



**THE MEMPHIS DEPOT
TENNESSEE**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 102

TECHNICAL MEMORANDUM



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SUBJECT: Selection of Early Removal Sites - Defense Depot, Memphis,
Tennessee (DDMT)

PROJECT: SRE70348.ER.ZZ

Executive Summary

Previous work at DDMT defined 36 sites in four operable units that may require a remedial investigation (RI) and possibly remedial action. Of these, approximately 30 sites appear to have the potential for early removal (ER) in lieu of a formal RI. ER was selected as an alternative to the RI process since ER provides the following potential advantages:

- Contaminated materials are all removed (in most cases) without involving the RI process.
- Further migration of contaminants is minimized with removal of source materials.
- Higher risk sites receive expedited cleanup.
- Greater assurance is provided to the appropriate agencies and the public that potential sources of surface and groundwater contamination will be dealt with in a timely manner.
- Reduced costs in studying the site and in performing the needed work now (rather than in the future when cleanup may be more costly) will probably result in lower overall remedial action costs, especially for the sites where removal is expected to be the primary remedial action.

Existing information concerning the 30 candidate ER sites was developed and a potential ER concept, scope, and an order-of-magnitude implementation (e.g., preconstruction studies, design, construction, and confirmation) cost was developed for each site. The resulting information was then reviewed and the sites were each ranked and prioritized using the following factors deemed to be important in selection of appropriate ER sites:

- Relative Toxicity and Health Risk
- Relative Mobility of Contaminants
- Relative Ease of Implementing ER
- Adequacy of Existing Information for Supporting ER
- Relative Implementation Cost

The first three factors were more heavily weighted than the last two to give greater priority to those sites which pose a greater potential risk to health and the environment, and to those which can most easily be accomplished with current technologies.

During a workshop session attended by representatives of the U.S. Army Corps of Engineers, Huntsville Division (CEHND), DDMT, and CH2M HILL, results of the site ranking process were further reviewed with respect to the following project-specific factors:

- Location relative to site boundaries, other sites (especially chemical warfare materials sites), etc.
- Potential influence on known plumes of contamination
- Potential that information from an RI may identify less costly or more appropriate alternatives
- Adequacy of existing information for scoping the ER requirements
- Relative cost of ER versus the cost of further study, reporting, and remediation

This resulted in the selection of 17 sites for the initial ER program. These sites include Sites 2, 3, 4, 4.1, 5, 7, 8, 13, 17, 11, 12, 16, 16.1, and 85 in Dunn Field and Sites 29, 87, and 88 in the main installation. Three of these sites, Sites 12, 16, and 16.1, which contain buried acid materials, will remain potential ER sites only if the Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) will allow the excavation, neutralization, and onsite reburial (or *in situ* neutralization) of these materials. Otherwise these sites would become RI sites since other forms of remediation could be very costly.

Most of the selected ER sites are in Dunn Field since the site boundaries are documented sufficiently to reasonably scope ER requirements. In addition, many of these sites represent an increased relative toxicity and health risk, greater relative mobility of contaminants, are near the boundary of the DDMT, and/or may be contributing to known sources of

contamination. The three sites chosen in the Operations Area represent the sites for which there is sufficient information to reasonably scope and plan for ER.

Several high ranking sites were not included in the initial ER program since insufficient information is currently available to reasonably estimate their limits, ER scope, and ER implementation costs. It was agreed that these sites should initially be RI sites, but should be considered as interim remedial action (IRA) sites if early RI information better confirms their extent and/or suggests that ER is preferable to continuing the RI/FS process.

Discussions with EPA and TDEC have indicated that these agencies are generally in favor of the proposed ER process and the initial selection of ER sites. They have also agreed to entertain the concept of neutralization and onsite redisposal of acid materials provided that the process does not conflict with applicable regulations or relative and appropriate requirements (ARARs).

ERs of the selected sites are being proposed as time-critical removals under EPA's Superfund Accelerated Cleanup Model (SACM) program in which a presumptive remedy (e.g. ER) can be developed in a timely manner with a minimum degree of preconstruction planning and document preparation. EPA and TDEC have indicated a willingness to accept the time-critical approach. They do, however, want to be involved as active team members in developing the final ER process to verify that appropriate regulatory, safety, risk-based cleanup, and confirmation requirements will be appropriately addressed.

There are also a number of practical and logistical requirements that must be addressed. Examples of these include a better definition of lateral and vertical limits of contamination, better definition of waste characteristics, and handling and disposal requirements. These will be addressed using the observational approach which involves planning for the probable condition and developing contingency plans, in advance, for anticipated reasonable deviations.

In order to fulfill the applicable SACM, practical, and logistical requirements, and still accomplish ER in a timely manner, it was determined that preconstruction planning must include the following elements:

- Site-Specific Design Information (Compilation and review of existing information and development of an essential data needs list)
- ARARs Review (A review of applicable rules, regulations, restrictions, handling and disposal requirements, regulatory and risk-based cleanup criteria, etc., relative to the work)
- Completion of Background Sampling Efforts
- Action Memorandum (An action plan for each ER site giving the rationale for selecting each site for removal, ER concepts, construction and disposal requirements, cleanup limits, and contingencies)

- Plans and Specifications (Construction documents for contracting and executing the work)
- Construction Control Plans (Operations, sampling, quality, and safety documents required to control and verify construction)

EPA and TDEC will be included in the actual development of these components. Where possible, this participation will begin with EPA and TDEC participation in kickoff and scoping meetings at the start of the ARARs review, design investigation, and action memorandum elements.

Introduction

Previous work at DDMT defined 36 sites in four operable units that may require a remedial investigation (RI). Of these, 30 have the potential for being designated as early removal (ER) sites in lieu of conducting a formal RI. The following are advantages of early removal designation:

- Contaminated materials are all removed (in most cases) without involving the RI process.
- Further migration of contaminants is minimized with removal of source materials.
- Higher risk sites receive expedited cleanup.
- Greater assurance to the appropriate agencies and the public that potential sources of surface and groundwater contamination will be dealt with in a timely manner.
- Reduced costs in studying the site and in performing the needed work now (rather than in the more expensive future) will probably result in lower overall remedial action costs, especially for the sites where removal is expected to be the primary remedial action.

Three of the remaining six RI sites were not considered as ER candidates because they are believed to contain chemical warfare (CWM) agent materials and are therefore handled under a separate program. Two RI sites, Lake Danielson and the Golf Course Pond, are impoundments containing contaminated sediments that do not lend themselves to the ER process. The final RI site is a former PCB-transformer storage area that has had a new building erected on the site location.

This technical memorandum summarizes the assumptions, site-by-site early removal concepts, and other factors used to evaluate and select the most appropriate sites for ER. In addition, it lists the sites that were selected for early removal. A list of the requirements for implementing ER also is included.

Assumptions

Limited information is currently available for most of the ER candidate sites. As a result, many of the site descriptions, excavation strategies, and conceptual-level costs discussed in this memorandum were developed using assumptions based on past experience at similar sites. These assumptions, which are described on a site-by-site basis in the next section, are considered adequate for the initial screening of potential ER sites.

