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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 730

The Memphis Depot – Dunn Field
Proposed Plan

Defense Distribution Center (Memphis, TN)
May 2003

MEMPHIS DEPOT ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative for the cleanup of environmental impacts found in soil and groundwater at the Memphis Depot Dunn Field and provides the rationale for the selection of cleanup methods. In addition, this plan summarizes other cleanup alternatives evaluated for the site.

This document is issued by the Defense Logistics Agency (DLA), the lead agency for site activities at the Memphis Depot. DLA and U.S. Environmental Protection Agency (EPA), in consultation with Tennessee Department of Environment and Conservation (TDEC), will select a final remedy for the site after reviewing and considering all information received from the Depot community during a 30-day public comment period. Based on new information or public comments that provide substantive new information, DLA, in consultation with EPA and TDEC, may modify the Preferred Alternative or select another remedial action described in this Proposed Plan. The approved alternative will be included in a Record of Decision (ROD) for Dunn Field.

Therefore, the public is encouraged to review and comment on all the alternatives and on the rationale for the Preferred Alternative presented in this Proposed Plan. DLA issues this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the Final Dunn Field Remedial Investigation (RI), the Final Feasibility Study (FS) Report, and other documents contained in the Administrative Record file for this site. DLA, EPA and TDEC encourage the public to review these documents to gain a better understanding of the site and remedial investigation activities that have been conducted. The Dunn Field FS presents a range of remedial alternatives to address the nature and extent of environmental impacts related to disposed substances, and to reduce the associated risks to human health and the environment.

IMPORTANT DATES

PUBLIC COMMENT PERIOD
May 8 – June 6, 2003
DLA will accept written, electronic and verbal comments on this Proposed Plan during the public comment period.

PUBLIC MEETING
May 15, 2003
DLA will conduct a presentation and public meeting to explain the Proposed Plan and all the alternatives presented in the Feasibility Study. Verbal and written comments will also be accepted at the meeting, which will be held at:

South Memphis Senior Citizens Center
1620 Marjorie St., Memphis, TN
Presentation begins 6:00 p.m.
Public Meeting begins 6:30 p.m.
Contact Persons: John De Back (901) 544-0622
Alma Black Moore (901) 544-0613

OTHER WAYS TO COMMENT
Leave comments on the Environmental Information Line at (901) 544-0617 or send comments to:
Defense Distribution Center (Memphis)
BRAC Environmental Coordinator
2163 Airways Blvd., Bldg. 144
Memphis, TN 38114
Comrel@ddc.dla.mil

For more information, visit the Information Repositories at the following locations:

- Defense Distribution Center (Memphis)
  2163 Airways Blvd., Bldg. 144
  Memphis, TN (901) 544-0613
  Hours: Monday to Friday, 8:00 a.m.-4:30 p.m.
  Community Outreach Room is in Building 144
- Memphis/Shelby County Health Department
  Pollution Control Division
  814 Jefferson Avenue
  Memphis, TN (901) 576-7775
  Hours: Monday to Friday, 7:30 a.m.-4:30 p.m.
- Memphis/Shelby County Public Library
  Cherokee Branch
  3300 Sharpe Avenue
  Memphis, TN (901) 743-3655
  Hours: Monday to Wednesday, 10 a.m.-6:30 p.m.
  Thursday, noon-6:30 p.m.; Saturday, noon-6 p.m.

SITE HISTORY

The Memphis Depot consists of approximately 642 acres on two adjacent sites (see Figure 1). The Main Installation (MI) includes open storage areas, supply warehouses, military family housing, and outdoor recreational areas. Dunn Field includes former mineral storage and former waste disposal areas. Starting in the 1940s, the Memphis Depot received, warehoused, and distributed supplies common to all U.S. military services and some civil agencies. These materials included food, clothing, medical supplies, and hazardous industrial materials.

To facilitate the investigation of this site, the Memphis Depot was divided into two areas: the MI and Dunn Field. This Proposed Plan focuses on the Dunn Field area of the Memphis Depot.

Dunn Field is a 64-acre rectangular area that joins the MI on the north, across Dunn Avenue, and has been designated Operable Unit (OU) 1. Most of the Dunn Field surface is unpaved. Specifically, about two-thirds of the area is grassed, and the remaining area is covered with crushed rock and paved surfaces. Dunn Field was used for aboveground bulk mineral ore storage (bauxite and fluorspar) and underground waste disposal. Based on information obtained from Depot records and interviews with former Depot personnel, Dunn Field was used intermittently for burial of waste. Disposal records and interviews with facility personnel identified specific instances when some of the burial occurred. The earliest records of burial date back to 1946.

Important dates for the Memphis Depot as part of the cleanup process are as follows:

- The site was placed on the National Priorities List (NPL) on **October 14, 1992**.

- On **March 6, 1995**, a Federal Facilities Agreement (FFA) was reached by EPA, TDEC and DLA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 120, and Resource Conservation and Recovery Act (RCRA), Sections 3008(h), and 3004(u) and (v). The FFA outlined the terms by which the investigation and cleanup would be conducted.

The Memphis Depot has conducted public participation activities throughout the CERCLA site cleanup process prior to this Proposed Plan. This includes monthly Restoration Advisory Board (RAB) meetings since 1994, periodic Community Information Sessions and public meetings, a regular newsletter, and the establishment of three information repositories, including a Community Outreach Room. As part of an ongoing commitment to public participation, the findings from the Dunn Field RI, including the baseline risk assessment, were presented to public during the February and April 2002 RAB meetings. A summary of the Dunn Field FS was presented at the February 2003 RAB meeting.

SITE CHARACTERISTICS

From 1998 through 2002, the Memphis Depot conducted an RI/FS with oversight by EPA, TDEC, and DLA. The RI/FS identified the types, quantities, and locations of substances detected in the environment and studied the feasibility of potential cleanup solutions. Dunn Field was divided into three geographic areas to facilitate the investigation (see the description below and Figure 2).

DUNN FIELD AREA DEFINITIONS AND ACTIVITIES

Northeast Open Area – Approximately 20 acres of land located in the northeast quadrant of Dunn Field. This area is mostly grass covered with some lightly wooded areas. Table 1 describes the seven sites located with the Northeast Open Area. *The Memphis Depot Redevelopment Plan* identified this area as future public open space for recreational purposes.

Disposal Area – Approximately 14 acres of open land located in the northwest quadrant of Dunn Field, where disposal sites are located. This area encompasses 25 sites, described in Table 1. Historical information concerning the location of the disposal sites are included in Dunn Field RI Report (July 2002). The anticipated future land use within this area is light industrial.

Stockpile Area - Approximately 30 acres of open land located in the southeastern and southwestern portions of Dunn Field. This area includes the former bauxite and fluorspar stockpiles (removed in 1999) and burial areas in the eastern and southwestern portions of Dunn Field. Table 1 describes sites located in this area. The anticipated future land use within this area is also light industrial.

Note: Groundwater from beneath the 3 onsite areas referenced above and offsite groundwater wells are also presented and discussed in the Dunn Field RI report (not including the Main Installation)

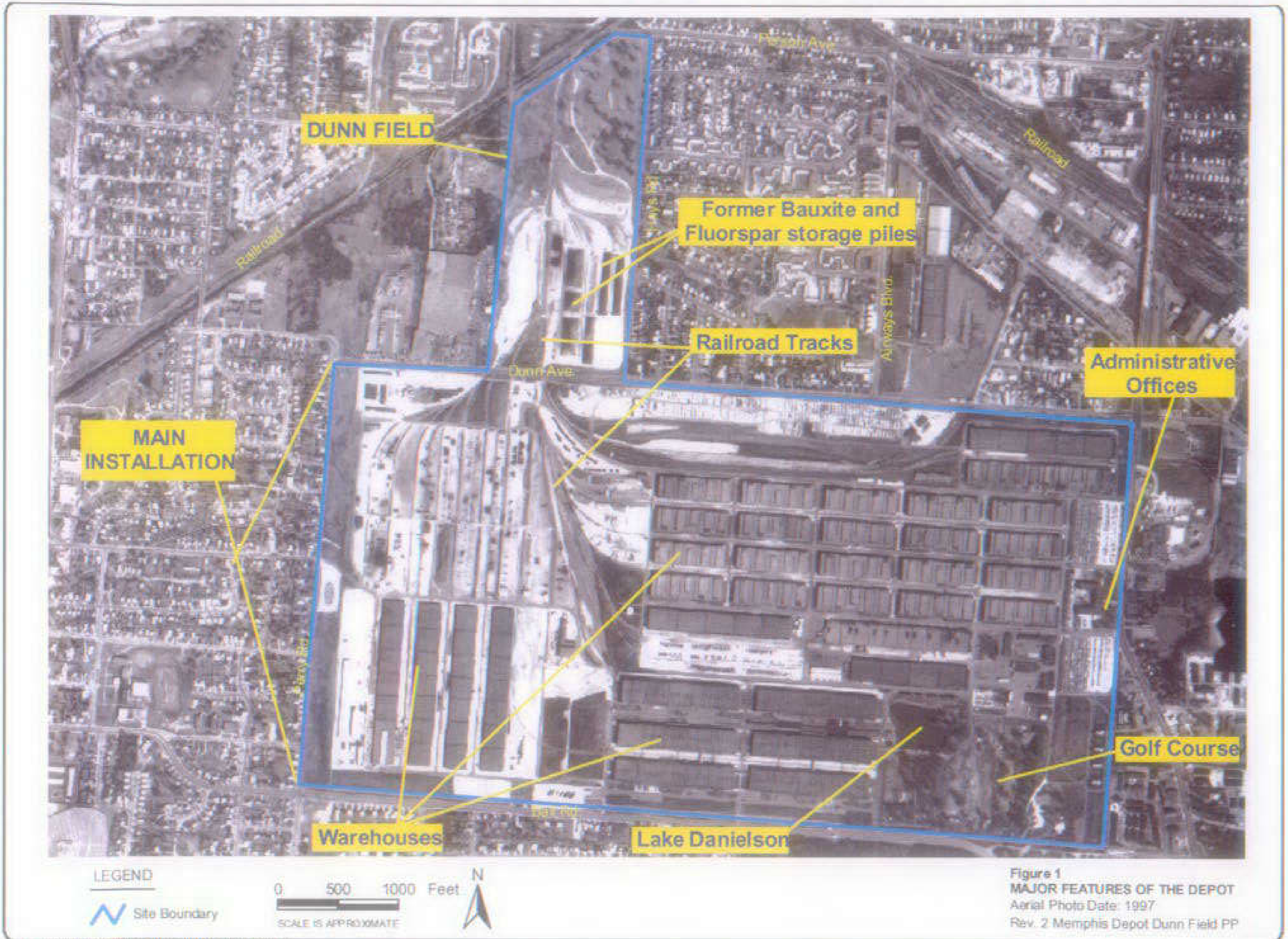

Figure 1
MAJOR FEATURES OF THE DEPOT
Aerial Photo Date: 1997
Rev. 2 Memphis Depot Dunn Field PP

