BUILDING DEBRIS MANAGEMENT AT A DOE REMEDIAL ACTION PROJECT

Felix Spittler
MK-Ferguson Company
Ken Warbritton
Jacobs Engineering Group, Inc.

ABSTRACT

Factors which add complexity to building debris management at DOE remedial projects include CERCLA-NEPA requirements, release restrictions and liability, and the desire to recycle materials to the extent practical. This paper presents the debris management approach at the DOE Weldon Spring Site Remedial Action Project, from building removal through final disposition.

The WSSRAP approach uses value engineering to define the functions that must take place and subsequently to evaluate alternatives which satisfy each function. The functions discussed include building and debris removal, material classification, material transfer, material staging, decontamination, size reduction, and final disposition. Alternatives for each function are evaluated and presented as a system flowchart in which debris management starts with building removal and ranges through material staging. Final disposition options are discussed for each category of material, and key decision points are highlighted for planning purposes.

This information is currently being implemented in building removal subcontracts as well as design and operation of appropriate storage facilities. This management scheme provides for building and debris removal, consolidation, and staging in a manner that does not bias final disposition options and outlines data required for critical decision points.

INTRODUCTION

The Weldon Spring Site Remedial Action Project (WSSRAP) was created as DOE Major Project Number 182 and is managed by MK-Ferguson the Project Management Contractor (PMC) for the Department of Energy (DOE). Jacobs Engineering Group, Inc., is an integrated subcontractor to MK-Ferguson. This project is part of the DOE Environmental Restoration Program, one of the remedial action programs under the direction of the Assistant Secretary, of Environmental Restoration and Waste Management. The site is comprised of the Weldon Spring chemical plant, raffinate pits, vicinity properties, and quarry. The site was used to produce uranium metal from the mid 1950s to the mid 1960s.

The site is currently in the latter stages of preparing the feasibility study that is required to reach a Record of Decision regarding the ultimate disposition of waste materials. Significant quantities of building materials and debris require management.

PROBLEM

Deteriorated chemical process and support buildings and associated debris must be removed and consolidated in order to maintain safety and enable remediation of contaminated soils and sludge on the site. These materials will be managed in a manner which will take into account the limited storage capacity available on the site while not biasing decisions regarding the ultimate disposition of these wastes.

APPROACH

In order to plan for removal and management of materials and debris, the PMC utilized value engineering techniques to identify all debris management functions and their relationships, and recommend alternatives to satisfy each function. Specific materials management functions analyzed included building and debris removal, material classification, transfer and staging; decontamination, size reduction, and disposition options. The logical sequence of these functions is presented in a Functional Analysis System Technique (FAST) diagram (Fig. 1).

Individual functions were then analyzed by preparing a list of viable alternatives, identifying and weighing criteria, and finally ranking the alternatives and reviewing the ranking objectively. In some cases, a single preferred alternative could not be determined, often because insufficient information was available at the time. In many of these instances, critical data and information requirements could be identified which would allow a choice between closely ranked alternatives.

After alternatives for all functions were evaluated, materials and debris were grouped by similar characteristics, and known or proposed staging and storage areas were listed. Flow charts were then prepared for specific groups of debris materials which outlined a logical progression from removal through disposition and noted critical requirements for handling and storage (Example, Fig. 2). Key decision points are included in these flowcharts to indicate data needed for management or disposition decisions. These decision points are generally related to regulatory requirements, release restrictions and liabilities. In all cases, the material flowcharts are based on appropriate management techniques which will not bias ultimate disposition decisions. Finally, a matrix of waste types and material staging and storage areas was prepared in order to define the storage criteria and size requirements for all storage areas.

Following this planning effort, data collection activities commenced, operational plans for material management areas were drafted, and building removal specifications were finalized.