Order-of-magnitude implementation cost estimates, which were used for various ER site selection decisions, were also based on a number of information sources and assumptions.

These sources and assumptions are defined in the following paragraphs. Costs presented here are estimated to provide ER implementation costs (e.g., design and construction costs) within a range of +50 percent to -30 percent, provided that the conditions at the time of remediation do not vary significantly from the assumed conditions. It should be understood, however, that these costs are for evaluation and scoping purposes only, and should be confirmed when the actual limits and conditions are better defined.

Unit costs for excavation, backfill, restoration, and other work items were estimated using the 1994 Means Guide and experience with recent remediation projects. Transportation and disposal costs were estimated using quotes from Waste Management, Inc., for hazardous waste disposal at their Emelle, Alabama, site and for the Port Arthur, Texas, incinerator facility. Cost for nonhazardous waste disposal were calculated on the basis of current range of solid waste tipping fees, as provided by CH2M HILL solid waste specialists. Table 1 summarizes the unit costs for major construction items; Table 2 summarizes the unit transportation and disposal costs.

Table 1 EARLY REMOVAL UNIT COST ASSUMPTIONS Defense Depot Memphis, Tennessee			
Item	Unit Costs		
	Level D	Level C	Level B
1. Excavate, Stockpile, Reinstall Uncontaminated Soils	\$22.00/CY	\$25.30/CY	\$27.50/CY
2. Supply, Install Imported Earth Backfill	\$14.50/CY	N/A	N/A
3. Excavate/Load Waste (w/o solidification)	\$26.75/CY	\$35.00/CY	\$40.00/CY
4. Excavate/Load Waste (w/solidification)	\$68.50/CY	\$65.00/CY	\$95.00/CY
5. Grading, Seeding, Site Restoration	\$5.000/AC.	N/A	N/A
6. Concrete Removal (6" Slab)	\$18.55/CF	\$24.10/CF	N/A
7. Concrete Replacement (6" Slab)	\$3.00/SF	N/A	N/A
8. Gravel	\$30.00/CY	N/A	N/A
9. Building Decon (Dust)*	N/A	\$3.00/SF*	N/A
10. Contaminated Water Collect. Disposal	\$2.00/GAL	N/A	N/A

* Based on floor area of building and information from CH2M HILL specialists that cost of contaminated dust removal is on the same order as the cost of sandblasting the floor of the building.

Table 2 TRANSPORTATION AND DISPOSAL COST SUMMARY Defense Depot Memphis, Tennessee	
Item	Unit Cost*
1. Transportation to Local Landfill (20 ton Dumps)	\$17/CY
2. Transportation to Emelle, AL (Rolloffs)	\$100/CY
3. Transportation to Port Arthur, TX (Rolloffs)	\$200/CY
4. Disposal at Local Landfill	\$65/CY
5. Disposal at Emelle, AL	
a. RCRA Waste w/o Slab	\$285/CY
b. RCRA Waste w/Slab	\$428/CY
c. TSCA Waste	\$412/CY
d. RCRA/TSCA Waste w/Slab	\$428/CY
6. Incineration at Port Arthur, TX	
a. RCRA Waste	\$1.650/CY TO \$2.550/CY
b. TSCA Waste	\$1.800/CY TO \$2.700/CY
* All costs assume an average unit weight of 1.5 T/CY.	

All costs include a 20 percent scope contingency and 15 percent contractor overhead and profit markup. All ER excavations are assumed to be open excavations with 1H:1V sideslopes. No other sheeting, shoring, or bracing is assumed to be necessary, because sufficient area is available to facilitate adequate sloping and the water table is well below the practical depth of excavation. It is further assumed that uncontaminated overburden soils can be replaced into the excavations, and offsite borrow will be brought in to fill the void left by the disposed materials. Unless otherwise stated, all backfilled excavations are assumed to be graded and seeded.

It is assumed that the remediation contractor will be contracted to do multiple ER sites so that the overall mobilization, demobilization, and general costs for the contract can be shared by each site task. In order to reasonably approximate this situation, mobilization and demobilization costs for each site are assumed to be 5 percent of nontransportation and disposal costs, or \$2,000, whichever is greater. This assumption does not include the costs for clearing the sites of stored inventory, because that is typically done by the owner prior to the contractor's mobilization to the site. General costs, including items such as security, staging areas, environmental controls, and support functions, are assumed to be 10 percent of the nontransportation and disposal costs, or \$2,000, whichever is greater, plus additional costs where level B or level C health and safety requirements are assumed.

Allowances were included for control of contaminated rainwater in the excavations and for confirmatory sampling. Control of water allowances (e.g., collection, sampling, and appropriate disposal) were developed assuming up to 6 inches of rainwater in each work area and a typical cost of \$2 per gallon of collected water. The work area was assumed to be the

entire open area for small excavations where segregation of contaminated zones would be difficult, and 25 percent of the open area for large-area shallow excavations where segregation is more practical. Confirmatory sampling allowances considered an assumed average cost of \$1,000 per sample, one sample per 100 square feet (10'x10') for small area excavations, or one sample per 625 square feet (25'x25') for large area excavations. A minimum of three samples was assumed for each site.

Field engineering, oversight, and sampling during construction is factored as being equivalent to 25 percent of the construction costs, minus the costs of waste transportation and disposal. For small sites where this computed factor is less than \$3,000, a minimum of \$3,000 was used. Costs for initial planning, sampling analysis, and design prior to construction, negotiations with regulatory agencies, required construction document preparation, and environmental permitting (if any) has been factored as being 20 percent of the total construction cost. This percentage is typical of preconstruction activities for projects of similar scope.

Most of the candidate ER sites are located in Operable Unit 1 (OU-1), which is comprised of the Dunn Field area. Dunn Field is an open field where waste disposal operations have been conducted since the late 1940s. Most of the disposal areas are believed to have been discrete excavations where waste was placed. The locations of the disposal areas have been roughly recorded using distances from known features. It is believed that most excavations were less than 8 feet in depth unless otherwise stated in the description.

The following paragraphs provide a brief description of the conditions, concepts, assumptions, and order-of-magnitude implementation costs for ER at the candidate sites in OU-1:

- Site 2 is believed to be a small excavation into which 1 gallon of ammonia hydroxide and 1 gallon of acetic acid were buried. These materials are considered to have low toxicity and a local influence because of their small volume. It is assumed that this area could be located by careful backhoe excavation in a grid zone of 20 feet by 20 feet, with the maximum depth of excavation assumed to be about 5 feet. Of approximately 50 cubic yards of possible excavation, only an estimated 1 cubic yard would require disposal if there is, in fact, only the remnants of two 1-gallon containers buried in this area. It is assumed that this would be consolidated with wastes from other sites for disposal at Emelle. Excavation is assumed to be level D work. Care must be taken in locating and excavating this site since CWM Site 1 is located to the south and CWM Site 9 is located to the east. The order-of-magnitude implementation cost estimate is \$22K.
- Site 3 is estimated from the RI Report to be approximately 30 feet long and 10 feet wide. It reportedly contains about 3,000 quarts of various chemicals, plus 5 cubic feet of orthotoludine dihydrochloride. As a result, toxicity potential may be high. Contamination is expected to be subsurface but could have high mobility, potentially migrating to the groundwater. For scoping

purposes, waste was assumed to be palletized in a 4-foot-thick zone, with its base approximately 8 feet below the surface. It was further assumed that an additional 2 feet of contaminated soil may have to be excavated below the buried chemicals. This would result in approximately 30 cubic yards of waste (including 15 cubic yards of stabilized waste) which, it is assumed, would be sent to Emelle for disposal. Excavation is assumed to be level B work because of the unknown nature of the waste materials. Special care and monitoring may be necessary since CWM Site 9 is located 25 to 30 feet to the east of this site. The order-of-magnitude implementation cost estimate is \$114K.

