisions made here can have serious implications later. Do not take anything for granted. Ask questions. This is where team members not familiar with the area can be especially helpful, as production and maintenance personnel who are familiar with the area, may have a tendency to overlook potential problems. In the nuclear Navy and U.S. Department of Energy (DOE), this is now known as "pulling the string." If people are not available that can answer questions, make notes to revisit these areas. It is important to pull the string and see what unravels. Visual observation of the project site and interviews conducted with former employees can provide the team clues for uncovering the history of the facility. Some things to look for during the walk-through are:

- Items such as asbestos in insulations and other building materials.
- Lead paint on walls that could have been used as a

matter-of-course during the years or to fix contamination.

- Discolorations on floors that could indicate spills.
- Polychlorinated Biphenyls (PCBs) in old fluorescent light ballasts or other oil-containing reservoirs.
- Residual process materials.
- Forgotten chemicals in cabinets and storage closets.
- Look outside the buildings. Is the ground discolored? Does the vegetation look distressed?
- Check pathways that the storm water runoff had taken. Look for storm drains that lead to collection ponds or that may have discharged into municipal systems.

Some materials, based on their location or use, may be determined to be "clean" or uncontaminated. They may or may not be waste. These materials could be used elsewhere in the facility, sent to a recycler, or disposed at a sanitary landfill. Regardless of their ultimate disposition, these materials should be removed from the remediation site prior to the start of the project.

If any hazardous materials are found that are not radiologically contaminated, remove them from the area prior to the start of remediation. Leaving these materials in place at the project site could result in the generation of mixed waste or at least cause all the waste to become suspect mixed waste and increase the amount and cost of verification sampling needed.

After the scope of the project has been determined, a formal project plan should be developed. This project plan should contain:

- All historical data accumulated, including information gathered during the walk-through, references to Engineering drawings, and information gathered during interviews with former employees.
- References to procedures that will be followed.
- Sampling and analytical plans for characterization of the waste.
- How analytical data will be interpreted or used.
- Waste segregation and control measures.
- How changes to work procedures will be handled.

- Employee training requirements.

V. Characterization

Characterization of the waste materials can be accomplished through "process knowledge" or "sampling and analysis."

Process knowledge is that method of describing the identity of a waste by means other than sampling and analysis methods. To the casual observer, process knowledge appears to be the most simple process. However, in today's regulatory climate, process knowledge can be as difficult and frustrating a task as trying to satisfy a small child's curiosity as they continue to ask "why." Only in this case, the question is "how."

- How do you know what went into the batch?
- How do you know what went into a waste container?
- How do you know that the waste was adequately characterized?
- How can you prove that the workers in the area understood what a hazardous waste was?
- How was the waste controlled?
- How were the contents of a container verified?
- How was the integrity of the container verified?
- How was the adequacy of the training verified?

The first step in characterizing waste by process knowledge is the same step used in developing the scope of the project; gather all historical data available.

Check drawings of the facility to see what material transfer systems were located in the area. What was in these systems? Was the material regulated by today's federal or state standards? Are there any reports of leaks or spills from these systems? How about during system maintenance? Are there signs of old stains near these systems? Are the systems insulated? Is the insulation asbestos? Could there be residual materials in the systems?

Was the facility a process area? If so, locate process sheets, batch reports, or production reports. Identify the ingredients. Look for material safety data sheets. Again, identify spills and residual materials.

Was the facility a laboratory? Identify the chemicals that were used or stored in the area by gathering chemical

VII. Case Specifics

The Nevada Test Site (NTS) has a very stringent WAC, which must be complied with by generators before their waste will be accepted for disposal. Most of the criteria is derived directly from regulations promulgated by the EPA and DOT, as well as DOE Orders. The criteria that fall into those categories have been identified above. Some of the WAC, however, are specific to the NTS. These cover such areas as package closure and strength, package size and weight, and marking and labeling.

The NTS also imposes upon generators, a requirement that a waste certification program be in place. This certification program requires a great deal of coordination and cooperation from all groups (previously identified in the "Planning" section). The final step in the certification program is the signing of a statement, by an approved Waste Certification Official (WCO), attesting to the fact, under penalty of law, that all the requirements of the WAC have been complied with. This is the proof of the pudding, that everyone involved in the D&D Plan has done their part.

That is why it is so important to develop D&D projects using the team approach. No one alone can manage the waste generated during a D&D project. The team approach utilizes subject matter experts to promote safe work practices, as low as reasonably achievable concepts, waste minimization, efficient procurement, and compliance with regulatory criteria.