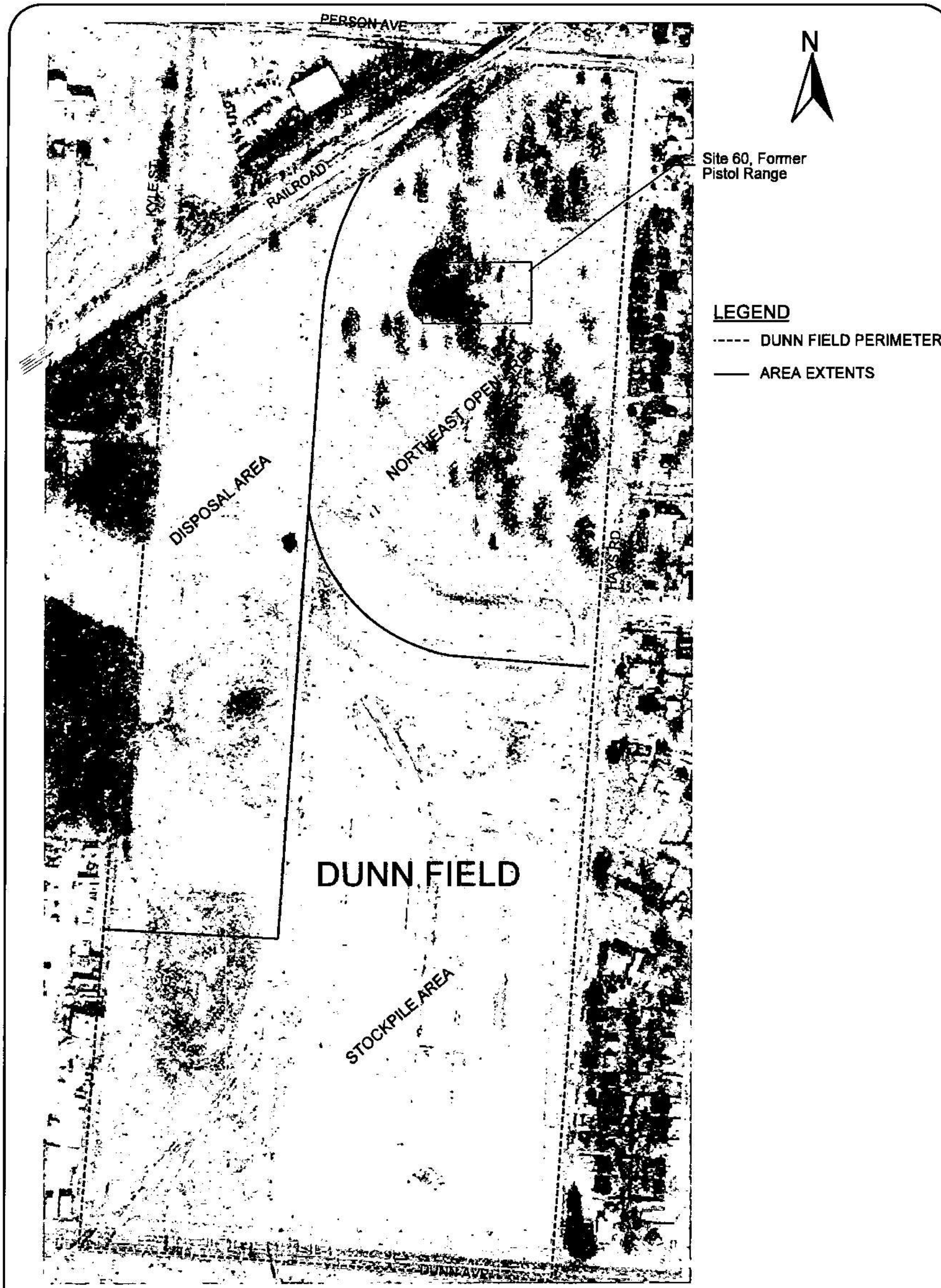

FIGURE 2
AREA DESIGNATIONS AT
DUNN FIELD
Rev. 1 Memphis Depot Dunn Field PP

ATL/CAD1/PROJECTS/148071 DDMT/Dunn Field PP 2003

CH2MHILL

The key findings from the Dunn Field RI indicated that:

Northeast Open Area

- Volatile organic compounds (VOCs) were found in surface and subsurface soil samples. In particular, tetrachloroethene (PCE) and trichloroethene (TCE) were detected at 3 to 5 feet below ground surface (bgs) and 8 to 10 feet bgs at multiple locations. The concentrations of these VOCs do not appear to be high enough to indicate that a release from a definable source area. However, the VOC results from the passive soil gas investigation suggest that incidental surface waste disposal of chlorinated solvents may have occurred in the Northeast Open Area during operations at Dunn Field. VOCs detected along the western boundary of the Northeast Open Area may be associated with waste disposal operations in the adjacent Disposal Area.

- There is no indication that zinc or semi-volatile organic compounds (SVOCs) have migrated from the XXCC-3 (stabilized impregnite) burial site (Site 21) along the eastern boundary of the Northeast Open Area.

- Elevated lead concentrations were detected in the surface soil at the former pistol range (Site 60).

- The distribution of pesticides across the Northeast Open Area is similar to that at the MI, indicating widespread surficial pesticide application on the ground surface rather than releases from the temporary pesticide storage area (Site 85).

- Concentrations of compounds detected in samples of surface water and sediment in the drainage ditch (Site 50) are no different than background.

Disposal Area

- The following chlorinated VOCs (CVOCs) were detected at elevated concentrations in subsurface soils in the Disposal Area:

  - Tetrachloroethene (PCE)
  - Trichloroethene (TCE)
  - 1,2 Dichloroethene (1,2-DCE)
  - Vinyl Chloride
  - 1,1,2,2 Tetrachloroethane (1,1,2,2-PCA)
  - 1,1,2 Trichloroethane (1,1,2-TCA)
  - Carbon Tetrachloride (CCl_4)
  - Chloroform

- VOCs detected in soils via laboratory analysis of soil samples correlate well with the extent of VOCs detected during the passive soil gas survey. The apparent clustering of the higher VOC concentrations correlates well with the historical information indicating that the disposal pits and trenches were relatively small and separate. VOCs have been transported from near the base of the disposal trenches (8 to 10 feet bgs) to the fluvial aquifer (up to 83 feet deep).

- Based on comparison of soil sample analytical results to environmental conditions in groundwater under Dunn Field, there appears to be a complete migration pathway from disposal area to subsurface soil and then to groundwater for CVOCs.

- Chromium and lead detected in surface and subsurface soil consistently exceed background concentrations (levels at which these substances are commonly found in other areas of Memphis). It is expected that these levels result from waste management operations at the Disposal Area. Arsenic, aluminum, copper, and zinc also exceed background concentrations in soil. Metals in both surface and subsurface soil are widely distributed or random and do not correlate consistently with specific disposal locations or sites.

- Pesticides were detected in surface and subsurface samples across the Disposal Area. The distribution of concentrations is indicative of past application of pesticides to the surface rather than disposal operations.

- Polycyclic aromatic hydrocarbons (PAHs) were detected in surface and subsurface soil samples in the Disposal Area. The PAHs appear to be related to former/existing railroad tracks on and off Dunn Field.

Stockpile Area

- There is no indication that VOCs or SVOCs were disposed of at the Stockpile Area. The elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) detected in surface soil samples appear to be related to former/existing railroad tracks and asphalt roadways on this area of Dunn Field.

- Detected metals are primarily associated with ore storage and in general are close to background levels, including arsenic.

- The distribution of pesticides across the Stockpile Area is similar to that at the MI, indicating widespread surficial pesticide application rather than releases.

- The alleged CC-2 (impregnite) burial trench is suspected as being located adjacent/near to Site 24-B in the west-south portion of the Stockpile Area. Information indicates the possible burial of 86,100 pounds of containerized CC-2 material in a 40-foot long trench in the southwest quadrant of Dunn Field in 1947. Impregnite (unstablized [CC-2] and stabilized [XXCC-3, stabilized with zinc oxide]) was used for impregnating or permeating protective clothing after laundering to protect personnel against the action of vesicant-type chemical agents. This area was not directly investigated during the RI field activities due to the chemical warfare materiel (CWM) removal action, which was completed in 2001.

Groundwater

- The groundwater in the fluvial aquifer (the water table under the site) is not a drinking water source for area residents.

- The nature and extent of environmental conditions in the shallow groundwater aquifer underlying Dunn Field and areas to the west were assessed based on an evaluation of data obtained from groundwater samples collected during 16 sampling events from January 1996 through February 2001. Groundwater samples were collected and analyzed for the presence of explosives, herbicides, metals (total), pesticides, polychlorinated biphenyls (PCBs), SVOCs, and VOCs. Groundwater Samples were also analyzed for CWM breakdown products, including thiodiglycol, 1,4-oxathiane, and 1,4-dithiane. Of all these parameters, VOCs, SVOCs, and total metals were the most frequently detected analytical constituents in groundwater samples.

- The investigation has identified three major VOC plumes in the shallow groundwater under Dunn Field: a northern plume; a west-northwest plume; and west-southwest plume. There is some mixing of the plumes, as expected from influence by the active groundwater extraction system, natural groundwater flow, and degradation processes. All of the plumes have on- and offsite components. Nine primary VOCs have been detected in groundwater during sampling events, including:

  - **Tetrachloroethene (PCE)**
  - **Trichloroethene (TCE)**
  - **(Cis & Trans)1,2 Dichloroethene (1,2-DCE)**
  - **1,1 Dichloroethene (1,1-DCE)**
  - **1,1,2,2 Tetrachloroethane (1,1,2,2-PCA)**
  - **1,1,2 Trichloroethane (1,1,2-TCA)**
  - **Carbon Tetrachloride (CCl_4)**
  - **Chloroform**

- The plume along the northern boundary of the site contains PCE, TCE, and 1,1-DCE. However, since the TCE, and 1,1-DCE have been detected in offsite monitoring well MW-51 and offsite piezometer PZ-02, which are upgradient to the northeast of Dunn Field, *an offsite source is suspected.* Additional sampling and analysis is being performed to determine the location and origin of the offsite source.

- The west-northwest plume is a mixture of PCE, TCE, 1,2-DCE, 1,1-DCE, 1,1,2,2-PCA, 1,1,2-TCA, CCl_4, and chloroform. Offsite portions of this plume flow to the west and northwest. The suspected source of the west-southwest plume under Dunn Field appears to be located at the southern end of the Disposal Area of Dunn Field. The west-southwest plume is principally composed of 1,1,2,2-PCA, CCl_4, 1,1,2-TCA, and chloroform, but contains TCE, PCE, and 1,2-DCE.

- Some metals were found to occur at frequencies and locations that suggest their presence could be related to past waste management practices at Dunn Field. These metals include (from highest to lowest frequency of detection above background) aluminum, vanadium, iron, lead, beryllium, and manganese.

- During the five RI sampling events (1996 through 1998), arsenic was detected in groundwater samples at concentrations above the laboratory detection limits in 3, 15, 4, 1, and 2 samples, respectively. The second quarter 1997 sampling event was anomalously high since in the preceding first quarter 1996 sampling event, arsenic was detected in only three samples. During the 1998 quarterly sampling events, exceedances were reported in samples collected from only three wells. Samples were collected from the onsite recovery wells in November 1999 and 2000, and arsenic was not detected in 17 of 18 samples. Arsenic was detected at a concentration of 0.003 mg/L in the sample from RW-01 in November 2000. In addition, arsenic was analyzed in 33 samples collected from the groundwater extraction system effluent between October 1998 and April 2002. Of the 33 samples analyzed, none had arsenic concentrations that exceeded the MDL of 0.003 mg/L. Therefore, arsenic does not appear to be a groundwater contaminant in the fluvial aquifer at Dunn Field.

- SVOCs and pesticides detected in groundwater samples were attributed to sampling and analytical artifacts such as the introduction of plasticizers (e.g., bis-ethylhexyl phthalate) via the sampling and analysis process rather than to waste management practices at Dunn Field. The reason for this is: due to low frequency of their detection, low concentrations of detection near detection limits and their detection is possibly associated with turbidity in samples which may have been introduced as a sampling. Also based on the innate nature of these chemicals, they have low solubility, and subsurface soils above the aquifer do not have significant (above leachability based levels) levels of these chemicals. Thus metals and non-VOC chemicals are not selected as constituents of concern (COCs) and will not be addressed further in this FS.