- Site 4 is a trench containing approximately 13 drums of oil, grease, and paint thinner that were disposed of in the mid-1950s. These materials are considered to be both potentially toxic and highly mobile. It is assumed that the drums were placed side by side in a trench reported to be up to 10 feet deep. Since the drums were placed 40 years ago, it is assumed they have corroded and are no longer intact. Approximately 95 cubic yards of materials may have to be excavated and disposed of, including sludge debris and the highly contaminated soil (approximately 3 feet) below the buried drums. Excavation is assumed to be level C work. Special care and monitoring may also be necessary since CWM Site 9 is also located 25 to 30 feet to the east of this site. The order-of-magnitude implementation cost is estimated to be \$149K, assuming that the excavated materials must be disposed of at Emelle. The actual cost, however, could vary from \$89K to \$345K, depending upon whether the materials are found to be nonhazardous and can be disposed of at a local landfill, or if they are hazardous and must be incinerated at Port Arthur. Waste Management, Inc. has indicated that incineration would be required if Emelle cannot landfill hazardous liquid sludges, or if the oils contain PCBs or other materials that Emelle cannot accept.
- Site 4.1 is similar to Site 4, except that it contains approximately 32 drums of oil, grease, or thinners. The early removal concept, assumptions, and CWM precautions are the same as those for Site 4. Approximately 250 cubic yards of contaminated materials would require excavation and disposal. The order-of-magnitude implementation cost estimate is \$335K, assuming that the materials must be disposed of at Emelle. The actual cost, however, could vary from \$176K to \$803K, depending upon the nature of the waste and the actual disposal requirements.
- Site 5 reportedly contains a single container of methyl bromide approximately 3 cubic feet in volume. If the container is broken, local contamination by this low toxicity material may have resulted. However, methyl bromide is potentially unstable in water. It is assumed that less than 1 cubic yard of contaminated materials, including the decommissioned container and 12 inches of soil in its vicinity, can be consolidated with other wastes for disposal at Emelle. Excavation is assumed to be level C work and similar

CWM precautions as those for Sites 2, 3, 4, and 4.1 are necessary. The order-of-magnitude implementation cost estimate is \$24K.

- Site 6 contains approximately 40,000 units of eye ointment, estimated to be buried in boxes at a maximum depth of 6 feet. It is estimated that the location can be found within a 20-foot by 20-foot grid, and that approximately 10 cubic yards of materials (the waste and 6 inches of soil beneath it) may have to be disposed of. It is assumed that although these materials are not expected to be toxic they may contain materials requiring disposal at a licensed landfill such as Emelle. Excavation is assumed to be level D work. Site 6 is located to the north and in direct line with CWM Site 9. As a result, appropriate precautions should be taken. The order-of-magnitude implementation cost estimate is \$25K.
- Site 7 is a trench containing approximately 1,700 quart bottles of nitric acid. Nitric acid is considered to have low toxicity, but could cause a low pH in the area, or mobilize metals, or both. It is assumed that excavation would include locating the materials, removing any dunnage, breaking (in place) the existing bottles, stabilizing fluids and up to 3 feet of contaminated subsoils with lime, and loading the stabilized materials (approximately 20 cubic yards) for disposal at Emelle. Of course, this assumes that onsite stabilization of materials will be permitted. Excavation is assumed to be level B work. The order-of-magnitude implementation cost estimate is \$56K. The implementation cost, however, could be significantly less if it is found that the neutralized acid materials do not exhibit hazardous waste characteristics and that they may be neutralized *in situ* or may be excavated, neutralized, and reburied within the excavation.
- Site 8 is an excavation containing approximately 3,768 cans of methyl bromide. The hazard is similar to that of Site 5, but the quantity is significantly greater. The disposal trench is estimated to be approximately 45 feet by 45 feet at the surface, and the reported burial depth is 7 feet. The estimated waste volume is 75 cubic yards, including 1 foot of contaminated soil below the buried wastes, and is assumed to be disposed of at Emelle. Excavation is assumed to be level C work. The order-of-magnitude implementation cost estimate is \$143K.
- Site 10 is a sanitary landfill cell approximately 100 feet long and 50 feet wide containing metal, cans, ash, broken glass, and other similar material. The RI Report indicates the waste was located in a zone from 3.5 to 10 feet below the ground surface. Materials descriptions suggest that the cell contains little organic matter. The site is not expected to contain toxic materials, except for metals, and the mobility of contaminants is expected to be low. Two scenarios were reviewed. The first will excavate and dispose of approximately 789 cubic yards of waste at a local sanitary landfill if the waste is found to be nonhazardous. The order-of-magnitude implementation cost of

this is estimated to be about \$297K. If metals cause the buried materials to be classified as hazardous waste, the second scenario includes excavation, stabilization, and disposal of waste at Emelle. Excavation is assumed to be (predominantly) level D work. The order-of-magnitude implementation cost estimate is \$744K.

- Site 11 is an excavation containing 11 gallons of the herbicide trichloroacetic acid in 1,433 1-ounce bottles. This is a reportedly unstable chemical, with a transient influence on pH and with low toxicity. Considering the low volume (less than 1 cubic yard) and the handling requirements for opening, draining, and stabilizing liquids from these small bottles for landfill disposal, it is assumed that transporting them to Port Arthur for processing and incineration is the appropriate and cost-effective approach. Excavation is estimated to be level B work. The order-of-magnitude implementation cost estimate under these conditions is \$43K.
- Site 12 consists of 3 trenches containing a total of 30 pallets of sulfuric and hydrochloric acid. These below-grade materials are not expected to be extremely toxic, but could affect the pH in the local area and cause metals to become more mobile. It is assumed that a significant quantity of containers may still be intact, and that the excavation, stabilization, and disposal approach would be similar to that which was previously described for Site 7. It is estimated that approximately 700 cubic yards of stabilized waste, including up to 3 feet of contaminated soil, could require disposal at Emelle. Excavation and stabilization is assumed to be level B work. The order-of-magnitude implementation cost estimate under these conditions is \$789K. As with Site 7, this cost could be significantly less if it is found that the neutralized acidic materials do not exhibit hazardous waste characteristics and that they can be neutralized *in situ* or can be excavated, neutralized, and redispersed within the excavation.
- Site 13 contains approximately 32 cubic yards of mixed chemicals, acid, and detergents, plus approximately 8,100 pounds of solids. The area is estimated at approximately 35 feet wide by 50 feet long, approximately 8 feet deep. The site appears to contain significant quantities of both detergents and intrinsic low-toxicity chemicals. However, the potential reactions between these chemicals is unknown. Approximately 55 cubic yards of waste (possibly stabilized due to constituents that may be present) and 20 cubic yards of contaminated soil, including the soil 3 feet below the waste, may require disposal at Emelle. Excavation would be level B work because of site uncertainties. The order-of-magnitude implementation cost estimate for this site is \$163K.
- Site 14 is a sanitary landfill cell reported to contain paper, food, and other similar sanitary landfill materials. The trench reportedly has horizontal dimensions of 40 feet by 80 feet and waste depths ranging from 6 to 18 feet.