IMPLEMENTATION AND CURRENT STATUS

Many of the operations and facilities noted above are being implemented at the present time. Data collection consisted of developing of radiological, chemical and physical characterization reports for all structures and debris on site. Physical characterization consisted of updating existing

DISPOSITION MATERIAL	PROCESS MATERIAL: REDUCE SIZE	PROCESS MATERIAL: REMOVE CONTAMINANT	PROCESS MATERIAL: REMOVE PRODUCT	STAGE MATERIAL: Location	STAGE MATERIAL: Method	CLASSIFY	REMOVE BUILDINGS
1. Recycle-Restricted 2. Landfill On-site 3. Recycle-Unrestricted 3. Salvage Intact 5. Landfill Off-site	Metal 1. Compact 2. Shred 3. Shear 4. Torch Concrete Hoe-ram Wrecking Ball Backhoe Crush Wood Compost Chip Burn Crush/Shred	Metal 1. Hydrolase 2. Liquid Abrasive Blast 3. Sand blast 4. Pressure Wash Concrete 1. Scrubbing 2. Hydrolase	1. Product Recovery (Subcontract) 2. Water Flushing 3. Vacuum 4. Wet vac	MSA TSA ASA//408 Ash Pond S. of Pit 4 Raffinate Pits 434 WTP Mulch Pile 109/110 Slab CMSA Mashalling Yard	*Metal* 1. Roll-off 2. Bins 3. Pile 4. Stack 5. Palletize 5. Band/Bale 6. Place Intact *Wood* 1. Pile 2. Stack 3. Palletize 4. Re-use Concrete/Masonry Pile Use as Fill Containerize (PCB) Soil Pile Use as Fill Containerize (RCRA, PCB) ACM *Non-Friable* Stack Palletize *Friable* Bags Sea/Land 408	Soil Wood Concrete/Masonry Metal Trash ACM RCRA TSCA Rad Product Misc. Material Graphite Diatomaceous Earth	1. Demolish-Equip. Intensive 2. Demolish-Labor Intensive 3. Dismantle 4. Demolish-Explosives

Fig. 1. Functional analysis system technique (fast) diagram.

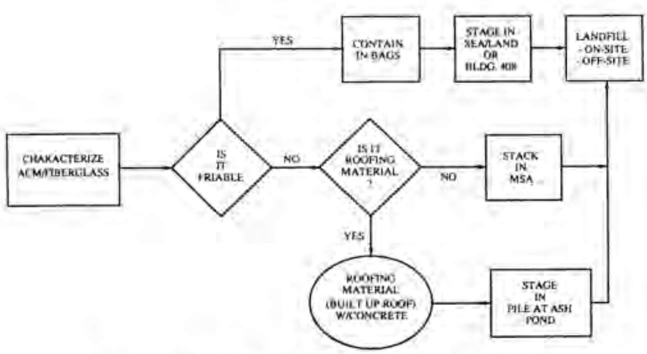

Fig. 2. ACM (Abestos containing material).

drawings to accurately show building conditions. These surveys helped establish an accurate picture of the types and quantities of debris. Specifications for the removal of support buildings, major process buildings, and site debris cleanup incorporate the results of the materials management surveys. Flowcharts based on these surveys allowed requirements for removing, cleaning, sizing, and storing material to be written. The specifications were written with the confidence that the requirements were based on a logical approach to the long range goals of the remediation project.

The sequence to major building removal subcontract activities starts with asbestos abatement and continues through removal of radioactively contaminated piping and equipment, interior building washdown, and finally removal of superstructures. This approach basically calls for dismantlement of the interiors and allows for traditional demolition techniques on the exterior. The materials are then sized and transported to appropriate material management areas. Contaminated systems have been identified on the basis of characterization reports and old plant drawings and records. The identification of regulated materials and Product Process Systems (systems which actually came in contact with the radioactive product material) will allow the interior dismantlement work to be limited to those systems only which have a potential for environmental release during demolition of superstructures.

REMOVAL SPECIFICATIONS

Segregation of debris into specific groups became the focal point of the removal specifications. 19 different groups of material were listed (Table I).

Each listed group was defined as to size and handling and storage requirements. Each group was then put into a waste stream designated for a specific site storage area. The storage area for each category within each group was also identified. Examples of material storage areas (Fig. 3) include Building 434 (the RCRA containerized storage building), a Temporary Storage Area (constructed to RCRA surface pile standards), a Material Staging Area (building materials and debris storage), an Asbestos Storage Area (cargo vans for asbestos storage), and the Ash Pond Storage Area (contaminated soil and rubble).