WHAT ARE THE "CONSTITUENTS OF CONCERN"?

The Memphis Depot, EPA and TDEC have identified the following substances in the soil or groundwater that, if exposed, may pose unacceptable risks to human health at this site based on the anticipated future land use. (Under the current conditions at Dunn Field, these substances are contained in soil beneath the ground surface or in the shallow aquifer, thereby minimizing the potential for direct exposure.)

Arsenic: A COC in surface soil in the Disposal Area for future residential use. Arsenic is an inorganic chemical that occurs naturally. It is released to the environment through metal smelting, combustion, and waste disposal, and in some pesticides. In soils it is relatively nonmobile. Arsenic is found at relatively low levels in many types of food, including seafood, meats, and grains. Symptoms of acute inorganic arsenic poisoning in humans may include nausea, anorexia, vomiting, epigastric and abdominal pain, and diarrhea. Long-term exposures to high levels of arsenic in drinking water are known to cause cancers and "black-foot" disease in humans.

Antimony: A COC in surface soil in the Disposal Area for future residential use. Antimony is a silvery-white metal that is found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys or combined with oxygen to form antimony oxide. Antimony is released to the environment from natural sources and from industry. In the air, antimony is attached to very small particles that may stay in the air for many days. Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum. Antimony is found at low levels in some rivers, lakes, and streams. Exposure to antimony at high levels can result in a variety of adverse health effects. Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers. The EPA has not classified antimony as to its human carcinogenicity.

Tetrachloroethene (PCE): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. PCE is most commonly used for dry-cleaning textiles and for metal degreasing. Occupational exposures are most common among workers at dry cleaning facilities. High exposures can cause effects on the central nervous system, leading to dizziness, headache, sleepiness, confusion, nausea, and difficulty in coordination and speech. Exposure of PCE at high levels (considerably higher than detected at the Depot) can cause unconsciousness and death. In animal experiments with exposure to long-term higher-than-typical environmental concentrations, PCE is shown to cause liver and kidney damage, developmental effects, liver cancer, and leukemia. Based on animal evidence PCE is presumed to be capable of causing cancer in humans, however, human exposure data do not conclusively indicate that it is carcinogenic.

WHAT ARE THE "CONSTITUENTS OF CONCERN"? (cont'd)

Trichloroethene (TCE): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. TCE is a halogenated organic compound used historically as a solvent and degreaser in many industries. Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions, and urinary tract disorders. Based on laboratory studies, TCE is considered a probable human carcinogen.

1,1,2,2-Tetrachloroethane (1,1,2,2-PCA): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. 1,1,2,2-PCA is a manufactured chemical historically used to make other chemicals, as a solvent, to clean and degrease metals, and in paints and pesticides. Commercial production for these uses has stopped in the U.S. and it is currently only used as an intermediate in the production of other chemicals. 1,1,2,2-PCA can be found at low levels in indoor and outdoor air. In closed environments, inhalation of high levels of 1,1,2,2-PCA can cause fatigue, vomiting, dizziness, and possible unconsciousness. Exposure to large amounts over long periods in time can cause liver damage, stomachaches, or dizziness. The health effects to long-term exposure to low levels are unknown. Based on animal studies, 1,1,2,2-PCA is a possible human carcinogen.

1,1,2-Trichloroethane (1,1,2-TCA): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. 1,1,2-TCA is an insoluble, colorless, liquid used as a solvent, as an intermediate in the production of 1,1-DCA, or as an impurity in other chemicals. Most 1,1,2-TCA in the environment is released into the air. Exposure of 1,1,2-TCA to the skin causes stinging and burning. Based on animal studies, inhalation of 1,1,2-TCA at high levels effected the liver, kidneys, and nervous system and ingestion of 1,1,2-DCE affected the stomach, blood, liver, kidneys, and nervous system. There is no information as to whether 1,1,2-TCA is a carcinogen.

1,1-Dichloroethene (1,1-DCE): A COC in the groundwater of the fluvial aquifer. 1,1-DCE is an colorless liquid that is used to make plastics, packaging materials, flame retardant coatings for fiber and carpet backings, coating for steel pipes, and in adhesive applications. Occupational exposures may occur to workers in industries who make or use 1,1-DCE. Long-term inhalation of 1,1-DCE may damage the human nervous system, liver, and lungs. Short-term exposure to high levels may damage the central nervous system. Contact of 1,1-DCE on skin or in the eyes causes irritation. Based on animal studies, 1,1-DCE is listed as a possible carcinogen although cases involving human have been inconclusive.

1,2-Dichloroethene (1,2-DCE): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. 1,2-DCE is a highly flammable, colorless, liquid that is present in two forms: cis-1,2-DCE and trans-1,2-DCE. It is commonly used to produce solvents and chemical mixtures. In the environment, it may break down into vinyl chloride. Short-term inhalation of 1,2-DCE at high levels can cause drowsiness, nausea, and fatigue. Inhalation of very high levels may cause death. Exposure to lower doses of cis-1,2-DCE can cause a decrease in red blood cells and affect the liver. Long term human health effects after exposure to low levels of 1,2-DCE are unknown. Cis-1,2-DCE is not classifiable as a human carcinogen and trans-1,2-DCE is not classified.

Carbon Tetrachloride (CCl_4): A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. Carbon tetrachloride is most often found as a colorless gas. It was historically used in the production of refrigeration fluid and propellants for aerosol cans, and as a pesticide, as a cleaning fluid, as a degreasing agent, in fire extinguishers, and in spot removers. Presently, these uses are now banned and carbon tetrachloride is only used in some industrial applications. Exposure to high levels through inhalation, ingestion, and possibly skin contact, can cause liver, kidney, and central nervous system damage. In severe cases, coma and death can occur. Carbon tetrachloride may reasonably be anticipated to be a carcinogen, however it is inconclusive.

Chloroform: A COC in subsurface soil in the Disposal Area and in the groundwater of the fluvial aquifer. Chloroform is a colorless liquid that is presently used to make other chemicals and may be formed in small amounts when chlorine is added to water. Short-term inhalation of 900 ppm of chloroform in air can cause dizziness, fatigue, and headache. Long-term exposure to high levels through breathing or ingestion may damage the liver and kidneys. Exposure of large amounts to the skin may cause sores. Chloroform may be reasonably anticipated to be a carcinogen.

Vinyl Chloride: Vinyl chloride is a colorless, flammable, gas used to make polyvinyl chloride (PVC), which is used in plastics and furniture and automobile upholstery. Vinyl chloride also results from the breakdown of other substances, such as TCA, TCE, and PCE. Short-term inhalation of high levels of vinyl chloride can cause dizziness or sleepiness; inhalation of extremely high levels can cause unconsciousness or death. Long-term inhalation can cause changes to the structure of the liver. Exposure to skin will cause numbness, redness, and blisters. Workers have developed nerve damage and immune reactions, problems with blood flow in the hands, and destruction of bones in the tips of fingers. Vinyl chloride is a known carcinogen.

Polycyclic Aromatic Hydrocarbons (PAHs): A COC in surface soil in the Disposal Area for future residential use. PAHs are a group of over 100 different chemicals formed during the incomplete burning of coal, oil, and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are found in coal tar crude oil, creosote, and roofing tar; some are used in medicines, to make dyes, plastics, and pesticides. Occupation exposures are possible for people who work in coke, coal-tar, and asphalt plants, smokehouses, and municipal trash incineration facilities. Animals studies show that short and long term exposure to PAHs may cause harmful effects on skin, bodily fluids, and the immune system, impact fertility, and cause birth defects; however, these impacts have not been seen in humans. Long-term exposures to PAHs with other chemicals have caused cancer and some PAHs may be reasonably expected to be carcinogens.

WHAT IS A "PRINCIPAL THREAT" WASTE" AND A "LOW-LEVEL THREAT WASTE"?

Principal threat wastes are highly toxic or highly mobile source materials that generally cannot be reliably contained, or that are a significant risk to human health or the environment if exposure occurs.

Low-level threat wastes are those source materials that generally can be reliably contained or managed through institutional controls, and that would present only a low risk in the event of exposure. They include source materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels.

Wherever practical, treatment is used to address the principal threats posed by a site (National Contingency Plan, Section 300.430(a)(1)(iii)(A)). This *principal threat* concept characterizes *source materials* at a site. A source material is any material that includes or contains hazardous substances, pollutants, or contaminants and acts as a reservoir for moving contamination to groundwater, surface water, or air; or that serves as a source for direct exposure to contamination. While contaminated groundwater is not usually considered a source material, non-aqueous phase liquids (NAPLs) in groundwater may be. The decision to treat these wastes is made for each site by analyzing the alternatives in detail with nine remedy selection criteria. (These criteria are provided in the tables at the end of this Proposed Plan) This detailed analysis provides a statutory basis for a remedy with treatment as a principal element.

Subsurface soils, including the disposal sites, in the Disposal Area are considered to be principal threat wastes as defined by EPA guidance (see the definition above). The principal threat wastes have significantly degraded groundwater quality in the shallow fluvial aquifer. Based on the highest observed concentration of the detected solvents TCE and 1,1,2,2-PCA in groundwater, free-phase solvents may be present in Dunn Field groundwater and would be considered principal threat wastes. However, free-phase solvents were not been detected during the RI and subsequent operations and maintenance (O&M) groundwater sampling events.

SCOPE AND ROLE OF THE RESPONSE ACTION

The overall strategy for remediating Dunn Field is to select the most effective response action to address soil and groundwater contamination that will allow transfer or lease of the property for its intended land use. This intended land use is industrial for the Disposal and Stockpile Areas, and recreational for the Northeast Open Area. This is consistent with the current and planned future land use of Dunn Field (as detailed in the Memphis Depot Redevelopment Plan). The current zoning for Dunn Field is Light Industrial (I-L), which prohibits residential use.

Interim remedial actions have taken place for the locations at Dunn Field:

- In 1996, an Interim Remedial Action (IRA) ROD was submitted for a groundwater removal action at Dunn Field. The selected IRA was for hydraulic control of the contaminant plume in groundwater beneath Dunn Field via groundwater extraction and discharge to the municipal sanitary sewer. The seven-well extraction system was constructed in 1998 on the northwest boundary of Dunn Field. Four additional recovery wells were added to the system in early 2000. A five-year review of this interim remedy was completed in January 2003. The technology was also evaluated in the Dunn Field FS, but is not included in the preferred alternative for reasons detailed below and in the FS.

- Remedial actions were conducted from mid-2000 to mid-2001 at Sites 1, 24-A, and 24-B to reduce or eliminate the potential CWM risk posed by these wastes. A total of 1,981 cubic yards of affected soil and debris, and 29 bomb casings were excavated and transported offsite for disposal.

- In January and February 2003, approximately 930 cubic yards (1,211 tons) of lead impacted surface soil was excavated, transported and disposed offsite at an approved, permitted landfill as part of the non-time critical removal action at Site 60.

- The MI RI and FS has been conducted (for OUs 2, 3 and 4) and the final reports are part of the Administrative Record (January 2000 and July 2000, respectively). The MI Proposed Plan (July 2000) was presented to the public in August 2000. The MI Record of Decision (September 2001) was completed and signed by DLA and TDEC in February 2001, and by EPA in September 2001. The Memphis Depot Main Installation Remedial Design Workplan (CH2M HILL, July 2002) has been approved by EPA and TDEC, and the Remedial Design (RD) is currently underway at the MI.