Considering the small dimensions and the large depth, the cell is assumed to be a bulldozer trench that ramped steeply (assumed to be 3H:1V slope) to a depth of 18 feet. This implies that the waste volume could be up to 600 cubic yards. It is assumed that the entire volume could be disposed of at a local landfill. Excavation is assumed to be level D work. The order-of-magnitude implementation cost estimate under these conditions is \$292K.

- Sites 15, 15.1, and 15.2 comprise an area approximately 100 feet long and 20 feet wide containing 14 discrete trenches with sodium salt, sodium phosphate, chlorinated lime, acid wastes, and various medical supplies. The disposal area is estimated at approximately 8 feet deep. Sodium salts and lime materials are typically not considered to be hazardous materials. However, there is the potential for migration of contaminants into groundwater. Approximately 500 cubic yards of waste, including 2 feet of contaminated soil below the waste, are assumed to be excavated and disposed of at a local landfill. Excavation is assumed to be level C work. The order-of-magnitude implementation cost under these conditions is \$290K. However, it could be as high as \$518K if it is found that the materials contain hazardous materials which must be shipped to Emelle for disposal.
- Sites 16 and 16.1 are disposal areas containing unknown acid materials. Records indicate disposal of just one pallet of an unknown acid. Depending upon the quantity, this acid could adversely affect the local pH and groundwater resources. For estimating purposes, it was assumed there are two pits each containing one pallet of acid. Pits are estimated to have surface dimensions of 20 feet by 20 feet and depths of 8 feet. It is assumed that the excavation, stabilization, and disposal approach will be similar to that assumed for Sites 7 and 12, and that 2 feet of contaminated soil must be removed below the buried waste. This equals approximately 55 cubic yards of waste, which may have to be transported to Emelle for disposal. Excavation and stabilization is assumed to be level B work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$100K. This cost, however, could be significantly less if the neutralized materials can be redispersed within the excavation.
- According to the RI Report, Site 17 is a 20-foot by 30-foot area containing an unknown quantity of herbicides, medical supplies, and cleaning compounds. The depth of the disposal trench is estimated at 8 feet. Assuming a 5-foot-thick waste zone with 3 feet of soil cover, the amount of waste requiring disposal is approximately 110 cubic yards. Another 160 cubic yards of potentially contaminated soil, approximately 2 feet thick, may have to be removed along the sides and bottom of the waste zone. All waste is assumed to be disposed of at Emelle without any form of stabilization. Excavation is assumed to be level B work. The order-of-magnitude implementation cost estimate for this work is \$303K.

- Site 85 is the building for the old Pistol Range, which was once used for storage of pesticides. There is a potentially high toxicity in surface debris, dust, and the like, but the contaminants are not considered to be highly mobile in water. It is assumed that the work would include removing dunnage, sampling and removing the 15-foot by 25-foot concrete floor plus an average of 6 inches of subsoil (for disposal at Emelle), decontaminating the interior of resulting dust, and replacing the excavated materials with gravel and a new concrete floor. Excavation is assumed to be level C work. The order-of-magnitude implementation cost estimate for this work is \$47K.

The other ER site candidates are located in the remaining three operable units (OU-2, OU-3, and OU-4). These operable units have been grouped together because they are within the main DDMT operations and support areas and because they have similar characteristics. Since these areas were not used for active disposal like Dunn Field was, most of the contamination is due to spills and leaks. Limits of contamination in many of these sites have not yet been defined, so the quantities and resulting order-of-magnitude implementation costs were based almost entirely on assumed conditions.

The assumptions concerning lateral extent, depth of excavation, and disposal requirements were chosen conservatively to develop reasonable upper-end range of implementation costs for planning purposes. It should be kept in mind that actual quantities, disposal requirements, and resulting costs could be significantly different than those assumed once they have been more thoroughly defined through further investigation or during removal.

The following paragraphs provide a brief description of the conditions, assumptions, and order-of-magnitude implementation construction costs for ER at the candidate sites in OU-2, OU-3, and OU-4:

- Site 27 is an 80-foot by 200-foot area, adjacent to Building 1086 where materials were repackaged on an as-needed basis. The extent or chemical nature of spillage in this area is unknown, but is assumed to be mixed solvent, oil, and other fluids that may have been spilled. Since lateral or vertical limits of contamination in this area have not been defined, it is assumed that an average of 1 foot of contaminated soil must be removed from the entire area (totaling approximately 600 cubic yards) and that all excavated soil and waste will have to be transported to Emelle for disposal. The excavated area would then be backfilled with 6 inches of soil and 6 inches of base stone. Excavation is assumed to be level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$529K.
- Site 29 is an old underground storage tank that contained waste oil. Potential contaminants are pesticides, PCBs, petroleum hydrocarbons, and metals, which could affect the groundwater below if the tank is leaking. Because little information is known about the tank's dimensions, it is assumed to be 5 feet in diameter, 3,000-gallon capacity, with its base approximately 8 feet below the surface. It is assumed that the tank would be removed and disposed of by a

subcontractor, and that approximately 25 cubic yards (equaling 2 feet of soil from all around the tank) of petroleum-contaminated soil would have to be removed to Emelle. Excavation is assumed to be (predominantly) level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$168K.

- Site 32 includes waste from the sandblast area near Buildings 1087 and 1088, which could contain lead, chromium, and paint contaminants. Because the lateral and vertical limits of this potential contamination are unknown, it is assumed that sand materials may have been spread or washed over the years into the gravel surfacing around the general vicinity of the sandblasting facility. It is further assumed that an average of 1 foot of soil, gravel, or other material may have to be removed from the entire 5,100 square foot area between Buildings 1087 and 1088, for a total estimated quantity of 190 cubic yards. Since this waste may contain metals from the sandblasting operations, stabilization may be necessary at the Emelle facility to meet RCRA disposal requirements. The excavated area is assumed to be backfilled with 6 inches of soil and 6 inches of base stone. All work is assumed to be level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$221K.
- Site 34 includes underground storage tanks at Building 770. The number and size of the tanks have not been confirmed, so it is assumed that the potential hazard is similar to that of Site 29, with three tanks of size similar to the tank at Site 29. Work is assumed to include removal and disposal of the three tanks by a subcontractor, and transportation and disposal of approximately 75 cubic yards of oil-contaminated waste (equaling 2 feet of soil from around each tank) to Emelle. Excavation is assumed to be level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$550K.
- Site 87 is a former disposal area for DDT and other banned pesticide agents in Building 1084. It is assumed that the potential hazard conditions and corrections are similar to those for Site 85. Since the building is small (approximately 30 feet by 40 feet), it is assumed that the concrete slab and 6 inches of subsoil will be sampled, removed, disposed of, and replaced in essentially the same manner. Concrete removal and decontamination are assumed to be level C work. The remaining work is assumed to be level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$112K.
- Site 88 is an old grease rack and POL storage area in Building 1085. Spillage or leakage from this area could affect local groundwater resources. It is assumed that the concrete grease rack structure and slabs will be removed, along with an average of 1.5 feet of soil beneath these structures. It is assumed that these materials, estimated to be 25 cubic yards of concrete and

25 cubic yards of contaminated soil, will be shipped to Emelle for proper disposal. Excavation is assumed to be level D work. The order-of-magnitude implementation cost estimate for these assumed conditions is \$68K.