After the categories of materials were defined, the appropriate sizes could be defined. Sizing was influenced by requirements which were developed to prevent from biasing any of the possible future disposition options. The sizing will take

TABLE I
Material Group Material

1	Friable asbestos-containing material meeting the definition in 40 CFR 61.141 and man made mineral fiber such as fiberglass batting.
2	Vehicles, engine blocks, air handling, exhaust fans, lathes, coring equipment, blending vessels and other similar type miscellaneous equipment.
3	Stainless steel: tanks, equipment structural members, pipe, and sheet.
4	Pipe larger than 12-inch outside diameter with valves, fittings and appurtenances removed; pipe 12-inch outside or less with valves, fittings and appurtenances intact.
5	Miscellaneous metals such as pipe fittings, electrical connectors, castings, light fixtures, valves, bolts, nuts, small pieces of equipment, short and curved piping, sag rods, and reinforcing steel.
6	Non-metal debris such as plastics, glass, paper products, floor scrapings, general trash, and debris collected during preparation, dismantlement, demolition and final cleanup.
7	Sheet metal from items such as metal desks, file cabinets, supply closets, lockers, ductwork, control boxes, and mandoors.
8	PCB contaminated material from cleanup of PCB contaminated areas of floors and equipment surfaces.
9	Select materials such as oils, or product material such as thorium compounds, yellow cake or greensalt residues from floor or equipment.
10	Nonfriable asbestos-containing siding sheets.
11	Asbestos-containing built-up roofing with the concrete roof decking.
12	Structural steel such as columns, beams, crane rail, girts, and purlins.
13	Plate steel such as metal decking, towers, tanks, vessels, plate, expanded metal decking and steel siding, and roofing.
14	Rubble from suspended concrete slabs, cinder block, porcelain and masonry.
15	Steel railroad rails.
16	Large wood pieces such as telephone poles and railroad ties and miscellaneous wood pieces such as wood desks, chairs, coat racks, doors, and partitions.
17	RCRA contaminated wood
18	Miscellaneous Non-metals including graphite and diatomaceous earth.
19	Special Metals such as copper, lead, and aluminum. Copper items include bus bars, copper wire, copper wire in conduit and motors. Lead includes shielding, scale weights, and seals in drain pipes. Aluminum includes siding, deck plate and structural shapes.

place at the time of building removal. This approach results in an initial increase in the cost of the removal project, but it reduces overall cost by minimizing the amount of double handling. After it is cleaned and sized, the material can be taken from the storage area directly to the final disposition area. By sizing the material, the amount of storage area required is reduced because the amount of void space created by tanks, vessels, large pipe, etc. is reduced. Sizing also allows for orderly placement of the materials in the storage areas.

The storage area operations plans and layout are based on the findings of the disposition options study. Since future disposition options have been identified the material is easily separated into groups for storage. Once the groups are identified, packaging and placement criteria for the different materials can be written.

Figure 4 shows the layout for the MSA, which is designed to hold most of the building removal debris. After the categories of material to be stored at this facility were identified, material quantity estimates were generated with appropriate bulking factors to determine the amount of area required for storage. The different areas of the facility were identified, and an operations placement plan was developed and incorporated into the building removal specifications. The operations plan is flexible so that as the structures are removed and actual quantities are being realized, adjustments can be made to increase or decrease storage areas as required.

ON-GOING EFFORTS

On-going and future efforts will include completing building removal, removing of building slabs and foundations and possibly decontaminating and releasing some items before the remaining debris is dispositioned.

Before the slabs and foundations are removed, additional characterization will be performed to determine contaminant levels in the debris and adjacent soils. Additional characterization of contaminated soil areas may also be performed to establish more accurate disposition volumes on the basis of the cleanup levels that will be established in the site Record of Decision.

Interim materials management will allow for efforts to decontaminate and release some structural components and higher value metals. Specific decontamination methods may be investigated further as remedial activities progress.

The overall advantage to this approach is that alternative disposition options are not unduly limited by material management, although critical decision points which influence ultimate disposition options are highlighted in order to plan for these decisions. The WSSRAP has plotted a course and is well into implementation. Thus, this paper describes a logical and flexible planning approach which is currently in action.