SUMMARY OF SITE RISKS

A baseline risk assessment (BRA), including an ecological risk assessment and human health risk assessment (HHRA), was conducted for each of the three areas of concern within Dunn Field and the underlying groundwater. Details of the BRA are presented in the Dunn Field RI Report. The baseline risk assessment focused on health effects for both children and adults, in industrial, recreational, and hypothetical residential settings that could result from contact with contaminated soil or groundwater. Examples include children ingesting soil while playing in the area or adults using groundwater for drinking water. The risk assessment included the following receptor groups:

1. Current/future onsite maintenance worker;
2. Future onsite commercial/industrial worker;
3. Future onsite recreational adult, youth and child (Northeast Open Area only);
4. Future onsite utility worker (Disposal Area and Stockpile Area)
5. Future onsite resident (at the Surrogate Sites);
6. Offsite resident - inhalation exposure to VOCs in site soils; and
7. Offsite resident - adult and child (groundwater)

The HHRA compared site- and contaminant-specific risk estimates with the acceptable health risks and hazard index (HI) levels. At NPL sites, acceptable excess lifetime cancer risks (ELCRs) for site-related carcinogenic chemicals in the environment range from 1 to 100 in 1 million (10^{-6} to 10^{-4}). Cancer risks lower than 100 in 1 million are acceptable. For non-carcinogenic site-related chemicals, the acceptable HI level is 1.0 or lower.

The current judgment is that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The BRA conclusions for human health and ecological protection for Dunn Field are as follows:

Northeast Open Area

- None of these exposure scenarios resulted in risks above acceptable levels for this area. Therefore, site-specific risk-based remedial goal options (RGOs) were not calculated for the Northeast Open Area.

- The carcinogenic risks for industrial worker exposures to Sites 60/85 (Surrogate Site) surface soil resulted in an estimated risk of 9×10^{-6} and a noncarcinogenic HI of 0.03. The carcinogenic risks are from dieldrin. The resulting risks are well within the acceptable limits for cancer risks and HI.

- The estimated cancer risk to future hypothetical onsite adult and child residents at Sites 60/85 was estimated at 7×10^{-5}, which is within the acceptable range. The estimated risk is due to dieldrin at exposure point concentration (EPC) of 2.54 mg/kg. The total noncarcinogenic health hazard was estimated to be an HI of 0.07 for an adult and an HI of 0.7 for a child, from dieldrin. Overall risks and HIs to future residents are within acceptable limits for the Surrogate Site 60/85.

- Lead detected at sample Location 60/85 is reported at 2,100 mg/kg. This particular sample concentration was well above a residential screening concentration of 400 mg/kg, and was also above the Memphis Depot industrial worker target value of 1,536 mg/kg. Lead-contaminated soil at Site 60 (including the area of dieldrin referenced above) has been removed as part of a removal action at the site, allowing for unrestricted land use for the majority of the Northeast Open Area.

- No further assessment of ecological risk associated with contaminants at the Northeast Open Area was found to be warranted.

Disposal Area

- The risk assessment indicated unacceptable risks in the Disposal Area primarily due to the potential exposure to the following classes of COCs: CVOCs, SVOCs, metals, and PAHs.

• The combined risks and hazards for the industrial worker from all applicable pathways (surface water, sediment, surface soil and soil column ambient air) in the Disposal Area resulted in a total ELCR of 6 x 10⁻⁵ and a total HI of 0.3, which are within acceptable limits. The total risk and hazards for the industrial worker exposed to indoor air in the Disposal Area are estimated to be 8 x 10^{-4} for an ELCR and 4 for an HI. These unacceptable risk and hazard levels are due to VOCs in the soil column.

• Combined risks from soil, sediment, and surface water exposure pathways for the maintenance worker in the Disposal Area resulted in a total ELCR of 4 x 10^{-6} and a total HI of 0.008, primarily from PAHs. The cumulative exposure is within acceptable limits.

• Combined risks from soil and ambient air pathways for the utility worker in the Disposal Area resulted in a total ELCR of 8 x 10^{-7} and a total HI of <0.01. However, the disposal sites in the Disposal Area are not suited for utility workers because of possible intrusive disturbance of buried wastes.

• The risk and hazard estimates from 1,1,2,2-PCA for the offsite residential receptor from the inhalation of ambient air originating from the Disposal Area are within acceptable limits (ELCR of 4 x 10^{-6} and an HI of 0.02).

• The maximum observed lead concentration in surface soil at the Disposal Area is 789 mg/kg, with an estimated arithmetic mean of 94 mg/kg. Both concentrations, except the maximum, are below a residential exposure-based screening level of 400 mg/kg, and all concentrations are below an industrial worker exposure-based target concentration of 1,536 mg/kg. Thus, the observed lead levels at the site are not expected to pose health hazards.

• The results of the risk assessment for Disposal Area - Site 61 Surrogate Study indicate the following:

⇒ Industrial Worker (Outdoor) *Exposure to surface soil and groundwater (potable use)* Total Risks & Hazards – total ELCR 1 x 10^{-4} and total HI 14. COCs include arsenic, PAHs, antimony and VOCs,

⇒ Industrial Worker (Indoor) *Exposure to soil-to-indoor air and groundwater (potable use)* Total Risks & Hazards – total ELCR 2 x 10^{-4} and total HI 6. COCs include primarily VOCs,

⇒ Utility Worker *Exposure to surface soil* Total Risks & Hazards – total ELCR 2 x 10^{-6} and total HI 0.01. COCs include primarily arsenic and PAHs,

⇒ Residential Child (Onsite) *Exposure to surface soil, soil-to-indoor air and groundwater (potable use)* Total Hazards – total HI 94. COCs include PAHs, arsenic, antimony and VOCs,

⇒ Residential Adult (Onsite) *Exposure to surface soil, soil-to-indoor air and groundwater (potable use)* Total Risks & Hazards – total ELCR 1 x 10^{-3} and total HI 25. COCs include PAHs, arsenic, antimony and VOCs.

• As detailed above, the total site risks and hazards from Surrogate Site 61 from arsenic, antimony, PAHs (surface soil) and CVOC (soil-to-indoor air and potable use of site groundwater) levels render Site 61 unusable as a residential site under current contamination conditions. Both cancer risks (1 x 10^{-3}) and non-cancer hazards (HIs of 24 and 95) are unacceptable for future onsite resident (adult/child).

• Given the poor quality of onsite habitat at the Disposal Area and the lack of surface soil COPCs, ecological impacts are expected to be negligible and are not expected to change in the foreseeable future.

Stockpile Area

• The surface soil ELCR to an onsite maintenance worker at the Stockpile Area was estimated to be 9 x 10^{-7}. The noncarcinogenic HI is 0.005.

• The ELCR to a future onsite industrial worker from the surface soils at the Stockpile Area was estimated to be 7 x 10^{-6}, primarily due to arsenic and benzo(a)pyrene (a PAH). Total noncarcinogenic HI was estimated at 0.04.

- The ELCR from exposures to the soil column for an industrial worker was estimated at 4×10^{-6}, and HI was estimated at 0.05.

- The ELCR to a future onsite utility worker from exposures to the soil column at the Stockpile Area was estimated to be 4×10^{-7}. The HI was estimated at 0.005.

- The maximum observed lead concentration in surface soil at the Stockpile Area is 107 mg/kg, with an estimated arithmetic mean of 29.4 mg/kg. All concentrations (including the maximum) are below a residential exposure-based screening level of 400 mg/kg, and an industrial worker exposure-based target concentration of 1536 mg/kg.

- The ELCR for industrial worker exposures to SSLFF (the Surrogate Site) surface soil resulted in estimated risks of 8×10^{-6} and an HI of 0.06, due to the presence of arsenic at 26 mg/kg.

- The total ELCR to future hypothetical onsite adult and child residents at Surrogate Site SSLFF was estimated at 6×10^{-5}, which is within the acceptable range of 10^{-6} to 10^{-4}. Total HI was estimated to be 0.2 for an adult and 2 for a child. The estimated risk and HI are also due to arsenic. The maximum arsenic level of 25.5 is within the range of background levels of 4 to 28 mg/kg detected elsewhere in Shelby County as reported in the Background Sampling Program Report (CH2M HILL, May 1998). The maximum arsenic concentration was used to calculate the risks and hazards for Surrogate Site SSLFF. Arsenic was detected at an average concentration of 11 mg/kg in surface soil samples from across the entire Stockpile Area (a total of 26 samples). These results suggest that site arsenic levels are within background, therefore, no action is proposed.

<u>**Groundwater**</u>

- The groundwater in the shallow fluvial aquifer under Dunn Field is not suitable for use as drinking water due to the concentrations of CVOCs detected during the RI.

- Overall, risks to a future industrial worker or hypothetical resident from exposure to onsite groundwater are not within the acceptable range of 1 to 100 in a million (ELCRs range from 1×10^{-4} to 1×10^{-2} and HIs range from 1.6 to 34). (*Note: there is no intent to use groundwater as potable water in the future*). The affected groundwater plume under the site extends beyond the property boundary. The groundwater concentrations do not meet maximum contaminant levels (MCLs).

- There are no fluvial groundwater users (private drinking water wells) within the site and none have been identified in the offsite areas impacted by the affected groundwater.

- There are houses in the offsite areas west of Dunn Field, however, all of the residents are supplied water via a municipal waterline. Groundwater impacts in the fluvial aquifer have been detected in selected offsite wells and indoor air exposures are the most pertinent exposure pathway. Risks through this pathway to the offsite residents are well within the acceptable limits, presenting negligible risks (indoor air inhalation risks ranged from 2×10^{-7} to 5×10^{-10}) and hazards (HIs were all <0.01).

REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) describe the goals that the remedial actions identified in this Proposed Plan are expected to accomplish.

The following RAOs have been developed for surface soil at Dunn Field:

- Limit use of the surface soil in the Disposal Area to activities consistent with Light Industrial use and prevent residential use through institutional controls.

The following RAOs have been developed for the disposal sites at Dunn Field:

- Eliminate potential for groundwater impacts from a release of buried containerized hazardous liquids and the leaching of contaminants from buried hazardous solids.

- Eliminate future unacceptable risk of direct contact with buried hazardous liquid and/or solids due to intrusive activities during future land use or site development.

The following RAOs have been developed for subsurface soil impacted with CVOCs at Dunn Field:

- Prevent direct inhalation of indoor air vapors from subsurface soils in excess of industrial worker and residential risk-based criteria.
- Reduce or eliminate further impacts to the shallow fluvial aquifer from the CVOCs in the subsurface soil.

The BRA also identified conditions in groundwater that could pose unacceptable risks. VOCs in the shallow fluvial aquifer may migrate further offsite or into deeper aquifers, posing a concern to water supplies. (*Note: conditions in the fluvial aquifer have not affected the deeper Memphis aquifer, which is a source of drinking water, to date.*) Based on analysis of the groundwater conditions, onsite and offsite potential receptors, and acceptable exposure levels, **the following RAOs have been developed for groundwater at Dunn Field:**

- Prevent exposure of groundwater contaminated with VOCs in excess of protective target levels from potential future onsite wells;
- Prevent further offsite migration of VOCs in groundwater in excess of protective target levels;
- Remediate fluvial aquifer groundwater to be protective of the deeper Memphis aquifer.

Based on the outcome of the risk assessment and the surface soil removal action at Site 60, the majority of the Northeast Open Area and Stockpile Area do not require further remedial action, and the RAOs listed above focus on waste primarily located in the Disposal Area.

No future residential use is planned for the Disposal Area of Dunn Field. However, it is nonetheless necessary to select a remedy that affords certitude to the local planning authority not to use the property as residential use property. Based on the future land use for the Disposal Area, RAOs and alternatives for remediation to residential standards are not presented in this Proposed Plan.