- Site 89 is Building 1089, where acids have been spilled, although the extent of spillage is unknown. In a worst-case assumption, the entire floor (39,000 square feet) would have to be removed. This was assumed that ER would include removal of the entire slab (assumed to be a 6-inch slab) plus 6 inches of soil beneath the joints and cracks (assumed to be 5 percent of the slab area) in a manner similar to that described for Site 87. Approximately 722 cubic yards of concrete and 35 cubic yards of contaminated soil would be disposed of at Emelle. The estimated order-of-magnitude implementation cost for early removal could be as much as \$1.2 million if the entire slab were removed and replaced.
- Site 58 is the pesticide and herbicide pad in Building 267. These materials may be highly toxic, but are probably of low mobility except as waterborne sediments, or dust from the area, or both. Since the extent of contamination is not known at this time, it is assumed that up to the entire 30,000-square-foot slab 267 (one-half of slab 267/269 on the map) might have to be removed and replaced in a manner similar to that which was assumed for Site 89. The order-of-magnitude implementation cost estimate for this could be as much as \$897K.
- Site 59 is a pesticide and herbicide area in Building 273. Toxicity and mobility characteristics are expected to be similar to other pesticide and herbicide spill areas. It is assumed that the minimum work will require removal and disposal of an average of 1 foot of soil within the building at Emelle, building decontamination, and replacement of removed soil with clean backfill. Work is assumed to require hand labor and a level D protective posture. The order-of-magnitude implementation cost estimate for this work is \$41K. However, discussions with DDMT suggest that there may have been spillage, equipment cleaning, etc., outside the building and that the contamination could extend some distance from the building. If this is the case, the scope of ER requirements, and thus the implementation costs for ER could be significantly greater than \$41K. Insufficient information exists to base an assumption of possible extent, so none was made.
- Site 57 is a pesticide spill area adjacent to Building 629. Toxicity and mobility characteristics are assumed to be similar to those for other pesticide and herbicide spill areas. Remediation would include the removal of contaminated soil along the western side of the building and possibly removing ballast and soil beneath the railroad tracks to the south of the building. For scoping and estimating purposes, it is assumed that the excavation will have an average depth of 1 foot, and that the work will require removal, excavation beneath, and replacement of about 150 feet of railroad

track. All contaminated soils would be taken to Emelle for disposal. All work is assumed to be level D work. The order-of-magnitude implementation cost estimate for this work is estimated to be \$456K.

Ranking and Selection of Early Removal Sites

Initial evaluation of candidate ER sites included a ranking process. The process was based on a scoring system in which each site was scored relative to its conformance with a number of selected site-specific factors deemed to be important to the ER process. The purpose of ranking the sites was to provide, to the extent possible, an objective and unbiased priority list which could be used with other selection factors to select the most appropriate sites for ER.

Each site was evaluated relative to five important site-specific factors. The first two site-specific factors reflect the need for ER on the basis of the contaminant's potential effects on health and the environment. These characteristics include:

- Relative Toxicity and Health Hazard (e.g., potential for significant hazard to health and the environment if ER does not take place.)
- Relative Mobility (e.g., potential for actually becoming a threat to health and the environment if ER does not take place.)

Table 3 summarizes the initial hazard and mobility information that was used for making these initial evaluations.

The remaining site-specific factors reflect the practical and logistical aspects (e.g., overall feasibility) of ER. These characteristics are:

- Relative Ease of Implementation (e.g., potential for ER being implemented in a reasonable manner using normal techniques)
- Existing Information (e.g., sufficiency of existing information for reasonably scoping ER requirements)
- Relative Implementation Cost (e.g., cost of ER relative to the cost of further study and for other remediation methods)

With respect to the last characteristic, it is believed that ER should be considered in lieu of further study where the cost of ER is likely to be less than the cost of further study, reporting, and/or other potential remedial measures. Further study should be considered where additional study might reveal less costly alternatives, or where additional study might provide a better definition of ER and requirements scope. Table 4 summarizes the order-of-magnitude implementation costs used for these determinations.

Table 3
ESTIMATED HAZARD AND MOBILITY SUMMARY
Defense Depot Memphis, Tennessee

Site	General Hazard/Mobility Information
2	Low toxicity and local influence only because of very small quantity.
3	Toxicity information indicated potential carcinogen. Highly mobile, could affect groundwater.
4	High toxicity, high mobility, significant quantity could impact groundwater.
4.1	Same as 4, except larger quantity.
5	Low stability in water, relatively low toxicity, low quantity.
6	Immobile and lack of significant exposure pathways, low toxicity
7	Low toxicity, however, may influence local pH and mobility metals.
8	Same as Site 5, except larger quantity could affect groundwater.
10	Low toxicity and low mobility of metals. No organics expected.
11	Unstable chemicals, transient influence on pH, low chronic toxicity.
12	Depending on quantity, could mobilize metals to the groundwater.
13	Detergents and low toxicity compounds interactions unknown.
14	Low toxicity, unknown impacts to groundwater. Possible methane gas hazard.
15/15.1/15.2	Low toxicity, but some constituents could mobilize into groundwater.
16/16.1	Depending on quantity could mobilize metals to groundwater.
17	Unknown chemicals. May contain VOCs.
85	Highly toxic pesticides with low mobility, except as dust.
27	Chemical nature unknown. If mixed solvents, could be toxic and mobile.
29	Waste oil may concern PAHs and could be migrating to the groundwater.
32	Could contain lead, chromium, or other toxic residue.
34	Water or cleaning solvent could be toxic to direct contact and mobile.
87	High toxicity, low mobility, except as dust.
88	Could affect underlying groundwater because of mobility.
89	Depending on acid quantities, could mobilize metals.
58	High toxicity, low mobility, except as dust.
59	High toxicity. If solvents, cleaners are likely to be highly mobile.
57	Pesticides (DDT), solvents, and oxidizers may be likely toxic and mobile.