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INTRODUCTION

- **WASTE MANAGEMENT CONCEPTS HAVE GENERALLY BEEN OVERLOOKED.**
- **LACK OF WASTE MINIMIZATION.**
- **TIME, MONEY, EFFORT DEFENDING WASTE.**

PLANNING

- **PROJECTS AND EXPERIMENTS ARE NEVER A SOLITARY FUNCTION.**
- **DEVELOP TEAM APPROACH.**
- **ENGINEERING, PRODUCTION, MAINTENANCE, ANALYTICAL, QUALITY, PROCUREMENT, SAFETY/HEALTH, WASTE MANAGEMENT, TRAINING, TRANSPORTATION, ENVIRONMENTAL COMPLIANCE, ETC...**

PLANNING (CONT)

- **APPROACH SHOULD BE USED AT THE FRONT END OF A PROJECT.**
- **D&D PROJECTS ARE AIMED AT OLDER FACILITIES.**
- **BETTER LATE THAN NEVER.**
- **GOAL - IDENTIFICATION, CHARACTERIZATION, AND DISPOSITIONING OF THE WASTE.**

PROJECT SCOPE

- **PROJECT MANAGEMENT SHOULD HAVE A BASIC IDEA OF THE SCOPE.**
- **EACH TEAM MEMBER DELINEATES THEIR AREAS OF RESPONSIBILITY.**
- **ENGINEERING SHOULD BE ABLE TO PROVIDE HISTORICAL DRAWINGS AND SPECIFICATIONS.**
- **PRODUCTION SHOULD BE ABLE TO PROVIDE PROCESS RECORDS AND BATCH RELEASE, AND MATERIAL INVENTORY REPORTS.**

PROJECT SCOPE (CONT)

- **MAINTENANCE MAY BE ABLE TO PROVIDE INFORMATION ON FACILITY MODIFICATIONS AND EQUIPMENT SPECIFICATION.**
- **ANALYTICAL GROUPS CAN PROVIDE HISTORICAL DATA ON PRODUCT ANALYSES AND CAN OFFER GUIDANCE FOR COLLECTING NEW SAMPLES.**
- **QUALITY SHOULD PROVIDE INDEPENDENT OVERSIGHT VERIFICATION AS REQUIRED BY ANY PHASES OF THE PROJECT.**
- **PROCUREMENT WILL BE RESPONSIBLE FOR PROVIDING GOODS AND SERVICES THAT MEET THE PROJECT'S REQUIREMENTS.**

PROJECT SCOPE (CONT)

- **SAFETY/HEALTH CAN PROVIDE EXPERTISE ON PERSONAL PROTECTIVE MEASURES.**
- **TRAINING WILL PROVIDE ASSURANCES THAT ALL PERSONNEL ASSOCIATED WITH THE PROJECT ARE FULLY TRAINED.**
- **TRANSPORTATION WILL MAKE SURE THAT SHIPMENTS OFFSITE ARE NOT IN REGULATORY VIOLATION.**

PROJECT SCOPE (CONT)

- **WASTE MANAGEMENT WILL BE RESPONSIBLE FOR ASSURING THAT ALL WASTE GENERATING ACTIVITIES FOLLOW THE PROCEDURES ESTABLISHED BY THE TEAM, INCLUDING WASTE SEGREGATION AND PACKAGING.**
- **ENVIRONMENTAL COMPLIANCE CAN REVIEW ANALYTICAL DATA FOR REGULATORY INTERPRETATIONS.**
- **AFTER THE TEAM HAS BEEN FORMED, PERFORM WALK-THROUGH.**
- **TEAM - OPPORTUNITY TO IDENTIFY THE VARIOUS WASTE TYPES OR MATERIALS THAT CAN BE ANTICIPATED.**

PROJECT SCOPE (CONT)

- **ANALYTICAL - OPPORTUNITY TO ASSESS THE AMOUNT AND TYPE OF SAMPLING AND ANALYTICAL WORK THAT WILL BE INVOLVED.**
- **SAFETY/HEALTH - ASSESS THE TYPES OF PERSONAL PROTECTIVE EQUIPMENT THAT MAY BE REQUIRED.**
- **ENGINEERING - ASSESS HOW UP-TO-DATE THEIR DRAWINGS ARE.**
- **PROCUREMENT/ENGINEERING - ESTIMATE WHAT KIND AND HOW MUCH CONTAINERIZATION WILL BE REQUIRED.**

PROJECT SCOPE (CONT)

- **TEAM MEMBERS - AN OPPORTUNITY TO SEE THE PROJECT SITE IN PERSON AND ASK QUESTIONS.**
- **WASTE MANAGEMENT/ENVIRONMENTAL COMPLIANCE - PRELIMINARY DETERMINATIONS FOR WASTE SEGREGATION AND CONTROL.**

AFTER EVERYONE IS TOTALLY FAMILIAR WITH THE PROJECT, THE SCOPE OF THE PROJECT CAN BE FINALIZED.