Because there are no federal or state cleanup standards for soil contamination, target levels where established that would both reduce the risk associated with exposure to soil contaminants to an acceptable level, and ensure minimal migration of contaminants into the groundwater. The subsurface soils, primarily within Disposal Area of Dunn Field, have residual CVOC levels that exceed the soil-to-groundwater migration based screening levels, and potential vapor intrusion to indoor air under altered land use conditions. Site-specific target values were calculated for the loess and fluvial deposits and are summarized below (values are expresses in mg/kg or parts per million [ppm]):

	Loess	Fluvial
PCE	0.180	0.092
TCE	0.182	0.093
Cis 1,2-DCE	0.755	0.404
Trans 1,2-DCE	1.520	0.790
Vinyl Chloride	0.024	0.015
1,1,2,2 –PCA	0.011	0.006
1,1,2-TCA	0.062	0.035
CCl_4	0.215	0.108
Chloroform	0.917	0.486

The findings of the HHRA for the CVOCs detected in the groundwater in the fluvial aquifer indicate that concentrations are high enough to make the water unfit for drinking either by industrial workers or residential receptors. The chemicals responsible for this predicted excess risk are primarily CVOCs.

Currently there is no exposure to the contaminated groundwater in the fluvial aquifer at Dunn Field. Thus the focus of this proposed plan is to protect human health from potential future exposures as well as protection against maximum beneficial uses of a potable aquifer.

Since multiple CVOCs were detected in groundwater at the site and in the immediate downgradient area, targeting to meet the MCLs may not be adequately protective of a potentially exposed receptor due to the possibility of cumulative toxicity exceeding the upper-bound limit of the acceptable risk or HI. Following the EPA guidance for Superfund sites, an upper-bound limit on target cumulative risk level of 1 in 10,000 ($1 X10^{-4}$) and an HI of 1.0 are selected as the **target remedial goals** for the plumes within and immediately downgradient of Dunn Field. Thus upon implementation of the remedial actions the residual risks will not exceed these target levels at the receptor points. The individual concentration of each COC within these plumes will be different from contaminated area to area; however, they will be within MCL levels and combined concentration levels will not exceed a cumulative upper-bound target risk of 1 in 10,000 ($1 X10^{-4}$) and HI of 1.0 in any given plume.

These calculated target remedial goal concentrations assume that all the chemicals are present in each of the plumes. However, these levels will be revisited during the evaluation of remedial action groundwater monitoring to ensure target risk levels are met. Some of the individual chemical concentrations can be higher or lower depending on proportion of the cumulative risk each COC presents in that particular plume at that time, while meeting target risk level.

COCs in groundwater and their respective target concentration levels based on cumulative target risk level of 1 in a million (10^{-6}) and 1 in 10,000 (10^{-4}) are shown below (in microgram per liter [ug/L] or parts per billion [ppb]. The proposed concentration levels in this target level table are likely to change, although target risk levels will remain the primary goal during groundwater remediation.

	Groundwater Target Goal
PCE	2.5
TCE	5
Cis 1,2-DCE	35
Trans 1,2-DCE	50
1,1 DCE	7/340*
1,1,2,2 -PCA	2.2
1,1,2-TCA	1.9
CCl_4	12
Chloroform	3

* EPA has recently reclassified 1,1-DCE as a non-carcinogen; however, existing MCL is based on previous assumption that it is a carcinogen. EPA may revise this MCL.

As stated earlier, these individual groundwater target goals will change with the number and concentrations of chemicals present in a plume during remediation, while target risk level (e.g. 1×10^{-4}) will remain fixed.

SUMMARY OF REMEDIAL ALTERNATIVES

The remedial alternatives for Dunn Field that are presented in the following text and are numbered as shown below to correspond with the Dunn Field FS Report.

LIST OF REMEDIAL ALTERNATIVES

Medium	Feasibility Study (FS) Alternative	Description
All	1	No Action
Disposal Sites & Associated Subsurface Soil	DS3	Soil Containment with Institutional Controls
	DS5	Ex-situ Soil Treatment with Institutional Controls
	DS6	Excavation and Offsite Disposal with Institutional Controls
Subsurface Soil	SB1	Presumptive Remedy (Soil Vapor Extraction [SVE]) with Institutional Controls
Groundwater	GW2	Zero-Valent Iron (ZVI) Injection, Enhanced Bioremediation and Enhanced Groundwater Extraction, and MNA with Institutional Controls
	GW3	Zero-Valent Iron (ZVI) Injection, Permeable Reactive Barrier (PRB), and MNA with Institutional Controls
	GW4	Air Sparging with SVE, PRB, and MNA with Institutional Controls

DS = Disposal Sites SB = Subsurface Soil GW = Groundwater

The 'No Action' alternative was evaluated for Dunn Field as a whole in accordance with the CERLCA statute. Based on the results of the baseline risk assessment, unacceptable risks exist at portions of Dunn Field, therefore the 'No Action' alternative is not protective and therefore does not meet the threshold criteria for remedy selection. It is not a medium-specific alternative and it will not be evaluated against each set of alternatives for each medium.

Common Elements

Many of the alternatives have common components Institutional controls, such as deed restrictions and land use controls, are a common element to all of the active alternatives for all media (soil and groundwater) Institutional controls limit the use of parts of Dunn Field (primarily the Disposal Area) and to make sure that the shallow fluvial groundwater is not used as drinking water These resource-use restrictions, along with existing land use and groundwater use controls (such as zoning restrictions and Memphis-Shelby County groundwater use restrictions) provide protective layers of land use restrictions They are discussed in each alternative where appropriate The costs associated with the implementation of institutional controls are specific to each alternative for each medium, and are not additive

The type of land use restriction, monitoring, and enforceability will need to be determined for the selected remedy in the Record of Decision (ROD) As described in CERCLA regulations, none of the alternatives rely on institutional controls alone to achieve protectiveness Monitoring to ensure the effectiveness of the remedy, including deed restrictions, is part of each active alternative Monitored natural attenuation (MNA) is part of each groundwater alternative

Each alternative for the disposal sites includes a pre-design investigation for selected sites This field effort is designed to

- define the location and dimensions of each disposal site as compared to existing information on each site,
- evaluate the chemical and physical characteristics of materials present within the former disposal sites along with the surrounding soil media, and
- develop estimates of the physical condition and quantity of potentially hazardous materials present in each disposal site

Although the Dunn Field RI and FS evaluated potential residential reuse, alternatives that would clean up to a level that would allow this use were not carried forward because it is not part of the planned reuse of Dunn Field All active soil and groundwater alternatives are expected to attain the RAOs

Site Wide – All Media

Alternative 1: No Action

Capital Costs	*$0*
Present worth (PW) O&M Costs	*$0*
Total PW Costs	*$0*
Duration to Achieve RAOs	*Unknown*

Regulations governing CERCLA require that the 'No Action' alternative be evaluated to establish a baseline for comparison Under this alternative, the Memphis Depot would take no action at the site to prevent exposure to soil and groundwater contamination at Dunn Field

Disposal Site and Associated Subsurface Soil

Alternative DS3: Soil Containment with Institutional Controls

Capital Costs	*$304,000*
PW O&M Costs	*$312,000*
Total PW Costs	*$616,000*
Duration to Achieve RAOs	*1 Year*

This alternative involves the placement of a protective cover or cap over disposal sites and residual waste to act as a physical barrier against direct contact to workers or residents and water percolation Natural clean soil consisting of low-permeability (clay) and high-permeability (sand) soil, asphalt, concrete or other material such as flexible geomembrane liner from offsite will be placed over disposal sites Surface controls such as stormwater controls and vegetative cover will be necessary to prevent erosion damage to a soil cover The location of the contained or capped materials onsite will be required to be recorded in the deed records for the site This alternative will require

- deed restrictions limiting the use of the property or portions of the property,

- regulation of intrusive activities during which potential receptors can encounter COCs,
- maintenance of access barriers to limit entry into contaminated areas,
- signage to warn visitors to the site that these areas exist, and
- periodic inspection for cover disturbance

Alternative DS5: Ex-situ Treatment with Institutional Controls

Capital Costs	*$2,069,000*
PW O&M Costs	*$60,000*
Total PW Costs	*$2,129,000*
Duration to Achieve RAOs	*<1 year*

This alternative includes the ex-situ treatment for subsurface wastes/soils by solidification/ stabilization Treatment physically binds constituents within a stabilized mass Ex-situ treatment assumes removal of residual waste and affected soil by excavation and then utilizes processes such as emulsified asphalt, pozzolan/Portland cement, or vitrification/molten glass to immobilize or contain the harmful constituents of concern This alternative would also involve permanent deed restrictions prohibiting residential use in the Disposal Area of Dunn Field Under CERCLA, material can be replaced on site, however, the locations available for placement of soil may be limited due to treatment Therefore, ex-situ soil treatment may also be used to comply with disposal requirements for offsite disposal facilities Some excavated receptacles/waste may be required to be disposed of at an appropriate offsite disposal facility The location of the treated material replaced onsite will be required to be recorded in the deed records for the site

Alternative DS6: Excavation, Transportation, and Offsite Disposal with Institutional Controls

Capital Costs	*$1 772,000*
PW O&M Costs	*$57,000*
Total PW Costs	*$1,772,000*
Duration to Achieve RAOs	*< 1 year*

This alternative includes excavation of buried waste and/or affected soil, and transportation and permanent offsite disposal in a RCRA-permitted landfill as an industrial waste or hazardous waste, depending soil/waste conditions and landfill permit requirements Some offsite pretreatment processes might be required to meet land disposal restrictions Following excavation of the disposal sites, clean backfill (laboratory-tested) would be placed in all areas excavated, and the site would be restored to its original condition This alternative would also involve permanent deed restrictions prohibiting residential use for the Disposal Area of Dunn Field

Subsurface Soil Impacted by VOCs

Alternative SB1: Presumptive Remedy (SVE) with Institutional Controls

Capital Costs	*$3 183,000*
PW O&M Costs	*$1,228,000*
Total PW Costs	*$4,411 000*
Duration to Achieve RAOs	*< 5 years*

This alternative combines institutional controls with SVE as the presumptive remedy VOCs in soil at Dunn Field For this alternative, airflow will be induced through affected soil by applying vacuum through vapor extraction wells and thus, creating a pressure gradient in the vapor phase within the unsaturated zone of the targeted soil treatment area As the soil vapor migrates through the soil pores toward the extraction vents, VOCs will be volatilized and transported out of subsurface The extracted soil vapor may or may not need treatment before release to the atmosphere depending on the COC, its concentration, and the system flow rate SVE may be implemented without any enhancements or in conjunction with technologies that enhance permeability or vapor transport, including a vapor seal at the land surface Site controls will be in place to limit access during implementation Further, process controls will be implemented to minimize fugitive emissions and releases of VOCs above the acceptable levels

Groundwater Alternatives

Alternative GW2: ZVI Injection, Enhanced Bioremediation and Enhanced Extraction, and MNA with Institutional Controls

Capital Costs	*$10,506,000*
PW O&M Costs	*$4,322,000*
Total PW Costs	*$14,828,000*
Duration to Achieve RAOs	*15 years*

This alternative combines the injection of zero-valent iron (ZVI) into the groundwater source areas on Dunn Field as a treatment zone, enhanced bioremediation while enhancing the existing groundwater extraction system positioned along the western boundary of Dunn Field MNA and institutional controls are the also considered as part of this groundwater remedial alternative ZVI injection is intended to destroy chlorinated organic contaminants by in-situ chemical reduction utilizing ZVI injected into the source areas on Dunn Field Through a series of reactions, the ZVI treatment process breaks down the CVOCs to an ultimately less toxic chemical