Table 4
ORDER-OF-MAGNITUDE
Defense Depot Memphis, Tennessee

Site	Description	Est. Cost
2	Ammonia Hydroxide & Acetic Acid Burial	\$22K
3	Mixed Chemical Burial Site	\$114K
4	POL Burial Site (13 55-gal drums of oil, grease, and paint)	\$149K to \$345K
4.1	POL Burial Site (32 55-gal drums of oil, grease, and paint)	\$335K to \$803K
5	Methyl Bromide Burial Site A	\$24K
6	40,037 units ointment Burial Site	\$25K
7	Nitric Acid Burial Site	\$56K
8	Methyl Bromide Burial Site B	\$143K
10	Solid Waste Burial Site	\$297K to \$744K
11	Trichloroacetic Acid Burial Site	\$43K
12	Sulfuric and Hydrochloric Acid Burial	\$789K
13	Mixed Chemical Burial	\$163K
14	Municipal Chemical Burial Site B	\$292K
15/15.1/ 15.2	Sodium Salts, Sodium Phosphate, Lime Burial Sites	\$290K
16/16.1	Unknown Acid Burial Sites	\$100K
17	Mixed Chemical Burial Site C	\$303K
85	Old Pistol Range Bldg. 1184/Temp. Pesticide Storage	\$47K
27	Former Recoup Area	\$529K
29	Former Underground Waste Oil Storage Tank	\$168K
32	Sandblasting Waste Accumulation Area	\$221K
34	Building 770 Underground Oil Storage Tanks	\$550K
87	DDT, banned pesticides	\$112
88	POL (Bldg. 1084)	\$68K
89	Acids (Bldg. 1089)	\$1.2M
58	Pesticides, herbicides (PAD 267)	\$897K
59	Pesticides, cleaners (Bldg. 273)	\$41K
57	Building 629 Spill Area	\$456K

Ranking of the candidate ER sites was conducted in the following manner:

- A weighting factor was assigned to each site-specific factor based on its relative importance in the selection process. These weighting factors (WF) are shown at the top of each scoring column in Table 5. It should be noted that the toxicity and hazard factor and the mobility factor were given high weighting factors to raise the priority of sites with greater potential for impacting health and the environment. Implementation was also ranked very high due to the importance of being able to achieve ER in a reasonable manner.
- Each site was then scored on a scale of 0 to 5 relative to its conformance with each site-specific factor. Scoring values are shown in Table 5. Criteria for the scoring are summarized in Table 6.
- Individual scores were multiplied by the appropriate weighting factor and all products were added together to provide a total score. These total scores are shown in the last column of Table 5.
- The 30 sites were then organized (i.e., ranked) in descending order using their total scores. Relative rankings (i.e., high, medium, and low) were assigned by dividing the list in thirds. This process is summarized in Table 7.

The second part of the selection process included an ER selection workshop in Memphis, Tennessee where the results of the site ranking process were combined with several other project-specific considerations to develop a list of ER sites to pursue at this time. The workshop was held on January 18, 1995, and was attended by representatives of the U.S. Army Corps of Engineers, Huntsville Division (CEHND), DDMT, and CH2M HILL. Project-specific considerations used in the final selection process included:

- Location relative to site boundaries, other sites, etc.
- Potential influence on known plumes of contamination.
- Requirements for extensive investigations to adequately define scope.
- Potential that a remedial investigation (RI) may identify less costly or more appropriate alternatives.
- Relative cost of early removal to cost of further study, reporting, and remediation.

Table 5
 INITIAL EARLY REMOVAL SITE RANKING
 Defense Depot Memphis, Tennessee

UNIT	SITE	DESCRIPTION	TOX/HAZ WF = 6	NOB WF = 5	IMPL WF = 5	INFO WF = 4	REL. COST WF = 3	TOTALS
OU-1	2	Ammonia Hydroxide & Acetic Acid Burial	1	2	5	4	5	72
	3	Mixed Chemical Burial Site	3	3	3	2	3	65
	4	POL Burial Site (13 - 55 gal drums of oil, grease, and paint)	5	5	3	3	3	91
	4.1	POL Burial Site (32 - 55 gal drums of oil, grease, and paint)	5	5	3	3	1	85
	5	Methyl Bromide Burial Site A	2	2	5	4	5	78
	6	40,037 units pigment Burial Site	0	0	4	3	5	47
	7	Nitric Acid Burial Site	0	2	4	3	4	54
	8	Methyl Bromide Burial Site B	2	4	5	4	3	82
	10	Solid Waste Burial Site	0	0	2	2	2	24
	11	Trichloroacetic Acid Burial Site	1	1	5	4	5	67
	12	Sulfuric and Hydrochloric Acid Burial	1	2	4	3	0	48
	13	Mixed Chemical Burial	2	4	3	3	3	68
	14	Municipal Chemical Burial Site B	0	1	5	3	2	48
	15/15.1/15.2	Sodium Salts, Sodium Phosphate, Lime Burial Sites	0	1	4	3	2	43
	16/16.1	Unknown Acid Burial Sites	0	1	4	2	4	45
	17	Mixed Chemical Burial Site C	5	5	3	3	1	85
	85	Old Pistol Range Bldg. 1184/Temp. Pesticide Storage	5	2	5	3	5	92
OU-2	27	Former Recoup Area	5	5	5	1	0	84
	29	Former Underground Waste Oil Storage Tank	5	5	5	2	1	91
	32	Sandblasting Waste Accumulation Area	5	3	5	1	2	80
	34	Building 770 Underground Oil Storage Tanks	5	5	5	1	0	84
	87	DDT, banned pesticides	5	2	3	3	3	76
	88	POL (Bldg. 1084)	3	5	4	2	4	83
	89	Acids (Bldg. 1089)	1	3	4	1	0	45
OU-3	58	Pesticides, herbicides (PAD 267)	5	2	3	1	0	59
	59	Pesticides, cleaners (Bldg. 273)	5	4	4	1	5	91
OU-4	57	Building 629 Spill Area	5	2	4	2	1	71

Table 6
SCORING CRITERIA
Defense Depot Memphis, Tennessee

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Toxicity and Health Hazard	
0	Non-toxic
1	Very low toxicity
2	Low toxicity
3	May contain some toxic elements
4	Moderate toxicity
5	Highly toxic
Mobility	
0	Immobile
1	Low mobility, small quantity (transient influence)
2	Low mobility, small quantity (local influence)
3	Moderately mobile, small quantity
4	Moderately mobile, large quantity
5	Highly mobile, large quantity
Implementability	
0	Implementation technology is not available
1	ER is not accomplishable
2	ER is accomplished with greater difficulties (e.g., many technical, physical, and regulatory hurdles)
3	ER is accomplished with some difficulties (e.g., a few technical, physical, and regulatory hurdles)
4	ER is accomplished with little difficulty, but with some uncertainties
5	ER is accomplished with little difficulty and few uncertainties
Existing Information	
0	No data for decision making
1	Limited data available (significant data needed for decision making)

Table 6
SCORING CRITERIA
Defense Depot Memphis, Tennessee

Page 2 of 2

2	Limited data available (additional data needed to verify decisions and characterize waste extent and type)
3	Adequate data available for decision making (additional data required to characterize waste extent and type)
4	Data is adequate for decision making (little uncertainty exists)
5	Adequate data available (extent and type of waste characterized)
Implementation Cost	
0	Greater than \$500K
1	\$300K to \$500K
2	\$200K to \$300K
3	\$100K to \$200K
4	\$50K to \$100K
5	\$0 to \$50K

Table 7
PRIORITIZATION OF EARLY REMOVAL SITES
Defense Depot Memphis, Tennessee

High Ranking Sites		Medium Ranking Sites		Low Ranking Sites	
Site 85	(92)	Site 8	(82)	Site 58	(59)
Site 29	(91)	Site 32	(80)	Site 7	(54)
Site 4	(91)	Site 5	(78)	Site 12	(48)
Site 59	(91)	Site 87	(76)	Site 14	(48)
Site 4.1	(85)	Site 2	(72)	Site 6	(47)
Site 17	(85)	Site 57	(71)	Site 89	(45)
Site 27	(84)	Site 13	(68)	Sites 16/16.1	(45)
Site 34	(84)	Site 11	(67)	Sites 15/15.1/15.2	(43)
Site 88	(83)	Site 3	(65)	Site 10	(24)
(X) = score					

The team identified 17 sites which should be included in the initial ER program. The following paragraphs identify these sites, provide a description of why they were selected, and identify special considerations which must be dealt with during further development.