IDENTIFICATION

- **WALK-THROUGH WILL ALLOW THE TEAM TO DO SOME INITIAL IDENTIFICATION.**
- **PRODUCTION AND MAINTENANCE PERSONNEL MAY OVER LOOK POTENTIAL PROBLEMS.**
- **PULL THE STRING.**
- **INTERVIEWS.**
- **VISUAL OBSERVATION.**

IDENTIFICATION (CONT)

- **ITEMS SUCH AS ASBESTOS IN INSULATIONS AND OTHER BUILDING MATERIALS.**
- **LEAD PAINT ON WALLS THAT COULD HAVE BEEN USED AS A MATTER-OF-COURSE DURING THE YEARS OR TO FIX CONTAMINATION.**
- **DISCOLORATIONS ON FLOORS THAT COULD INDICATE SPILLS.**
- **POLYCHLORINATED BIPHENYLS (PCBs) IN OLD FLUORESCENT LIGHT BALLASTS OR OTHER OIL-CONTAINING RESERVOIRS.**

IDENTIFICATION (CONT)

- **RESIDUAL PROCESS MATERIALS.**
- **FORGOTTEN CHEMICALS IN CABINETS AND STORAGE CLOSETS.**
- **LOOK OUTSIDE THE BUILDINGS. IS THE GROUND DISCOLORED?
DOES THE VEGETATION LOOK DISTRESSED?**
- **CHECK PATHWAYS THAT THE STORM WATER RUNOFF HAD
TAKEN.**

IDENTIFICATION (CONT)

- **SOME MATERIALS DETERMINED TO BE NON-HAZARDOUS OR UNCONTAMINATED**
 - **REMOVE FROM THE REMEDIATION SITE.**
- **HAZARDOUS MATERIALS NOT RADIOLOGICALLY CONTAMINATED**
 - **REMOVE FROM THE AREA.**
- **SUSPECT MIXED WASTE.**

PROJECT PLAN

- **DEVELOP PROJECT PLAN.**
- **HISTORICAL DATA, ENGINEERING DRAWINGS, INTERVIEWS.**
- **REFERENCES TO PROCEDURES.**
- **SAMPLING AND ANALYTICAL PLANS.**

PROJECT PLAN (CONT)

- **HOW ANALYTICAL DATA WILL BE INTERPRETED OR USED.**
- **WASTE SEGREGATION AND CONTROL MEASURES.**
- **HOW CHANGES TO WORK PROCEDURES WILL BE HANDLED.**
- **EMPLOYEE TRAINING REQUIREMENTS.**

CHARACTERIZATION

PROCESS KNOWLEDGE OR SAMPLING AND ANALYSIS

PROCESS KNOWLEDGE

- FOR LOW-LEVEL WASTE - MUST DOCUMENT NO RCRA MATERIALS.
- FOR HAZARDOUS WASTE - MUST DOCUMENT NO RADIOACTIVITY.
- FOR SOLID SANITARY WASTE - DOCUMENT BOTH CONDITIONS.

PROCESS KNOWLEDGE IS ROUTINELY SCRUTINIZED MORE CLOSELY.

PROCESS FACILITY

- **REPORTS OF LEAKS OR SPILLS.**
- **SYSTEM MAINTENANCE.**
- **SYSTEM INSULATION.**
- **RESIDUAL MATERIALS.**
- **LOCATE PROCESS SHEETS, BATCH REPORTS, OR PRODUCTION REPORTS.**
- **IDENTIFY SPILLS AND RESIDUAL MATERIALS.**

LABORATORY

- **CHEMICAL INVENTORY REPORTS.**
- **SPILL REPORTS.**
- **ANALYTICAL LOGBOOKS.**

STOREROOM

- **REGULATED MATERIALS.**
- **SPILL REPORTS.**
- **PROCUREMENT DOCUMENTS.**
- **INVENTORY RECORDS.**

CLEANSING MATERIALS

- **SOLVENTS USED FOR DEGREASING.**
- **MATERIALS DISPOSED.**

SAMPLING AND ANALYSIS

FOLLOWS A WRITTEN PLAN

- **PROJECT DESCRIPTION.**
- **NAMES OF THE KEY POSITIONS.**
- **DATA QUALITY OBJECTIVES.**
- **SAMPLING STRATEGIES, PROCEDURES, AND APPROACH, SAMPLE RANDOMNESS, AND NUMBER OF SAMPLES.**
- **IDENTIFY THE LABORATORY.**
- **PROCEDURES.**
- **REPORTING REQUIREMENTS OF THE DISPOSAL FACILITY.**
- **DOCUMENT EVERYTHING.**

DISPOSITION

DISPOSAL CRITERIA

- **PHYSICAL FORM.**
- **CHEMICAL COMPONENTS.**
- **NUCLIDES CONTENT AND CONCENTRATION.**
- **PACKAGING.**
- **MODE OF TRANSPORT.**
- **MATERIAL HANDLING PROCEDURES.**
- **EMPLOYEE TRAINING.**

TEAM APPROACH

TEAM APPROACH

- **SUBJECT MATTER EXPERTS.**
- **PROMOTES SAFE WORK PRACTICES.**
- **AS LOW AS REASONABLY ACHIEVABLE (ALARA) CONCEPTS.**
- **WASTE MINIMIZATION.**
- **EFFICIENT PROCUREMENT.**
- **COMPLIANCE WITH REGULATORY CRITERIA.**

DATE

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