The ZVI will be injected into the groundwater through boreholes or wells to maximum depth of 100-ft below land surface A bench-scale and pilot field study will assist design of the ZVI treatment zone for the groundwater source areas and the groundwater COCs

The existing extraction system reduces further offsite plume migration by creating a hydrological barrier along the western side of Dunn Field For this alternative, additional extraction wells will be added to the existing system to decrease the possibility of contaminated groundwater traveling offsite and placing recovery wells offsite in the areas of highest VOC concentrations If system effluent concentrations fail to comply with effluent discharge standards established via a permit with the City of Memphis, onsite treatment will be required (as a contingency)

Enhanced bioremediation will reduce contaminant levels in those parts of the plumes outside the influence of the enhanced extraction system This remediation method involves adding nutrients, microbes, and/or chemicals that accelerate in-situ anaerobic or aerobic biodegradation processes via injection boreholes or wells The injection of microorganisms into the subsurface is considered an experimental technology, while the injection of nutrients has been shown to be effective This alternative will consider only injection of nutrients, such as vegetable oil and sodium lactate, to enhance bioremediation

Long-term groundwater monitoring will be needed to record site conditions and contamination levels and to monitor the progress of the enhanced bioremediation Additional injections may be necessary as part of the enhanced bioremediation process

This alternative also relies on deed restrictions, coupled with existing groundwater use controls established by the Memphis/Shelby County Health Department, Water Quality Branch, prohibiting installation and use of groundwater production wells until groundwater plume concentrations meet MCLs This alternative also relies on MNA (dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials) to reduce groundwater COC concentrations in the untreated parts of the groundwater plumes

Alternative GW3: ZVI Injection, PRB, and MNA with Institutional Controls

Capital Costs	*$7,827,000*
PW O&M Costs	*$981,000*
Total PW Costs	*$8,808,000*
Duration to Achieve RAOs	*15 years*

This alternative combines ZVI injection as a more aggressive method of remediating the most contaminated portions of the groundwater plume in the source area (as described in GW2) and more passive remedial method, a permeable reactive barrier (PRB) in an offsite, downgradient position The alternative also includes MNA (to reduce groundwater COC concentrations in the untreated parts of the groundwater plumes) and institutional controls (prohibiting installation and use of groundwater production wells until groundwater plume concentrations meet MCLs) ZVI, MNA, and institutional controls are the same as those indicated in Alternatives GW2

A PRB is a passive in-situ chemical reduction treatment zone of reactive material like granular iron or ZVI that degrades contaminants as groundwater flows through it A permeable treatment barrier will be installed as a permanent unit across the flow path of the offsite contaminant plume (approximately 1000 linear feet in length) through jetting or vertical hydrofracturing to a maximum depth of 90-ft below land surface Both delivery techniques use iron suspended in a biodegradable slurry Natural groundwater flow transports contaminants through strategically placed treatment media This degradation barrier will facilitate reactions that break down contaminants in the plume into harmless byproducts through chemical reduction The applicability of PRBs to the site COCs will be demonstrated with the use of bench-scale testing

Alternative GW4: Air Sparging with SVE, PRB, and MNA with Institutional Controls

Capital Costs	*$7,195,000*
PW O&M Costs	*$1,949,000*
Total PW Costs	*$9,144,000*
Duration to Achieve RAOs	*15 years*

This alternative combines a method that volatilizes the VOCs in groundwater (air sparging) and removes the vapors (soil vapor extraction, or SVE) In addition, a PRB will be used to remediate the downgradient, offsite portion of the plume MNA and institutional controls will also be used to monitor groundwater contaminant levels and control groundwater use PRB, MNA, and institutional controls are the same as those indicated in Alternatives GW3

Alternative GW4 involves injecting air via wells into the fluvial aquifer in the source on and near Dunn Field This technology removes contaminants from the groundwater through volatilization into the injected air stream VOCs removed from the groundwater will move upwards into the vadose zone and ultimately towards the presumptive remedy SVE system A network of sparge wells will be located within the source areas and corresponding contaminant plume The treatment will immediately affect concentrations within the zone of influence of the sparge wells and ultimately reduce levels of VOCs downgradient of the sparge wells The number and placement of sparge wells will have to be determined from pilot testing at the site Results of the pilot tests will also indicate the release rate of VOCs into the soil and further aid in the development of the presumptive remedy for subsurface soil (SVE)

CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

The selection of the preferred alternative for the soil and groundwater at the Memphis Depot Dunn Field, as described in this Proposed Plan, is the result of a comprehensive screening and evaluation process The FS identified and analyzed appropriate alternatives for addressing the contamination at Dunn Field The FS and other documents describe, in detail, the alternatives considered, as well as the process and criteria used to narrow the list of the potential remedial alternatives to address the contamination at Dunn Field These documents are available for public review in the Information Repositories

The nine criteria used to evaluate the different remediation alternatives individually and against each other in order to select a remedy are discussed below

Threshold Criteria

1. ***Overall Protection of Human Health and the Environment*** - Addresses whether a remedy provides adequate protection of human health and the environment, and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls

2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)*** - Addresses whether or not a remedy is expected to meet any identified 'applicable' or 'relevant and appropriate' federal or more stringent state environmental law or regulations (i e , ARARs) Alternatively, addresses whether a waiver of an

ARAR can be invoked under CERCLA Section 121(d)(4).

Evaluating Criteria

3. ***Long-Term Effectiveness and Permanence*** - Refers to the expected magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. ***Reduction of Toxicity, Mobility, or Volume through Treatment*** - Refers to the anticipated performance of the treatment technologies that may be employed in a remedy.

5. ***Short-Term Effectiveness*** - Addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. ***Implementability*** - Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. ***Cost*** - Includes estimated capital and operations and maintenance (O&M) costs, also expressed as net present worth costs.

Modifying Criteria

8. ***State Acceptance*** - Indicates whether, based on its review of the FS and Proposed Plan, the state concurs with, opposes, or has no comment on the preferred alternative. The assessment of state concerns may not be complete until after the public comment period on the FS and Proposed Plan.

9. ***Community Acceptance*** - Summarizes the general response to the alternatives described in the FS and Proposed Plan on public comments received. Like state acceptance, evaluations under this criterion usually will not be completed until after the public comment period is held. Community acceptance will be assessed in the ROD following a review of the public comments received on the FS and Proposed Plan.

Each of the alternatives is evaluated by the nine criteria in the following tables. Note that the costs listed in this table are order-of-magnitude estimates, meaning that they are typically accurate within plus 50 to minus 30 percent.

The presumptive remedy for VOCs in soil is SVE. The SVE alternative is protective of human health and the environment by treating VOC-contaminated soil to levels that are acceptable for industrial land use and that are protective of groundwater. This alternative complies with ARARs. This alternative remains effective after completion because the treatment removes VOCs from the subsurface soil to site specific cleanup levels. Treatment is reliable and permanent. No monitoring or management beyond completion will be required.

This alternative meets the statutory preference for using treatment as a principal element and few waste streams are produced. In the short-term, site engineering controls will be required to minimize fugitive dust and stormwater releases during installation of treatment system. Site workers might be required to wear dermal and respiratory protection to minimize the likelihood of exposure during intrusive activities in the VOC-contaminated areas. Temporary controls will be required to prevent exposure or disturbance to contaminated soil during the treatment period. SVE treatment is expected to take <5 years to meet RAOs. SVE is reasonably easy to implement and a proven technology. Equipment is readily available.

The 4-year present worth cost is estimated to be $4,411,000, with a capital cost of $3,183,000 to treat areas exceeding RGOs. The capital cost is primarily for construction of the treatment system and establishing controls, and sampling and analyses. The annual O&M cost is primarily for maintenance of the treatment system, sampling requirements, and adherence to controls.

The "Detailed Analysis of the Alternatives" and the "Comparative Analysis of the Alternatives" can be found in the Dunn Field FS, Sections 5, 6 and 7.

Evaluation Criteria	Disposal Sites Remedial Alternatives DS3 Soil Containment with Institutional Controls	DS5 Ex-situ Soil Treatment with Institutional Controls	DS6 Excavation and Offsite Disposal with Institutional Controls
Protective of Human Health and Environ.	Low	High	High
Complies with ARARs	Yes	Yes	Yes
Effective and Permanent	Low	Medium	High
Reduces Toxicity, Mobility or Volume through Treatment	No	Yes	No
Short-term Effectiveness	High	Medium	Medium
Implementable	Yes	Yes	Yes
Cost	$616,000	$2,129,000	$1,772,000
State Acceptance	Will be determined after comment period	Will be determined after comment period	Will be determined after comment period
Community Acceptance	Will be determined after comment period	Will be determined after comment period	Will be determined after comment period

Evaluation Criteria	Groundwater Remedial Alternatives GW2 ZVI Injection, Enhanced Bioremediation and Enhanced Extraction, and MNA with Institutional Controls	GW3 ZVI Injection, PRB, and MNA with Institutional Controls	GW4 Air Sparging with SVE, PRB, and MNA with Institutional Controls
Protective of Human Health and Environ.	Medium	High	High
Complies with ARARs	Yes	Yes	Yes
Effective and Permanent	Medium	High	High
Reduces Toxicity, Mobility or Volume through Treatment	Yes	Yes	Yes
Short-term Effectiveness	Medium	High	Medium
Implementable	Yes	Yes	Yes
Cost	$14.8 million	$8.8 million	$9.1 million
State Acceptance	Will be determined after comment period	Will be determined after comment period	Will be determined after comment period
Community Acceptance	Will be determined after comment period	Will be determined after comment period	Will be determined after comment period

PREFERRED ALTERNATIVE

After conducting a detailed analysis of all the feasible cleanup alternatives based on the criteria described in the previous sections, the following cleanup plan is proposed to remediate soil and groundwater at Dunn Field of the Memphis Depot

The preferred Disposal Area alternative is

***Alternative DS6*, <u>Excavation, Transportation, and Offsite Disposal</u>,** with capitol costs of $1,715,000, present worth O&M costs of $57,000, and a net present worth cost of <u>$1,772,000</u>

The preferred alternative for VOCs in subsurface soil is

***Alternative SB1*, <u>SVE</u>,** with capital costs of $3,183,000, present worth O&M costs at $1,228,000, and a net present worth cost of <u>$4,411,000</u>

The preferred alternative for groundwater in the fluvial aquifer is

***Alternative GW3*, <u>ZVI Injection, PRB, and MNA with Institutional Controls</u>,** with capitol costs of $7,827,000, present worth O&M costs of $981,000, and a net present worth cost of <u>$8,808,000</u>

The Preferred Alternative for cleaning up Dunn Field combines

- Alternative DS6 (Excavation, Transportation and Offsite Disposal) to investigate and document the contents/location of 16 Disposal Sites and remove approximately 3,900 cubic yards of affected soil and debris (see Figure 3)

- Alternative SB1 (SVE) to treat soil containing VOCs to levels that are protective of human health and acceptable for industrial land use, and that are protective of groundwater (see Figure 4)

- Alternative GW3 (ZVI Injection, PRB, and MNA with Institutional Controls) to accelerate destruction of VOCs in the most impacted areas of the groundwater plumes on/near Dunn Field, and to treat the offsite VOC plume downgradient of Dunn Field (see Figure 5)

Deed restrictions, in conjunction with existing land use controls, are the main types of institutional controls proposed for Dunn Field The deed restrictions for the Dunn Field are

- Prevention of residential development land use on the Disposal Area of Dunn Field

- Maintenance of fencing around the disposal area during active remediation to protect the public