- Sites 2, 3, 4, 4.1, and 5 (Dunn Field): These sites are in a line suggesting the possibility that they may have been individual cells in a single long trench. At a minimum, ER should include the removal to the extent possible of mixed chemicals (Site 3) and oil, grease, paint thinners, etc. (Sites 4 and 4.1) which might be highly mobile and contributing to releases from Dunn Field. Sites 4 and 4.1 were amongst the highest ranking sites of the potential ER sites. Wastes in Site 2 (two 1-gallon jugs reported) and Site 5 (a single methyl bromide cylinder reported) would likely be excavated incidental to the endwall sloping requirements for excavating the larger trench.

Special care, however, must be exercised during development and excavation of this large trench area since it is bounded on one side by a CWM trench that is 25 to 30 feet away (Site 9) and potential CWM cells to its south (Site 1). This could ultimately have an effect on the scheduling of this ER and/or how much waste can actually be removed in the area.

- Site 7 (Dunn Field) contains 1,700 quarts of nitric acid. Although this site was not a high ranking site, it was selected due to its location near the northwestern corner of Dunn Field and the fact that it is small and can be removed relatively inexpensively, even if neutralized acids would have to be disposed of at a hazardous waste facility. Site 7 also provides a potential pilot site for a neutralization and onsite redisposal option for remediating other acid sites at Dunn Field.
- Site 8 (Dunn Field), which contains about 4,000 cans of methyl bromide, was selected due to its location near the northwestern corner of Dunn Field and its high ranking (near the top third of potential ER sites reviewed).
- Site 13 (Dunn Field), which contains mixed chemicals, was not a high ranking site, but was selected since it is located near the plume of groundwater contamination extending from the northwest quadrant of Dunn Field.
- Site 17 (Dunn Field), which contains various herbicides, medical supplies, and cleaning compounds, was selected due to its high ranking among the potential ER sites reviewed and its proximity to an existing plume.
- Site 11 (Dunn Field), which contains 11 gallons of the herbicide trichloroacetic acid, was selected due to its location and its low cost of removal relative to further study and remediation.

- Sites 12, 16, and 16.1 (Dunn Field), which contain various acid materials, were selected for potential ER provided that neutralization and onsite reburial are allowable. Removal and neutralization could be expected to reduce future leaching and movement of metals in soils.

ER may not be cost-effective for these sites if the neutralized materials cannot be redispersed onsite either due to regulatory hurdles or the presence of other constituents such as metals. If EPA or TDEC do not allow neutralization and onsite redispersion, or *in situ* neutralization, these sites would be made RI sites so that other more cost-effective remedial methods could be reviewed.

- Site 85 (Dunn Field), which is the old range building which was used for pesticide storage, was selected due to its potential toxicity, high ranking among potential ER sites reviewed, and the relatively low cost of contaminant removal and disposal.
- Site 29 (Operations Area), an underground waste oil storage tank suspected of containing such things as waste oil, pesticides, PCBs, metals, etc., was selected for ER due to its high ranking and potential for contamination.
- Site 87 (Operations Area), a DDT and other banned pesticide storage area in Building 1084, was selected due to the potential toxicity, its relatively small size and estimated costs, and its ranking in the upper half of the potential ER sites reviewed.
- Site 88 (Operations Area), a grease rack and POL storage area in Building 1085, was selected due to potential migration of hydrocarbons, its relatively small size and estimated costs, and its ranking in the upper third of the potential ER sites reviewed.

In summary, removal of major non-CWM source areas along the northern portion of Dunn Field and the removal of others which could be source areas contributing to groundwater contaminant plumes within the Dunn Field area is recommended. The three sites selected within the operations area represent the only contaminant sources in that area which can be reasonably scoped for ER at this time.

Several other high ranking sites were deleted from current consideration as ER sites since insufficient information is available to provide a reasonable estimate of ER requirements and scope. These sites include Sites 27, 34, and 59. It was agreed that these deleted sites should initially be RI sites and could be considered as interim remedial action (IRA) sites if early RI information better confirms their extent and suggests that ER is preferable to continuing the remedial investigation/feasibility study (RI/FS) process.

Discussions with representatives of EPA and TDEC have indicated that there is general agreement with the proposed list of ER sites and the reasoning behind the list. Both agencies agreed to entertain the acid area neutralization and redispersion concept, provided that it does not conflict with applicable regulations or relative and appropriate requirements (ARARs)

and agency policies. TDEC expressed some concerns with the potential for mobilization of metals and the potential for mixing of acid components with constituents in other sites. It was agreed that this is a primary issue which will be investigated if the concept is pursued.

Early Removal Requirements

The ER concept is being proposed under EPA's Superfund Accelerated Cleanup Model (SACM), in which a presumptive remedy (e.g. removal) is implemented rather than a full RI/FS process that may ultimately recommend the same remedy anyway. However, this model still requires a minimal amount of preconstruction planning, the degree of which depends on the criticality of the site. Primary requirements are shown in Figure 1. ER sites at DDMT are considered to be time critical sites, and fall within the second column of the figure's removal action portion. At this stage, the project is within the area defined by Site Removal Evaluation.

There are also a number of practical and logistical requirements that must be accomplished along with SACM requirement to make ER successful. Examples of these other requirements would be better definition of the lateral and vertical limits of contamination and better definition of waste characteristics so that excavation, handling, and disposal requirements can be incorporated into a remedial action plan and design. These will be addressed using the observational approach which involves planning for the probable condition and developing contingency plans, in advance, for anticipated reasonable deviations.