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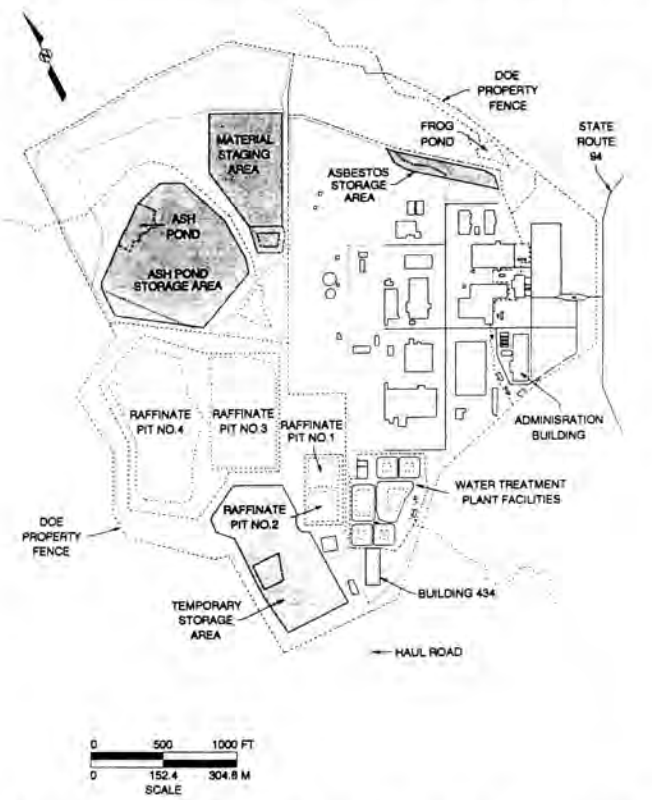

Fig. 3. Map of the Weldon Spring Chemical Plant and Weldon Spring raffinate pit area debris management area.

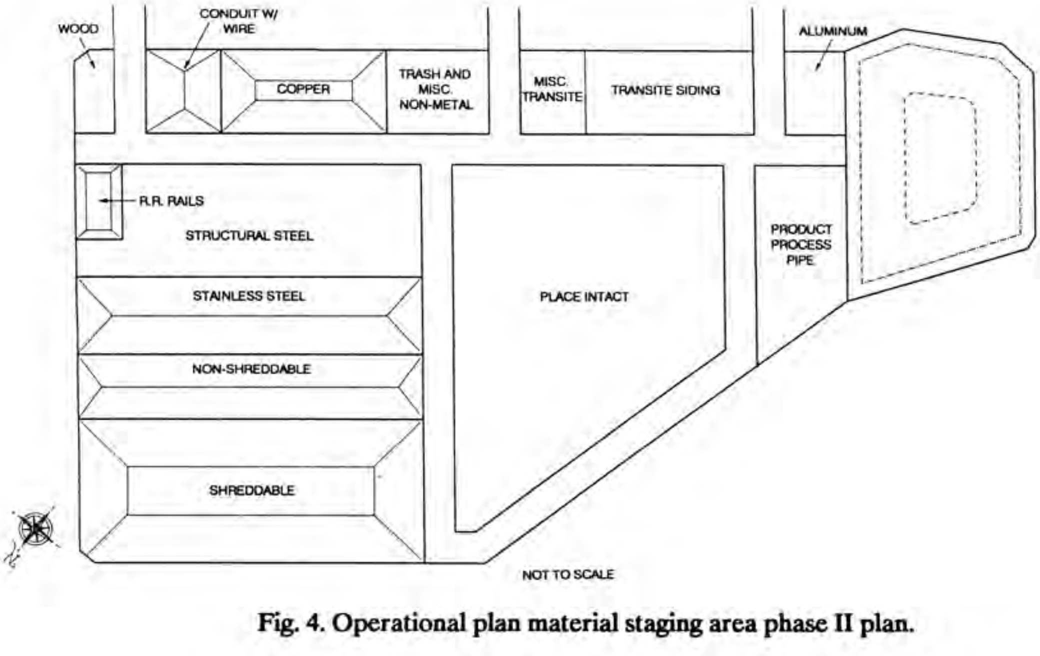

Fig. 4. Operational plan material staging area phase II plan.