- Production/consumptive use groundwater well controls to restrict use of water in the fluvial aquifer, and preventing drilling into aquifers below the fluvial aquifer until aquifer restoration is achieved

Tennessee Code (TAC) § 68-21-225 requires "Notice of Land Use Restrictions" to ensure that the land use restrictions are recorded into the deeds transferring the property TAC § 68-21-225 requires that the locations and dimensions of the areas of environmental concern be identified through surveyed, permanent benchmarks

DS6 was chosen as the preferred alternative for remediation of the Disposal Sites due to its expediency, permanency, and moderate cost DS6 provides permanent reduction through removal verses containment as described in DS2 and treatment as described in DS5 This alternative is expected to allow the property to be used for the anticipated industrial land use, and does not preclude future removal actions if warranted Some of the soil and disposed materials that are excavated (i e , generated) may exhibit a RCRA hazardous characteristic because it contains elevated concentrations of constituents

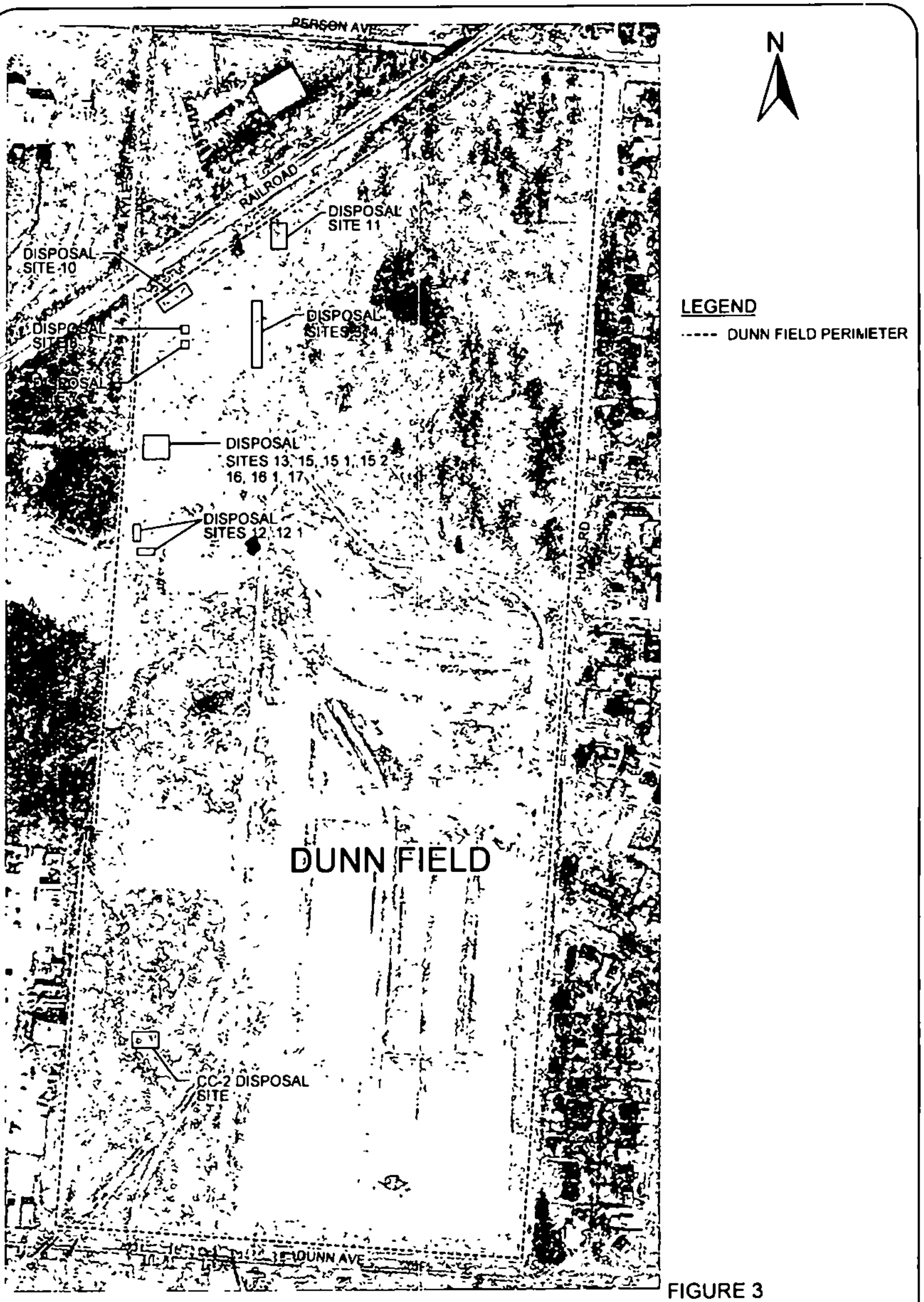

FIGURE 3
PRIORITY DISPOSAL
SITE LOCATIONS
Rev 2 Memphis Depot Dunn Field PP

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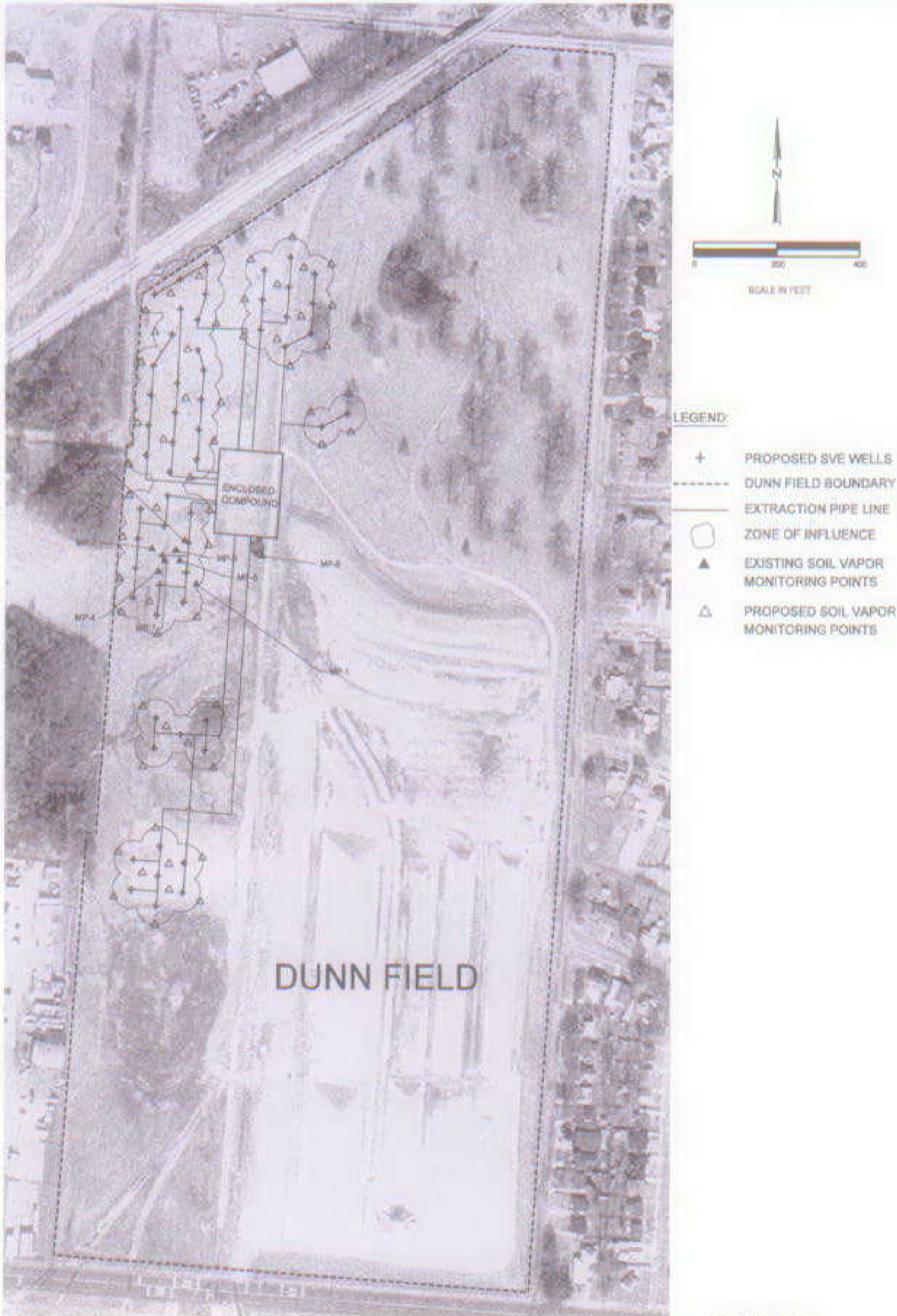

FIGURE 4
CONCEPTUAL SVE SYSTEM LAYOUT
Rev. 2 Memphis Depot
Dunn Field PP

ATL/CAD1/PROJECTS/148071 DDMT/DUNNFIELD PP 2003

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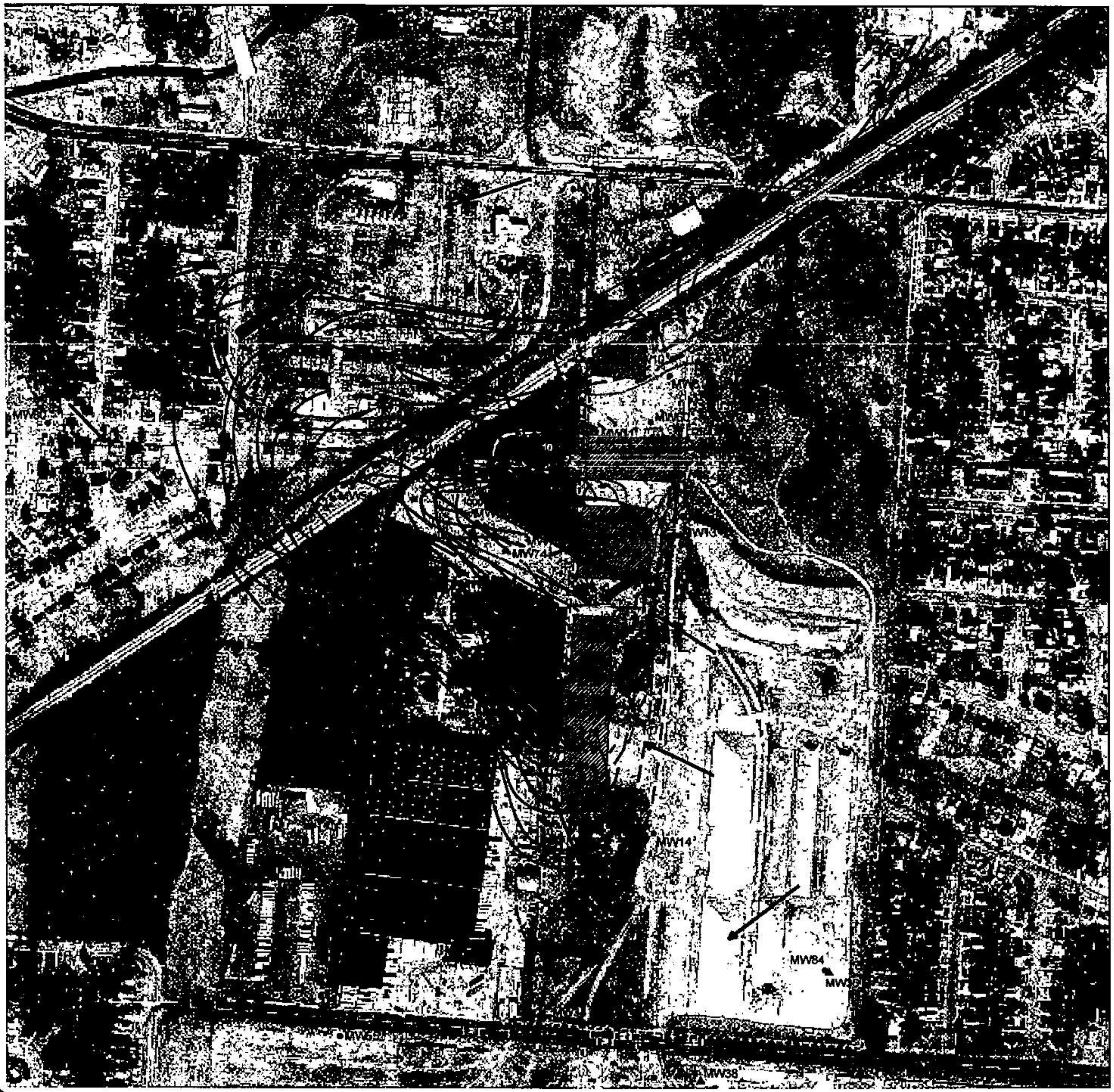