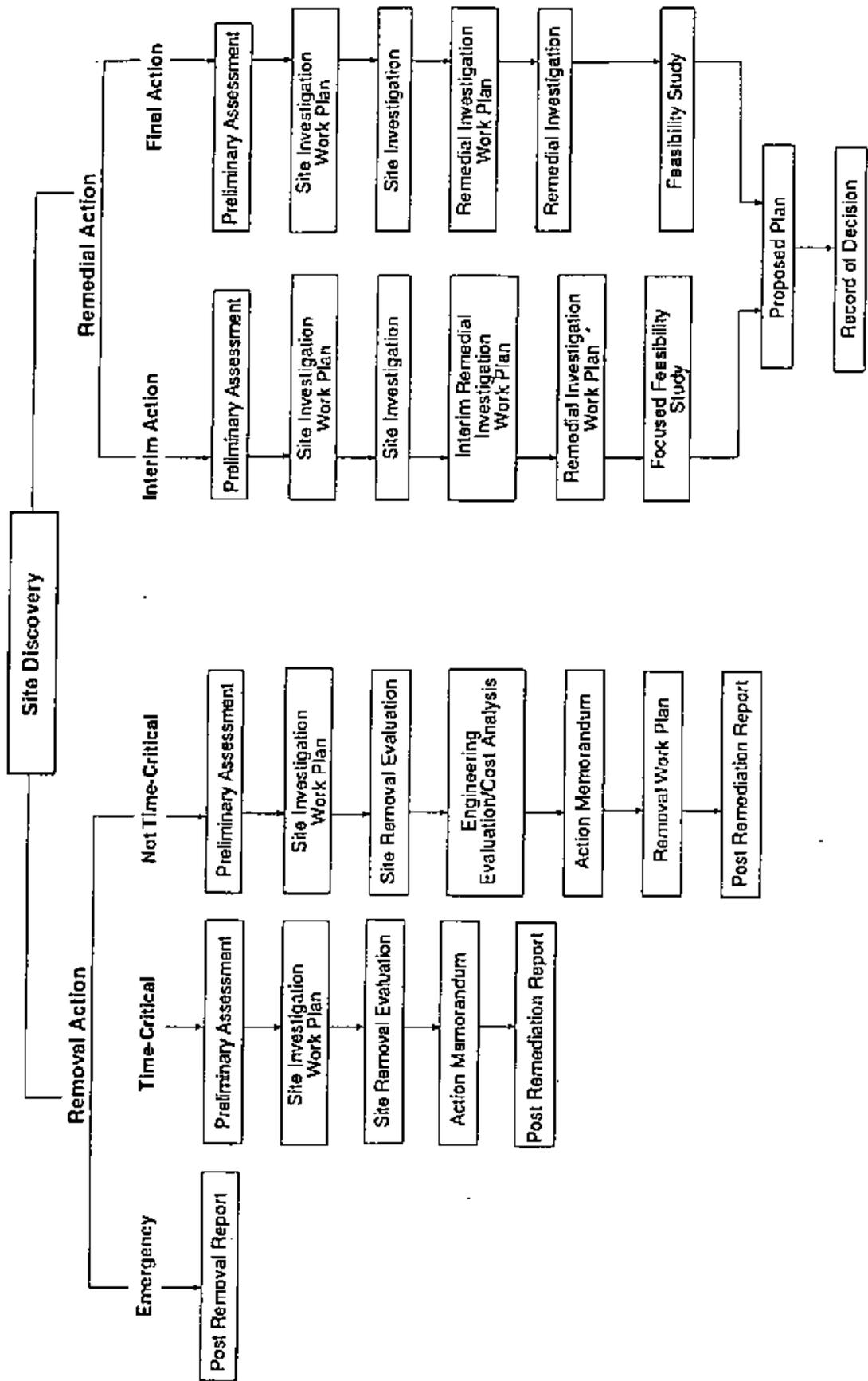
Discussions with both the EPA and TDEC indicate that both agencies are in agreement with this approach since they favor the remediation versus study approach and understand the technical and political advantages of starting the remediation process as soon as possible. Both agencies have expressed an interest in being included as active participants in the development process so that their concerns might be alleviated early in the process.

It was agreed to by all parties that the ER process for each site should be developed in a logical sequence which fulfills both the regulatory and practical needs of the project. The following are the agreed-upon preconstruction elements, with a summary of their major elements:

- **Site-Specific Design Information Development.** Each site should be physically inspected for features that might more accurately define limits, configurations, and other site specific information. Where possible, an onsite records search should be done to obtain a better definition of actual waste constituents which may have been buried. In addition, available utility plans, as-built drawings, and site-specific procedures critical to the design and implementation should be reviewed. This information then should be compiled with other known information to determine whether there are additional data needs that must be addressed in the subsequent investigations. In addition, a site-specific list of data needs should be prepared.



Figure 1
SACM PROCEDURES



- **ARARs Review.** The evaluation of applicable laws, regulations, agreements, or procedures for implementing the remedial action should be reviewed. Where possible, this review should focus on specific requirements for implementing a removal action (such as handling, transportation and disposal requirements and restrictions, or cleanup standards).

Concurrently, a canvassing should be made of possible disposal facilities to determine any limits, restrictions, or requirements they may have for disposing of any materials from DDMT. These entities are often helpful in defining related ARARs and restrictions that may be new or forthcoming, and in defining the type of data they require for disposal approval.

The ARARs evaluation should also include, where possible, risk-based cleanup criteria for each site. Where insufficient information exists to do this, a data needs list must be developed to facilitate the development of risk-based criteria no later than the Action Memorandum phase of the process. Both the EPA and TDEC have indicated a desire to participate in these determinations as early as possible.

- **Action Memorandum Development.** This memorandum is a major element of SACM, but in this case is somewhat different than the normal SACM document since its goal is to define the ER process and not to justify funding as is the case for an Action Memorandum in an EPA-led ER. To provide this function, it should define the removal, disposal, and restoration concepts for each site. It should also include the justification for doing ER instead of the conventional RI/FS process and should include specific information such as proposed cleanup limits, special design considerations, and contingencies for such things as:
 - Intercepting CWM or other materials which could cause hazardous working conditions
 - Excavating to the practical limits of excavation and finding that cleanup criteria simply cannot be met
 - Intercepting additional and/or different materials than were anticipated at the time of design.

EPA and TDEC have also indicated a strong desire to participate in this component, especially in the development of cleanup limits and contingency actions. This is another area where a teaming workshop should be held early in the process to discuss and agree upon these issues.

- **Plans and Specifications Development.** Construction plans and specifications should be developed sufficiently to allow a contractor to price and execute the work specified in the various action memoranda. Where possible, a set of master project specifications should be prepared, especially

where the work will be similar for various sites. Site-specific drawings, however, should be prepared for each specific site. This method of design development should be a feasible and cost-effective approach at DDMT because of the relatively few types of work anticipated. In addition, it could facilitate early contractor acquisition and construction startup since the master specifications and a general scope of work provide a reasonable basis for contractor unit price bidding even though specific design details have not been completed. Individual elements of the work can then be progressively phased in as task orders as various design packages are completed.

- **Construction Control Plans Development.** Various documents are typically required by the EPA to control the work in the field and to verify the removal action has been satisfactorily completed. One of these documents, a Site Operations Plan, generally includes such items as roles and responsibilities, lines of communications, documentation requirements, post-remedial report requirements, and other items required to adequately control and verify the work. A Confirmatory Sampling Plan and a Quality Assurance Plan generally include information concerning sampling locations, intermediate and final confirmatory sampling requirements, quality requirements, and the like for the work. A Construction Health and Safety Plan generally includes those elements required by OSHA for working at hazardous waste sites. Where possible, the primary portions of those documents should be generic enough to apply to the entire project, with site-specific requirements being added as appendices as various elements of the work come online.

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FINAL PAGE

ADMINISTRATIVE RECORD

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