N

0 400 800
SCALE IN FEET

LEGEND

- DUNN FIELD BOUNDARY
- 10 — 1,1,2,2-PCA ISOCONCENTRATION LINE (IN ug/L)
- 10 — 1,1-DCE ISOCONCENTRATION LINE (IN ug/L) [OFFSITE SOURCE FOR THE 1,1-DCE]
- 10 — TCE ISOCONCENTRATION LINE (IN ug/L)
- 10 — CARBON TETRACHLORIDE ISOCONCENTRATION LINE (IN ug/L)
- 10 — CHLOROFORM ISOCONCENTRATION LINE (IN ug/L)
- 10 — 1,2-DCE ISOCONCENTRATION LINE (IN ug/L)
- 10 — PCE ISOCONCENTRATION LINE (IN ug/L)
- • MW MONITORING WELL SCREENED IN FLUVIAL AQUIFER
- ▲ MW MONITORING WELL SCREENED IN INTERMEDIATE AQUIFER
- GROUNDWATER FLOW DIRECTION
- IRON PRB TREATMENT ZONE
- AREAS WHERE CONTINGENCY REMEDIAL ACTION MAY BE IMPLEMENTED
- ZVI SOURCE AREA INJECTION ZONES

NOTE:

1. SAMPLE COLLECTED MARCH/APRIL 2002; ALL DATA COLLECTED VIA DIFFUSION SAMPLER UNLESS OTHERWISE NOTED.
2. SAMPLE COLLECTED JANUARY/FEBUARY 2001.
3. SAMPLE COLLECTED MARCH OR NOVEMBER 2000.
4. SAMPLE COLLECTED MARCH 1999.
5. SAMPLE COLLECTED OCTOBER 1998.
6. DUE TO SMALL DIAMETER OF PIEZOMETER, SAMPLED WITH BAILER.

SOME INFERRED ISOCONTOURS (DASHED) ARE BASED ON DATA FROM A PREVIOUS SAMPLING EVENT (S).

FIGURE 5
SELECTED GROUNDWATER REMEDY
ZVI INJECTION AND IRON PRB
REV. 2 MEMPHIS DEPOT, DUNN FIELD PP

CH2MHILL

ATL/CAD1/PROJECTS/148071 DDMT/DUNN FIELD PP 2003 02-MAY-2003 8071FIG5_S.dgn

Subsequent management of these wastes is subject to those RCRA Subtitle C requirements identified as ARARs in the FS and forthcoming ROD Also, any hazardous wastes that are removed from the area of contamination for treatment and subsequent disposal are subject to the RCRA Land Disposal Restriction (LDR) treatment standards

SB1 (SVE) is the presumptive remedy for VOCs in soil Approximately 1200 pounds of VOCs are present in the soils in the Disposal Area, which require treatment Presumptive remedies are "preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation" (EPA, 1993) SVE has been selected as the preferred remedy based on data analyses of similar types of sites conducted by EPA Through this evaluation, it has been determined that certain remedies have been consistently selected as the appropriate remedy and other alternatives are typically screened out based on effectiveness, implementability, excessive costs, and the nine detailed criteria The use of presumptive remedies are recommended by EPA because they allow the FS process to be streamlined by bypassing the technology identification and screening steps, potentially saving time and money

The preferred groundwater (GW3) alternative was selected over the other alternatives because it is expected to achieve risk reduction through the reductive destruction of VOCs via the injection of ZVI into the four source areas of the groundwater plumes on and near Dunn Field (total areas of approximately 312,000 square feet) The offsite, downgradient VOC plume will be passively treated through an iron PRB that will be installed as a permanent unit across the flow path of the offsite contaminant plume (approximately 1000 linear feet in length) This alternative also relies on MNA (dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials) to reduce groundwater COC concentrations in the untreated parts of the groundwater plumes

Groundwater monitoring would occur to document changes in plume concentrations, and to detect potential further plume migration to offsite areas or into deeper aquifers It also provides use restrictions to prevent future exposure to currently affected groundwater during the life of the remedy

Hence, the combination of Alternatives DS6, SB1 and GW3, hereafter referred to as the Preferred Alternative, reduces the risk within a reasonable time frame and provides for long-term reliability of the remedy The net present worth cost for the Preferred Alternative is $14,991,000 A contingency plan would be developed and implemented if an unacceptable risk were indicated during the implementation of this alternative (i e , concentrations of VOCs migrating deeper into underlying aquifers greater than the MCLs) If a significant or fundamental change to remedy would be warranted, then an Explanation of Significant Differences (ESD) or a ROD amendment would be required in accordance with CERLA §117(c) and NCP §300 435(c)(2)(i) and (ii) Because the Proposed Plan leaves waste in place at levels that do not allow for unrestricted future use at the site, CERCLA requires that the protectiveness of the remedy be reviewed at least every 5 years

Based on the information available at this time, the Memphis Depot, EPA and TDEC believe the Preferred Alternative will be protective of human health and the environment, will comply with ARARs, will be cost-effective, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable The Preferred Alternative can change in response to public comment or new information, such as a detected change in groundwater conditions that would require an additional or more active remedy For example, if a responsible party is identified and ordered to address the offsite groundwater contamination entering Dunn Field from the northeast prior to issuance the ROD or implementation of the remedy, then certain aspects of the preferred alternative may be performed differently

COMMUNITY PARTICIPATION

The Memphis Depot, EPA and TDEC provide information regarding the cleanup of the Memphis Depot to the public through Restoration Advisory Board (RAB) meetings, public information sessions, the EnviroNews community newsletter, the Administrative Record file for the site that can be found in the Information Repositories, and announcements published in *The Commercial Appeal*, *Tri-State Defender* and *Silver Star News* The Memphis Depot, EPA and TDEC encourage the public to gain a more comprehensive understanding of the site and the remedial investigation activities that have been conducted to date

The dates for the public comment period, as well as the date, location and time of the public meeting, and the locations of the Information Repositories, are provided on the front page of this Proposed Plan

For further information on the Memphis Depot's environmental cleanup program, please contact:

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ACRONYMS

AR	Administrative record
ARAR	Applicable or relevant and appropriate requirement
BCT	BRAC Cleanup Team
BRA	Baseline risk assessment
BRAC	Base Realignment and Closure
CCl_4	Carbon Tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of concern
COPC	Constituent of potential concern
CVOC	Chlorinated volatile organic compound
DCA	Dichloroethane
DCE	Dichloroethene
DLA	Defense Logistics Agency
ELCR	Excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FR	*Federal Register*
FS	Feasibility Study
GW	Groundwater
HI	Hazard index
IQ	Intelligence quotient
IR	Information repository
LDR	Land disposal restriction
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MI	Main Installation
MNA	Monitored natural attenuation
NAPL	Non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPL	National Priorities List
O&M	Operation and maintenance
OU	Operable unit
PCA	Tetrachloroethane
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
POTW	Publicly owned treatment works
ppb	Parts per billion
ppm	Parts per million
PRB	Permeable reactive barrier
PRG	Preliminary remediation goal
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SS	Surface soil
SVE	Soil vapor extraction
TAC	Tennessee Code Annotated
TCA	Trichloroethane
TCE	Trichloroethene
TDEC	Tennessee Department of Environment and Conservation
VOC	Volatile organic compound
ZVI	Zero-valent iron

GLOSSARY OF TERMS

Terms used in this Proposed Plan are defined below.

Administrative Record: A file that is maintained and contains all information used by the lead agency to make its decision on the selection of a method to be utilized to treat and/or clean up environmental impacts at a CERCLA site. This file is held in the information repository for public review.

Air Sparging: An in-situ technology in which air is bubbled through an affected groundwater aquifer, creating an underground treatment zone via volatilization.

Applicable or relevant and appropriate requirements (ARARs): The federal and state environmental laws that a selected remedy must meet. These requirements may vary among sites and alternatives.

Aquifer: An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Background value: Concentration level of a chemical that may be present or occurring naturally at similar levels in other areas near the site, and is not attributed to current site activities.

Bioremediation or Biodegradation: The use of microorganisms to transform or alter, through metabolic or enzymatic action, hazardous organic substances into non-hazardous substances.

Contaminant plume: A column of contamination with measurable horizontal and vertical dimensions that is suspended in and moves within groundwater.

Ex-situ: The removal of a medium (for example, water or soil) from its original place, as through excavation, in order to perform the remedial action.

Groundwater: Underground water that fills pores in soils or openings in rocks to the point of saturation. Groundwater is often used as a source of drinking water via municipal/domestic wells.

Information Repository: A resource area containing accurate up-to-date information, technical reports, reference documents, and other materials pertinent to the site. The IR is usually located in a public building such as a library, city hall or school that is accessible for local residents.

In-Situ: The in-place remediation of a medium (for example, groundwater or soil) at its original place, as through the addition or nutrients, chemicals or processes, in order to perform the remedial action.

Land Disposal Restriction (LDR): The land disposal restrictions program requires certain wastes to be treated before they may be disposed of in the land.

Long term Monitoring: Periodic sampling and analysis of groundwater for the purpose of monitoring environmental conditions over time.

Monitoring: Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action.

Natural Attenuation: Natural subsurface processes, such as dilution, volatilization, biodegradation, adsorption and chemical reactions with subsurface material that reduce chemical concentrations.

Organic compounds: Carbon compounds, such as solvents, oils, and pesticides. Most are not readily dissolved in water.

Operations and maintenance (O&M): Activities necessary to maintain and operate a treatment system.

Present worth analysis: A method to evaluate expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative. When calculating present worth cost for CERCLA sites, total operations and maintenance costs are included.

Resource Conservation and Recovery Act (RCRA): The federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and imposes standards for transporting, treating, storing, and disposing of hazardous waste.

Safe Drinking Water Act Maximum Contaminant Level (SDWA MCL): The maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Volatile organic compound (VOC): An organic compound that is characterized by being highly mobile in groundwater and which is readily volatized into the atmosphere.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Dunn Field portion of the Memphis Depot is important Comments provided by the public are valuable in helping select a final cleanup

You may use the space below to write your comments, then fold and mail Comments must be postmarked by June 6, 2003

If you have any questions about the comment period, please contact Alma Black Moore at (901) 544-0613

Those with electronic communications capabilities may submit their comments via Internet to the following e-mail address

comrel@ddc dla mil

You may also provide comments via voice mail on the Memphis Depot Environmental Line at (901) 544-0617

Name: ____________________

Address: ____________________

City: ____________________

State Zip: ____________________

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE