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SOUTH ANDOVER SALVAGE YARDS

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

South Andover Salvage Yards,
Andover, Anoka County, Minnesota.

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected soil operable unit remedial action for the South Andover Salvage Yard Site (the Site) developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). This decision is also in accordance with the Minnesota Environmental Response and Liability Act of 1983.

The decision is based upon the contents of the administrative record for the South Andover Salvage Yard Site.

The State of Minnesota and the United States Environmental Protection Agency (U.S. EPA) agree on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This operable unit is the second of two operable units for the Site. The first operable unit addresses contaminated groundwater. The remedy for the first operable unit was documented in a March 1988, ROD which specifies pumping the contaminated groundwater at select locations across the Site. The second operable unit which is described in this decision document, addresses soil contamination.

The remedy selected for contaminated soil incorporates excavation and on-site biological treatment of 2,100 cubic yards of contaminated soil. The remaining 9,300 cubic yards of contaminated soil will be excavated and disposed of off-site in a solid waste landfill permitted to receive industrial and/or commercial wastes.

The major components of the selected remedy include:

- Excavate and treat approximately 2,100 cubic yards of predominately PAH-contaminated soils using an above-ground biological treatment unit. Use clean fill from other areas of the site as backfill for the excavated areas.

  Biologically treated soil will be returned to the Site after performance testing confirms successful biodegradation of the PAHs.

- Excavate and transport approximately 9,300 cubic yards of soils contaminated with PCBs, PAHs, lead and antimony to an off-site solid waste landfill permitted to receive industrial and/or commercial wastes. Included in this component is the replacement of excavated soil with clean fill from other areas of the site.

- Sample and remove approximately twenty drums located on the site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

December 24, 1991
Date

Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V

DECISION SUMMARY

South Andover Salvage Yards
Andover, Anoka County, Minnesota

I SITE NAME, LOCATION AND DESCRIPTION

The South Andover Salvage Yards Superfund Site (the Site) is located in Anoka County, Minnesota, approximately 16 miles north-northwest of Minneapolis and 3 miles northeast of the City of Anoka. The Site is situated at 45 degrees, 16 minutes N Latitude, and 93 degrees, 12 degrees West Longitude, in the south half of Section 34, Township 32 North, Range 24 West of Grow Township (Figure 1).

The Site is comprised of several privately owned parcels, which jointly encompass more than 50 acres. Bunker Lake Boulevard defines the northern extent of the Site. The eastern site boundary is roughly 500 feet west of Jay Street (Figure 2).

Small businesses and new residential developments are located near the Site. Several active businesses involved with used car and auto parts sales, auto salvage operations, and auto body repair can be found both at and adjacent to the Site. For many years the area's population was minimal, however, residential development has encroached the Site since the early 1970s. Development continues to occur around the Site.

There are several small recreational lakes in the area. Crooked Lake is one mile west of the Site and Bunker Lake is 1-1/4 miles to the east. The Site is in the Coon Creek watershed which supports an oak savanna plant community.

Subsurface investigations confirmed the presence of three major hydro-stratigraphic units within the unconsolidated sediment: an upper sand aquifer which ranges from 23 to 40.5 feet thick, an intermediate till and lacustrine aquitard that is 47 to 65 feet thick, and a lower sand aquifer. These unconsolidated sediment deposits are underlain by a sandstone bedrock. Major water users in the Coon Creek watershed obtain potable water supplies from this bedrock aquifer.

II SITE HISTORY AND ENFORCEMENT ACTIVITIES

Waste storage and disposal activities began at the Site during the mid-1950s. More than 1,000 drums of waste were stored at the Site. Ink, ink and paint sludge, adhesives, chlorinated and nonchlorinated solvents were stored, disposed of in trenches, and burned at the Site. Solvent recovery, the storage of transformers and salvaged electrical equipment, and smelting have also occurred at the Site. Solid and liquid chemical waste dumping and open pit burning of solvents occurred during the 1960s and 1970s. Drum storage and chemical waste disposal sites were partially obscured by auto salvage operations and more than three million waste tires (Figure 3).

Two tire fires occurred at the Site. The first occurred during July 1988 and was extinguished with water. A second much larger tire fire occurred in February 1989. The fire was smothered with sand.

Actions to limit waste handling operations at the Site began in 1973 when Anoka County officials instructed Cecil Heidelberger, one of the property owners, to remove and dispose of chemical wastes stored on his property. Investigation of the Site was initiated by the Minnesota Pollution Control Agency (MPCA) in 1973 after a citizen complaint of suspected residential well contamination. In 1976, the MPCA issued a Citation of Violation to Cecil Heidelberger and his wife Marian Heidelberger for unregulated chemical waste storage. These individuals continued processing waste until early 1977, and stopped accepting waste in 1978 when the property was sold to Parmak, Incorporated.

The MPCA initiated actions to regulate other identified waste handlers in 1980 and 1981. Notices of Violation for the improper storage and disposal of chemical wastes were served to several property owners. Cecil Heidelberger continued to dispose of industrial waste by mixing the contents of 700 drums with waste oil for use as fuel in an asphalt plant.

ACME Tag Company, Bemis Company, Color-Add Packaging, and Standard Solvents Company were notified by the MPCA in 1980 that they were potentially responsible parties (PRPs). Sixteen parties, including site owners, operators, and waste generators, were notified in 1982 by the U.S. EPA that the U.S. EPA was considering enforcement actions at the Site. All parties were also informed of their potential joint and several liability related to these activities. The MPCA took similar actions in 1983, outlining remedial actions for the Site.

In July 1985, U.S. EPA notified twenty one PRPs that it intended to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Site, but that U.S. EPA would also consider an offer by the PRPs to conduct the RI/FS. Failure on the part of the PRPs to negotiate such action resulted in the U.S. EPA using Superfund monies to conduct the RI/FS.

III HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Remedial Investigation (RI), Feasibility Study (FS) and Proposed Plan for the South Andover Superfund Site were released to the public for comment on October 9, 1991. These documents were made available to the public in an information repository maintained at the U.S. EPA Docket Room in Region V, Chicago, Illinois. These documents were also maintained as part of the administrative record at the following locations: Andover City Hall located in Andover, Minnesota and the Minnesota Pollution Control Agency located in Saint Paul, Minnesota.

The notice of availability for the RI, FS and Proposed Plan was published in the October 9, 1991 edition of the Anoka County Shopper, the local newspaper. This notice also included a news release which provided the dates of the public comment period as well as the date of the public meeting. This news release along with a fact sheet which described the preferred alternative, was sent to all individuals on the South Andover Salvage Yards mailing list. The mailing list includes but is not limited to, interested residents, township and county officials, elected officials, and site owners and operators.

The public comment period began on October 11th and ended on November 9, 1991. A response to the comments received during this period as well as during the public meeting, is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document represents the selected remedial action for the South Andover Salvage Yards Site, in Andover, Anoka County, Minnesota, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for the Site is based on the administrative record. A public meeting was held on October 30, 1991 at the Andover Elementary School. At this meeting, representatives from U.S. EPA and MPCA answered questions about problems at the Site and the remedial alternatives under consideration.

IV SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

The remedy for the South Andover Salvage Yards Site has been divided into two units or discrete actions, referred to as "operable units" (OU). They are as follows:

OU One: Remediation of contaminated groundwater.

OU Two: Remediation of contaminated soil.

The operable unit under consideration is Operable Unit Two: Contaminated Soil. The remedial action objective for soil is to clean-up the contaminants of concern to a level which is protective of human health. The selected remedy meets this objective by biologically treating contaminated soil or transporting it off-site where it is contained in a secured, permitted landfill. Clean-up levels were based on a cancer risk, a non-cancer hazard index, and federal and state applicable or relevant and appropriate requirements (ARARs).

Operable unit one addressed groundwater contamination at the Site. U.S. EPA issued a Record of Decision (ROD) on March 30, 1988 documenting its decision to pump the contaminated groundwater at selected locations on the Site. On March 4, 1991, the MPCA concurred with this ROD. U.S. EPA and MPCA are currently conducting a Design Investigation of this operable unit to obtain more details on the character of groundwater contamination beneath and near the Site. Initial sampling results do not indicate an identifiable plume of contamination at this time. Based on these new sampling results, U.S. EPA and MPCA will consider whether to amend their original decision concerning groundwater. Any amendment of the groundwater action would require public comment and involvement.

V SUMMARY OF SITE CHARACTERISTICS

The U.S. EPA and MPCA have determined that the South Andover Superfund Site contains hazardous substances which pose a risk to human health. The hazardous substances which pose such a threat are polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), lead and antimony. The source of these hazardous substances is contaminated soil which has come into contact with leaking drums which were disposed of at the Site, electrical transformers and/or salvaged automobiles.

PAHs are probable carcinogens that exhibit a low subsurface mobility. PAHs also have a low water solubility. They originate as constituents of crude oil fractions. Such crude oil fractions include fuel and motor oils, as well as coal tar fractions. The highest PAH concentration found at the Site is 30.3 ppm.

PCBs are probable carcinogens that also exhibit a relatively low potential for subsurface mobility. PCBs are chemically inert and insoluble in water. PCBs do adsorb strongly to soils, the amount of PCBs adsorbed is proportional to the amount of organic material in the soil. Based on their strong adsorption to soil organic matter and their relative insolubility in water, PCBs can be persistent. PCBs can be found in oils, greases, dielectric liquids, and thermostatic or insulting fluids, especially in electrical equipment such as transformers. The highest PCB value found at the Site is 15.17 ppm.

Lead and antimony are non-carcinogens and have low subsurface mobilities. Both are metals and can exist in a complexed form which allows the metals to be mobile. Metal movement can occur in sandy, acid, low organic metal soils which receive high rainfall. Even under these conditions the extent of metal movement will be limited. Lead can be found in paint wastes, inks and salvaged auto parts. Antimony is used as a hardening alloy for lead. The maximum concentration of lead found at the Site is 1980 ppm. Antimony's maximum concentration at the Site was 75.9 ppm.

The horizontal extent of soil contamination at the Site is spatially discontinuous and heterogeneous which is characteristic of a "hot spot" distribution. Vertical soil contamination is confined to surface soils. Contamination is limited to a depth of six feet. Soils at the Site consist primarily of excessively-drained to somewhat poorly-drained fine sand with limited areas of poorly-drained, loamy fine sand. The total volume of PAH, PCB, lead and antimony contaminated soil at the Site is estimated to be 11,400 cubic yards. The 11,400 cubic yards of contaminated soil are distributed in seven hot spots (Figure 4).

Surface water and sediments samples were collected and analyzed as part of the soil Remedial Investigation. The following contaminants were detected in the surface water: methylene chloride, acetone, toluene, bis(2-ethylhexyl)phthalate, lead, cyanide, aluminum, cadmium, copper, mercury and zinc. Sediment samples contained the following: methylene chloride, acetone, toluene, bis(2-ethylhexyl)phthalate, 4,4'-DDT (a pesticide), 4,4'-DDD (another pesticide), lead and cyanide. None of the above mentioned contaminants were found at a level in either the surface water or sediment which presented a risk to human health. A Preliminary Ecological Assessment was performed to determine the ecological risk presented by the surface water and sediments. The results of this Assessment are discussed later in this Record of Decision.

The site hydrogeology is represented by three major hydro-stratigraphic units within the unconsolidated sediment: a shallow upper sand aquifer which ranges from 23 to 40.5 feet thick; a till and lacustrine aquitard that is 47 to 65 feet thick; and a lower sand aquifer. These unconsolidated sediment deposits are underlain by a bedrock aquifer composed of sandstone. The major water users and residents in the area obtain drinking water from this bedrock aquifer.

As mentioned earlier, a Design Investigation is currently being performed to obtain more details on the character of groundwater contamination beneath and near the Site. Initial sampling results do not indicate an identifiable plume of contamination. Arsenic was detected in one shallow upper sand aquifer monitoring well above the Maximum Concentration Limit (MCL). However, no on-site source of arsenic could be found in the soil to account for this exceedence.

Several drums are present on-site. Approximately twenty drums were counted during a December 2, 1991 site visit. The majority of drums were numbered. These numbers correlate with the inventory numbers of drums which were counted by the MPCA in the Summer of 1989. Most of the drums had partially rusted surfaces but none appeared to be punctured. A third of the drums sounded as though they contained frozen material when tapped with a broom handle. U.S. EPA expects to address these drums through a removal action to determine the nature of the material contained within the drums as well as have the drums removed from the Site.

VI SUMMARY OF SITE RISKS

Human Health Risk

The baseline risk assessment for the South Andover Superfund Site was conducted to determine the potential exposure an individual could have to the chemicals detected at the Site. This was accomplished by estimating how much of each chemical could be absorbed by various body parts (i.e. skin, lungs, or intestines) and then estimating how often, for how long, and under what conditions such exposure could occur.

Based on the frequency of occurrence, concentration, and health effects, the baseline risk assessment identified the following soil contaminants as contaminants of concern for the Site: polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), lead and antimony.

As mentioned earlier, the July 1991 Remedial Investigation determined that the nature and extent of soil and buried contamination at the Site is distributed in localized "hot spots". Seven hot spots exist at the Site which present a risk to human health. These hot spots were generally found in surface soils at a depth of six feet or less.

All residential wells sampled were free of site related contaminants and safe for drinking. Only one on-site shallow aquifer monitoring well had an arsenic level which exceeded federal and state drinking water standards but, no on-site source of arsenic could be found which could have caused such a level to occur in groundwater.

The baseline risk assessment also determined that the contaminants detected in surface water and sediments do not pose a risk to human health.

When conducting the risk assessment, the highest concentrations of contamination found at the Site are used when determining the risks posed. Consequently, the risk calculations do not represent the average value of that contaminant found at the Site as much as a maximum estimated risk. For example, when the cancer risk for groundwater was determined the concentration of arsenic found in the shallow aquifer monitoring well was used. This well exceeded the Maximum Contaminant Level (MCL) for arsenic but it was not representative of arsenic values found in groundwater across the Site which were an order of magnitude lower than the MCL. The MCL is the maximum level of a contaminant permitted in drinking water which is delivered to the consumer's tap and used by the general public for drinking.

The baseline risk assessment also must take into consideration the possible present and future uses of the Site in order to determine the exposure pathways and populations affected. In determining exposure pathways and populations affected a plausible maximum exposure scenario is assumed. As a result, the potential exposure or risk is intentionally conservative. The actual risk is likely to be less than the estimated risk.

Given these assumptions, people likely to be exposed to contaminants at the Site under current conditions are:

Workers in the active on-site auto parts businesses exposed to contaminated surface soil.

Adult residents of on-site dwellings exposed to contaminated surface soil and groundwater.

Adults and children scavenging or trespassing in nonbusiness areas of the Site exposed to contaminated surface soil.

Children scavenging or trespassing in nonbusiness areas of the Site exposed to contaminants detected in the surface water or sediments.

For the future exposure scenario, the risk assessment developed a scenario that the entire Site would be developed for residential use. Under this scenario, the people who could be exposed would be:

Construction workers exposed to contaminated subsurface soil.

Adult and child residents exposed to contaminated surface soil and groundwater.

Given these exposure assumptions the baseline risk assessment determined clean-up levels for the contaminants of concern found in the soil. These clean-up levels are based on cancer risks and a hazardous index value. Cancer risks are determined by multiplying the intake level with the cancer potency factor.

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of mg/kg-day, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g. 1E-06). An excess lifetime cancer risk of 1E-06 indicates that an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The acceptable cancer risk range for clean-up of carcinogens is 1E-04 to 1E-06.

The hazard index value represents the risk of noncancer effects from site related contaminants of concern. The hazard index is determined by adding the hazard quotient for all contaminants within a medium or across all media to which a given population may reasonably be exposed. The hazard quotient is a ratio that is estimated by determining the intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. The reference dose is a U.S. EPA standard which measures the potential for adverse human health effects from exposure to noncarcinogenic chemicals.

Once the hazard quotients have been determined for the various contaminants, they are added. The resultant sum is the hazard index. The hazard index (HI) provides a threshold level for gauging the potential significance of multiple contaminant exposures within a single medium or across media. When the hazard index is less than or equal to 1, no noncancer health effects are considered to be likely. Conversely, an HI greater than one indicates a potential noncarcinogenic health threat exists.

A cancer risk of between 2E-05 and 3E-05 was determined as appropriate for the clean-up of PAHs and PCBs. These clean-up levels are within the U.S. EPA acceptable risk ranges for clean-up of carcinogens. Additionally, clean-up to a risk range of between 2E-05 and 3E-05 would be cleaning up the hot spots to a level where they could just be detected using current U.S. EPA analytical methods. Lower clean-up levels would be difficult to consistently confirm. Resultant clean-up levels would be 4 ppm for PAHs and 2 ppm for the PCBs.

Site noncancer risks result from exposure to lead and antimony. A clean-up level based on a hazard index value of 1 is needed to remediate antimony. This results in a clean-up level of 25 ppm. The target levels for noncancer risk from lead exposure are selected as a 5 percent chance of exceeding a 10 ug/dL blood lead level in children. The target soil lead concentration to achieve a predicted percentage below 5 percent is 500 ppm, this value will be the clean-up level for lead.

Environmental Risks

A Preliminary Ecological Assessment was performed on the Site. The objective of this assessment was to determine whether contaminants detected during the Remedial Investigation in the surface waters and sediments of the four wetland areas located within or adjacent to the Site pose, or could in the future pose, an unacceptable risk to non-human biological receptors (Figure 5).

The assessment determined that several surface water and sediment standards were exceeded mainly in two of the four wetland areas. These are Wetland Areas 1 and 4. U.S. EPA's Ambient Water Quality Criteria (AWQC) standards were exceeded for cadmium, copper and cyanide in the surface waters of Wetland Area 1. Minnesota surface water quality standards were also exceeded for cadmium and copper in Wetland Area 1. The AWQC standards for lead and zinc were exceeded in the surface waters of Wetland Area 4. Minnesota surface water quality standards were exceeded for aluminum and zinc in Wetland Area 4. See Table 1.

Sediment values were evaluated using U.S. EPA guidance and other published research material. Sediments in Wetland Area 1 exceeded guidelines for copper, iron, lead, manganese and zinc. Sediments in Wetland Area 4 exceeded guideline levels for copper, lead, DDD and DDT. See Tables 2 and 3.

If Wetland Area 1 which is located within the Site, is to be remediated according to human health concerns, the Preliminary Ecological Assessment recommends that the clean-up of contaminated soils surrounding the wetland be designed to avoid contamination of the wetland area via surface water runoff. The assessment also recommends that once clean-up of the soil has occurred follow-up sampling of surface water and sediments within this wetland should be done to determine if any impacts were caused to the wetland due to remedial activities.

Wetland Area 4 is located south and adjacent to the Site. This wetland appears to contain elevated levels of inorganic contaminants and pesticides. In order to more completely assess the ecological risk posed by contaminants present in this wetland, the Preliminary Ecological Assessment recommends that further investigations, including surface water and sediment sampling, should be conducted.

VII DESCRIPTION OF ALTERNATIVES

The alternatives under consideration for soil contamination were developed by examining a number of possible remedial technologies and compliance of these alternatives with applicable or relevant and appropriate requirements (ARARs) of federal and state environmental statutes.

The remedial alternatives developed include various combinations of containment, treatment and disposal. A total of four alternatives were evaluated in detail for remediating contaminated soil. The alternatives analyzed are as follows:

Alternative 1:	No Action.
Alternative 2:	On-Site Aerobic Biological Treatment with Capping of Contaminated soil. Monitoring of Surface Water and Sediments in Wetland Areas 1 and 4.
Alternative 3:	On-Site Aerobic Biological Treatment in Tandem with Above Ground Stabilization and Disposal in an On-Site Landfill. Monitoring of Surface Water and Sediments in Wetland Areas 1 and 4.
Alternative 4:	On-Site Aerobic Biological Treatment with Disposal in an Off-Site Landfill. Monitoring of Surface Water and Sediments in Wetland Areas 1 and 4.

Alternative 1: NO ACTION.

Estimated Capital Costs: $0.
Estimated Operation and Maintenance Costs: $0.

Estimated Present Worth Costs: $0.
Estimated Implementation Timeframe: Not applicable.

The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken to remediate soil.

Alternative 2: ON-SITE AEROBIC BIOLOGICAL TREATMENT WITH CAPPING. MONITORING OF WETLAND AREAS 1 AND 4.

Estimated Capital Costs: $1,000,000.
Estimated Operation and Maintenance Costs: $270,000.
Estimated Present Worth Costs: $2,500,000.
Estimated Implementation Timeframe: 2 years.

Under this alternative a total of 2,100 cubic yards of PAH-contaminated soil from three hot spot areas (Areas 1, 5 and 6) would be excavated and treated in an above-ground biological treatment unit. Treated soil would be returned to the Site as clean fill. The remaining 9,300 cubic yards would be covered by two non-RCRA caps. One cap would cover a contiguous area defined by three hot spots (Areas 2, 3 and 4). The second cap would cover Area 7. A total area of approximately 1.7 acres would be covered. A monitoring program would need to be established in order to evaluate the long-term physical integrity and effectiveness of the cap. Supplemental controls such as deed restrictions would be considered as necessary to maintain the effectiveness of the remedy.

A total of twelve surface water samples would be collected from Wetland Areas 1 and 4. These samples would be analyzed for pH, alkalinity, Total Organic Carbon, major anions, the Hazardous Substance List metals, and chronic aquatic toxicity testing would be performed. Surface water samples would be collected on a semi-annual basis with one of the sampling events-occurring during the spring snowmelt. Twelve sediment samples would be analyzed for grain size, Total Organic Carbon, Total Volatile Solids, the Hazardous Substance List metals, and toxicity testing would be performed. Sediment samples would be collected annually.

This particular alternative will require a cap to be installed as close as possible to the wetlands. Cap construction, increased runoff and, potentially, sedimentation may be major impacts to the wetlands. As a result, temporary controls will be necessary during the construction of the cap. Temporary controls during construction might include the installation of silt fences or straw bales. Supplemental measures to control post-construction runoff and/or sedimentation which may be considered if determined to be necessary, might include grassed swales and grading on and around the cap and surrounding areas to direct runoff away from the wetlands.

Alternative 3: ON-SITE AEROBIC BIOLOGICAL TREATMENT IN TANDEM WITH ABOVE GROUND STABILIZATION AND DISPOSAL IN AN ON-SITE LANDFILL. MONITORING OF WETLAND AREAS 1 AND 4.

Estimated Capital Costs: $2,600,000.
Estimated Operation and Maintenance: $280,000.
Estimated Present Worth Costs: $4,000,000.
Estimated Implementation Timeframe: 2 years.

Alternative 3 involves excavating and biologically treating 2,100 cubic yards of PAH-contaminated soil from Areas 1, 5 and 6 in the same manner as described in Altérnative 2. Alternative 3, however, provides for the excavation and stabilization of the remaining 9,300 cubic yards of PCB-, PAH-, and metal-contaminated soil from Areas 2, 3, 4 and 7. These treated soils would then be placed in an on-site landfill. As with Alternative 2 a monitoring program would need to be established in order to evaluate the integrity and effectiveness of the landfill over time. Also, supplemental controls such as deed restrictions would be considered as necessary to maintain the effectiveness of the remedy.

Surface water and sediment samples would be analyzed for the same parameters and at the same frequencies and locations as described in Alternative 2.

Alternative 3 will require excavation adjacent to wetlands. Temporary controls similar to those in Alternative 2 will be needed to prevent runoff from entering the wetlands.

Alternative 4: ON-SITE AEROBIC BIOLOGICAL TREATMENT WITH DISPOSAL IN AN OFF-SITE LANDFILL. MONITORING OF WETLAND AREAS 1 AND 4.

Estimated Capital Costs: $2,200,000.
Estimated Operation and Maintenance Costs: $195,000.
Estimated Present Worth Costs: $2,470,000.
Estimated Implementation Timeframe: 2 years.

Alternative 4 also involves excavating and biologically treating 2,100 cubic yards of PAH-contaminated soil from Areas 1, 5 and 6. Treatment would occur in an above-ground unit and treated soil would be returned to the Site as clean fill (see Alternative 2). The remaining 9,300 cubic yards of PCB-, PAH-, and metal-contaminated soil from Areas 2, 3, 4 and 7 would be taken to a permitted landfill for final disposal.

The July 1991 Remedial Investigation determined that soils from the Site are not hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA). This determination was made based on the results of Toxicity Characteristic Leaching Procedure (TCLP) testing and knowledge of the materials disposed of at the

Site. Consequently, soils excavated from Areas 2, 3, 4 and 7 may be disposed of at a landfill which is permitted to receive commercial and/or industrial solid waste.

Surface water and sediment samples would be analyzed for the same parameters, and at the same frequencies and locations as described in Alternative 2.

Alternative 4 will require excavation adjacent to wetlands. Temporary controls similar to those in Alternative 2 will be needed to prevent runoff from entering the wetlands.

VIII SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The National Contingency Plan and Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) form the regulatory basis for the nine evaluation criteria to be utilized in determining the appropriate remedial action at a CERCLA site. Specifically, Section 121 of SARA requires that the selected remedy is to be protective of human health and the environment, cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The following is a summary of the nine evaluation criteria used to evaluate remedial alternatives:

Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Long-term Effectiveness and Permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume through Treatment is the anticipated performance of the treatment technologies that may be employed in a remedy.

Short-term Effectiveness refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost includes capital, operation and maintenance costs.

State Acceptance indicates whether, based on its review of the Remedial Investigation, Feasibility Study and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

Community Acceptance indicates the public support of a given alternative. This criteria is discussed in the Responsiveness Summary.

Overall Protection of Human Health and the Environment

Alternative 1, no action, does not satisfy the requirement for overall protection of human health and the environment. The risk associated with the no action alternative pertains to the release of contaminants to the air and surface water pathways and for exposure of contaminated soils through direct contact and ingestion.

Alternatives 2, 3 and 4 are more protective of human health and the environment than Alternative 1. These alternatives can all achieve a cancer based risk clean-up of between 2E-05 to 3E-05. Each alternative includes treatment and containment of the contaminated soils, and thus eliminates the potential pathways of concern for both human and non-human exposure. Alternative 4 would either treat or remove all contaminated soil at the Site so that no residuals would remain on-site. Alternatives 2 and 3 would require continued long-term monitoring of residuals left on-site.

Compliance with ARARs

Currently, several Federal Ambient Water Quality Criteria for the Protection of Aquatic Life (AWQCs) and Minnesota surface water quality standards are being exceeded for several inorganic compounds in surface waters at the Site (Table 1). Alternative 1 would allow this continued exceedence.

Alternatives 2, 3 and 4 provide for the monitoring of surface waters and sediments in wetland areas 1 and 4 once contaminated soils have been remediated. This will ensure compliance with Federal standards (AWQCs) and Minnesota regulations concerning the protection of state surface waters.

The Land Disposal Restrictions (LDRs) of the Resource Conservation and Recovery Act (RCRA) do not apply to this Site. Contaminated soils were analyzed using Toxicity Characteristic Leaching Procedures (TCLP) testing to determine if they were characteristic hazardous wastes. Testing results indicated that the soils are not RCRA characteristic hazardous wastes (Table 4). Earlier investigations concluded that no RCRA listed hazardous wastes were disposed of at the Site.

Long-Term Effectiveness and Permanence

The evaluation of alternatives under this criterion address the risk remaining at the South Andover Site at the conclusion of remedial activities. The primary focus of this evaluation is to determine the extent and effectiveness of controls that may be required to manage the risk posed by treatment residuals and/or untreated waste. Alternative 1 provides no long-term effectiveness and would result in the continuation of elevated site risks.

Alternatives 2, 3 and 4 each include excavation and above-ground biological treatment of the PAH-contaminated soils. No untreated residuals from this process would remain on-site since the PAHs are destroyed. The primary difference between Alternatives 2, 3 and 4 relative to long-term effectiveness and permanence is the approach taken in managing the risk associated with contaminated soils in Areas 2, 3, 4 and 7.

Alternative 2 assumes the perpetual containment of these soils under an engineered cap on-site. Alternative 3 provides for the stabilization of contaminated soils and assumes that the stabilized material will be permanently contained in an on-site landfill. Alternative 4 exports the contaminated material to an off-site, permitted landfill and assumes that continued compliance with landfill regulations will address any potential containment problems which may arise from managing these wastes. With regards to the Site, no untreated residuals remain on-site when Alternative 4 is implemented.

Reduction of Toxicity, Mobility and Volume

This evaluation criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of the untreated waste.

Alternative 1 provides no reduction in toxicity, mobility or volume of the contaminant mass. The remaining alternatives each include the degradation of PAHs in contaminated soils. This treatment element provides for the destruction of the PAH molecule in the soil and thus meets the preference for implementing irreversible treatment processes that reduce the volume of contamination.

Alternatives 2 and 4 do not include the use of treatment for addressing the PCB and metal-contaminated soils form Areas 2, 3, 4 and 7. Both of these alternatives incorporate capping and landfilling of the contaminated soils to cause a reduction in the mobility of the contaminants. Alternative 3, however, provides the most reduction of toxicity, mobility and volume because of the use of stabilization for immobilizing all contaminants of concern.

Short-Term Effectiveness

This evaluation criterion addresses the effects of the alternatives on human health and the environment during construction and implementation phases. The short-term effectiveness period extends until the remedial response objectives are attained. All of the alternatives, with the exception of no action, include mitigative measures for minimizing short-term impacts during construction. The no action alternative provides unacceptable risks through all exposure pathways to the community.

Alternative 2 includes the installation of surface caps over Areas 2, 3, 4 and 7, while Alternatives 3 and 4 entail excavation and containment of soils. All three of these alternatives involve the excavation and treatment of PAH-contaminated soils. There may be dust, noise and traffic issues associated with the cap installation, treatment and excavation activities for these alternatives. These potential threats to the community will be minimized through control of emissions, noise and traffic during installation of the cap and excavation of the soils.

Issues related to worker construction are similar for all three alternatives. There are risks associated with normal construction activities, particularly for remediation efforts that are primarily excavation or site work related. Health and safety plans will require that workers are adequately protected during any site work related activities.

In evaluating the time required until remedial action objectives are met, there are no distinguishing features to Alternatives 2, 3 and 4. Each will require approximately one construction season and possibly a second year to accommodate the biological treatment component of the alternatives.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative, and the availability of various services and materials required for its implementation. Technically, Alternative 2 through 4 are implementable and can be readily constructed of available materials. The technologies considered, which include biological treatment, capping, stabilization, and landfill disposal, are available from multiple vendors and can be designed with minimum implementation concerns.

There are several site-specific implementation issues, however, which need to be addressed in order to meet the Site remedial objectives. Specifically, the proximity of wetlands to Areas 4 and 7 will require some sort of engineered device to prevent impact to these wetlands if a cap or a landfill is to be constructed. Also the siting of an on-site landfill is further complicated by the high water table at the Site.

Long-term monitoring will be required for Alternatives 2 and 3 since residuals are either contained on-site under a cap or stabilized material is contained in an on-site landfill. No site monitoring as part of the Second Operable Unit would be required for Alternative 4 since no residuals would remain on-site.

Cost

Alternatives are evaluated for cost in terms of capital costs, operation and maintenance cost (O&M), and present worth cost. The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial alternatives over its planned life.

The estimated present worth costs of the various alternatives are as follows:

Alternative 1:	$ 0
Alternative 2:	$2,500,000
Alternative 3:	$4,000,000
Alternative 4:	$2,470,000

State Acceptance

U.S. EPA and MPCA agree on the preferred alternative (Alternative 4). Both Agencies have been involved in the technical review of the Remedial Investigation Report, Feasibility Study and the development of the Proposed Plan and the ROD.

Community Acceptance

Community acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments, received on the Remedial Investigation, Feasibility Study and Proposed Plan, and U.S. EPA's and MPCA's responses to the comments received.

IX SELECTED REMEDY

The U.S EPA selects Alternative 4 as the most appropriate alternative for soil remediation at the South Andover Superfund Site. Alternative 4 involves the on-site aerobic biological treatment of 2,100 cubic yards of PAH-contaminated soil; the excavation of 9,300 cubic yards of PCB-, PAH-, and metal-contaminated soil with disposal into a permitted industrial/commercial landfill; and monitoring of surface water and sediments in Wetland Areas 1 and 4. MPCA concurs with the selected alternative.

Implementation of this alternative provides a permanent remedy for the Site in which long-term cancer risks are reduced to a level which is protective of human health. Specifically, cancer risks are reduced to a level of between 2E-05 to 3E-05 when Alternative 4 is implemented. Resultant carcinogenic clean-up levels are 4 ppm for the PAHs and 2 ppm for the PCBs. Clean-up to these levels would be cleaning up the seven hot spot areas to a point where they could just be detected using current U.S. EPA analytical methods.

Implementation of Alternative 4 will also reduce the risks of exposure from the noncarcinogens, lead and antimony, present at the Site. A clean-up level based on a hazard index of 1 was used to establish the remediation goal for antimony. This results in a clean-up level of 25 ppm. The remediation goal for lead is expressed as a 5 percent chance of exceeding a 10 ug/dL blood lead level in children. The soil lead concentration to achieve a predicted percentage below 5 percent is 500 ppm, this value is the clean-up level for lead.

In determining both the carcinogenic and non-carcinogenic clean-up levels, the risk assessment developed a scenario that the entire Site would be developed for residential use. Under this scenario, the people who could be exposed would be: construction workers exposed to contaminated subsurface soil; and adult and child residents exposed to contaminated surface soil and groundwater.

In summary, Alternative 4 provides a permanent remedy in which all contaminated soil is either treated through biological treatment or is transported off-site where it is contained in a secure, permitted landfill. As a result, there are no residuals left on-site which would require long-term monitoring. Also, there is no need for imposing deed restrictions or other institutional controls as part of this remedy.

Alternative 4 also requires that the approximately twenty drums located on the Site will be sampled and removed. U.S. EPA expects to address these drums through a removal action.

The selected alternative is believed to provide the best balance of trade-offs among the alternatives with respect to the nine evaluation criteria. Based on the information available at this time, the selected alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected alternative should also satisfy the preference for treatment as a principal element.

X STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The selected remedy is protective of human health because all contaminated soil is either treated or removed from the Site. As a result, no unacceptable health risks will remain once the selected remedy is implemented. Remediation of PAH and PCB carcinogens to within a cancer risk range of 2E-05 to 3E-05 will result in clean-up levels of 4 ppm for the PAHs and 2 ppm for the PCBs. Remediation of the non-carcinogen antimony to a hazard index value of 1 will result in a clean-up level of 25 ppm. The non-carcinogen lead will be cleaned up to a level of 500 ppm. This clean-up level is based on permissible blood lead levels in children. These clean-up levels and their associated risk ranges are in compliance with U.S. EPA and MPCA standards and policies and are protective of human health.

It is anticipated that the selected remedy is protective of the environment as well. Once contaminated soils are removed from the Site, the primary source of contaminated surface water run-off will have been removed and surface water quality in the wetlands should improve. Monitoring of surface water and sediments after remediation will ensure compliance with Federal and State regulations concerning the protection of aquatic life in surface waters. Additionally, precautions will be taken when soils are being excavated so as to avoid contamination of the wetland area via surface water runoff. Such temporary controls might include the installation of silt fences or straw bales.

The selected alternative involves the excavation and treatment of contaminated soils. There may be dust, noise and traffic issues associated with these activities. However, a site specific health and safety plan will be developed as part of the Remedial Design\Remedial Action Work Plan. The purpose of the health and safety plan would be to address these potential threats to the community, environment and on-site workers.

Compliance with ARARs

The selected alternative meets all applicable and relevant and appropriate requirements (ARARs) of federal and state environmental laws. The Federal Ambient Water Quality Criteria for the Protection of Aquatic Life (AWQCs) and the surface water quality standards under Minnesota Rules, Chapter 7050 are considered relevant and appropriate considering the purposes of this remedial action.

Currently, several Federal AWQCs and Minnesota surface water quality standards are being exceeded for several inorganic compounds. After contaminated soil is excavated and either treated or removed from the Site, it is anticipated that the surface water quality standards will improve. Monitoring of surface waters after soil remediation will ensure compliance with federal and state surface water quality standards.

Also, precautions will be taken so that surface water quality in the wetlands will not be degraded further by remedial activities at the Site. Specifically, temporary controls-such as silt fences and straw bales could be used to prevent run-off into the wetlands.

As mentioned earlier, contaminated soils were analyzed using TCLP testing to determine if they were characteristic hazardous wastes as defined under the Resource Conservation and Recovery Act (RCRA). Testing results indicated that the soils are not RCRA characteristic hazardous waste (Table 4). Earlier investigations concluded that no RCRA listed hazardous wastes were disposed of at the Site. Therefore, the Land Disposal Restrictions (LDR) of RCRA do not apply to this remedy. U.S. EPA generally will not consider the Land Disposal Restrictions (LDRs) to be relevant and appropriate for soil and debris contaminated with hazardous substances that are not RCRA restricted wastes. The basis for this determination is that soil which is primarily of a geologic origin, is not sufficiently similar to a listed RCRA waste code or family of waste codes such that the LDR standard for that waste code is relevant and appropriate. Consequently, neither the RCRA regulations nor the land disposal restrictions would be ARARs at the Site.

Additionally, RCRA closure regulations are not ARARs for the cap or landfill proposed in Alternatives 2 and 3 because the contaminated soil is being excavated and treated to health based levels.

Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $2,470,000. The selected remedy is the least most expensive alternative; however, it is the most consistent with the overall Site strategy for remediating the soil.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions can be utilized in a cost-effective manner for the soil remedy at the South Andover Superfund Site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S.EPA and the State have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume, short-term effectiveness, implementability, cost, also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

Implementation of the selected remedy provides a permanent solution for the Site in which long-term cancer risks are reduced to a level which is protective of human health. The remedy will also reduce the amount of contaminated surface water run-off to the wetlands and thereby reduce environmental risks. All contaminated soil is either treated through biological treatment or is transported off-site where it is contained in a secure, permitted landfill. As a result, there are no residuals left on-site which would require long-term monitoring. Also, there is no need for imposing deed restrictions or other institutional controls as part of this remedy.

The selected alternative is therefore considered to be the most appropriate solution to soil contamination at the Site because it provides the best trade-offs with respect to the nine criteria. The selected alternative also ulitizes treatment technologies to the maximum extent practicable.

Preference for Treatment as a Principal Element

The selected alternative meets the statutory requirement to utilize permanent solutions and treatment technologies, to the maximum extent practicable. The selected alternative provides for the biological destruction of the PAH molecule in contaminated soil. The aerobic biological treatment process selected for the PAH contaminated soil is irreversible. This treatment process permanently reduces the toxicity, mobility and volume of the PAH contaminated soil.

XI DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes have been made since the publication of the Feasibility Study or Proposed Plan.

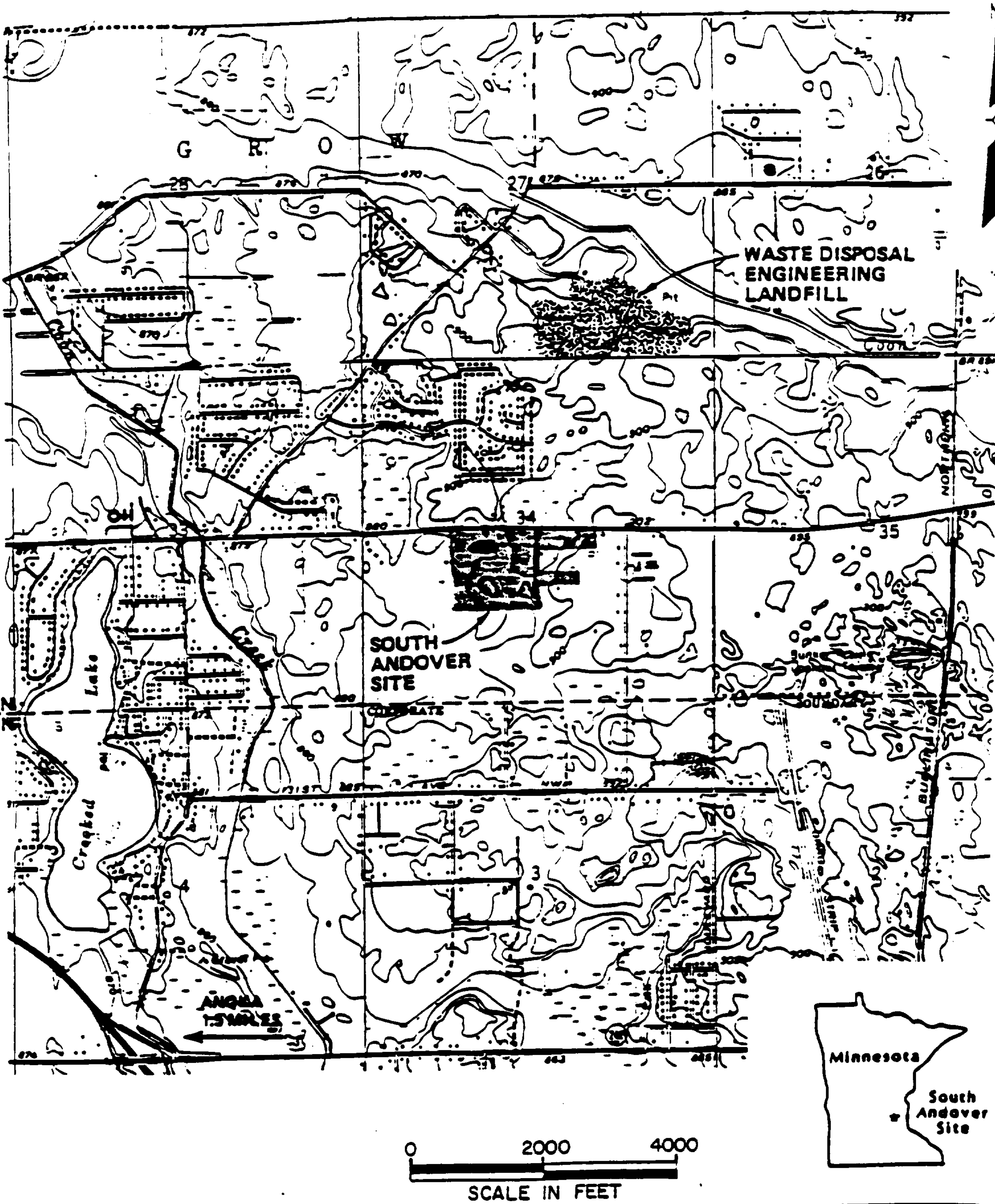


FIGURE 1

LOCATION MAP

SOUTH ANDOVER SECOND OPERABLE UNIT
REMEDIAL INVESTIGATION / FEASIBILITY STUDY
ANDOVER, MINNESOTA

20029

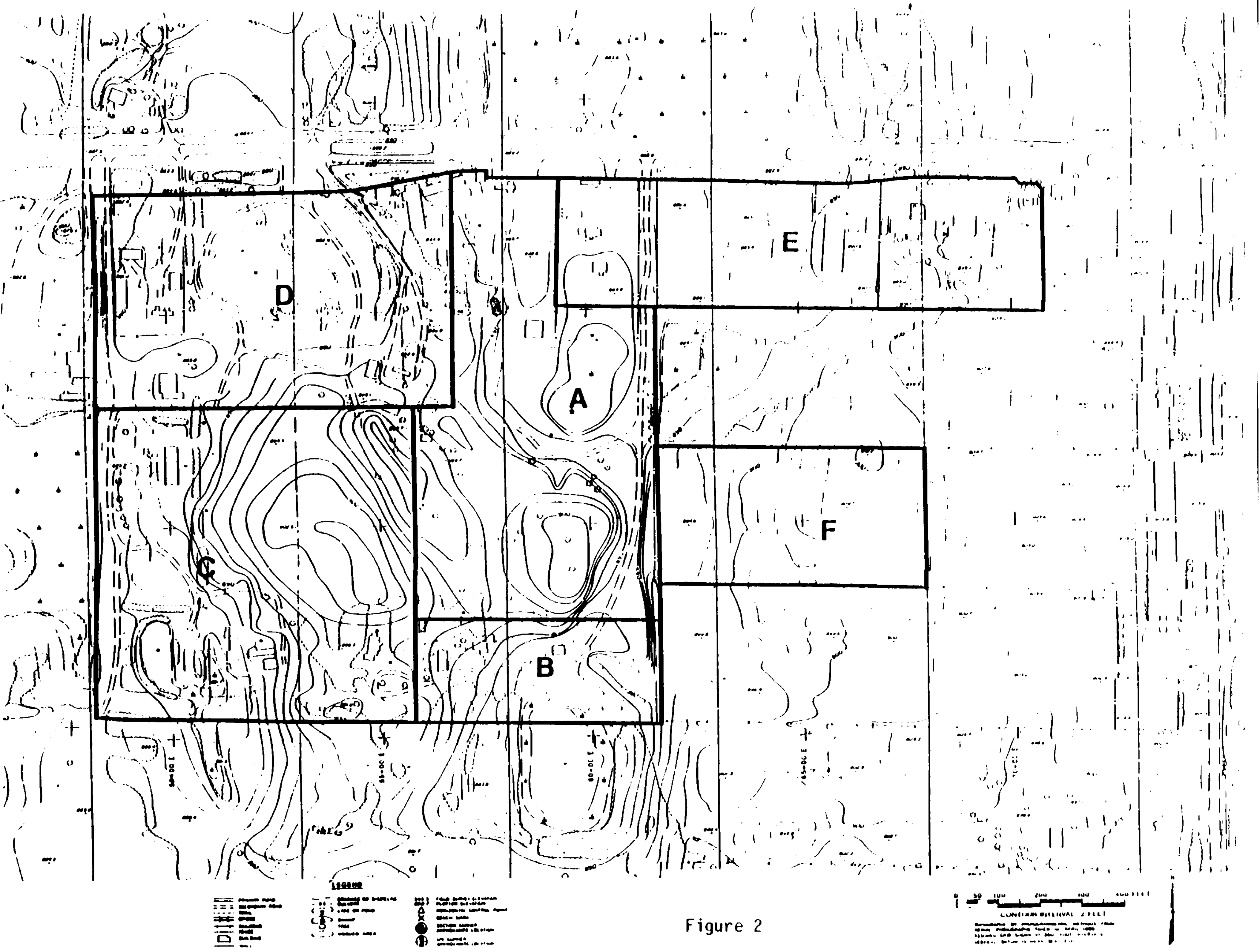


Figure 2

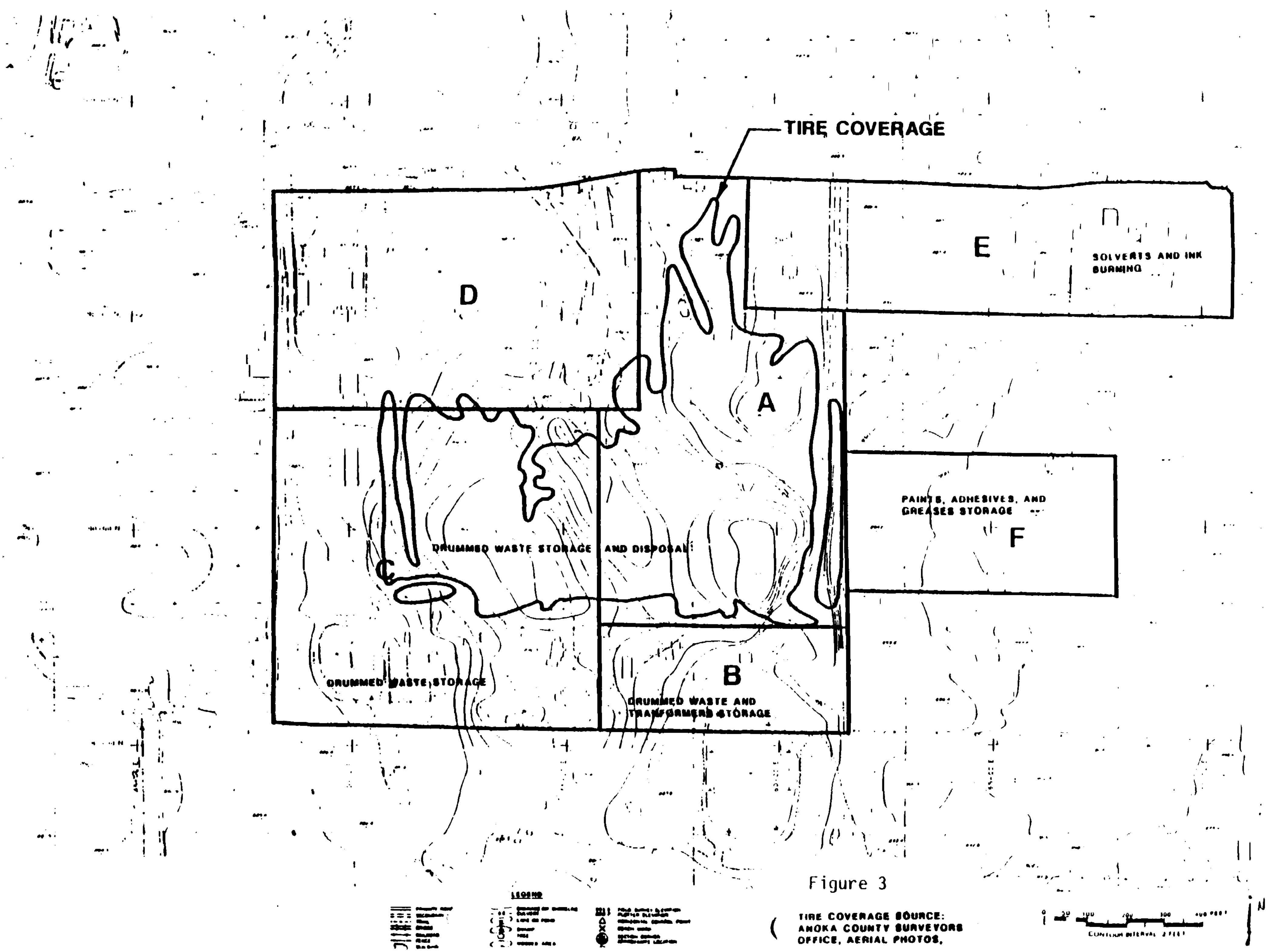
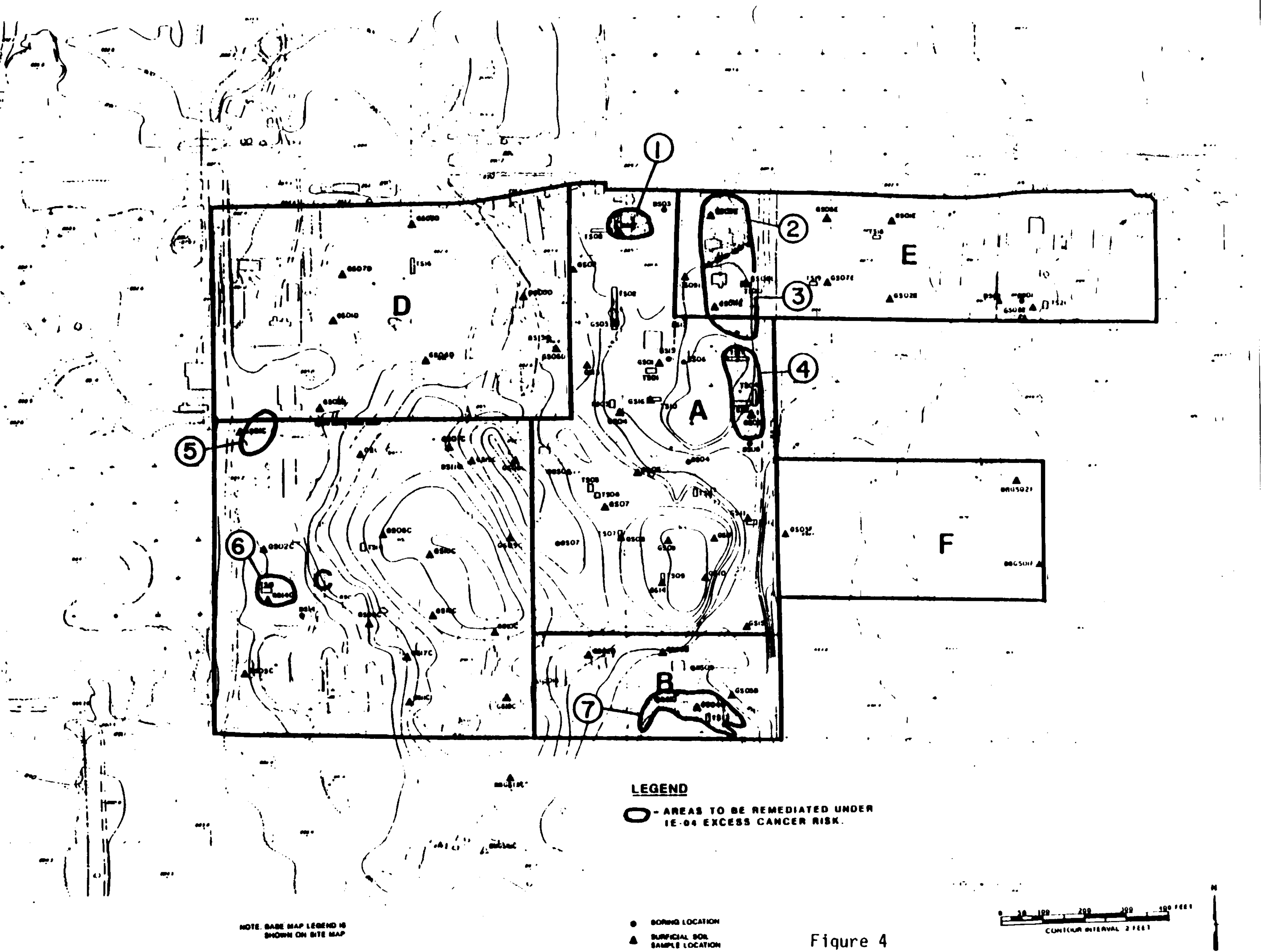

TIRE COVERAGE
D
E
SOLVENTS AND INK BURNING
A
PAINTS, ADHESIVES, AND GREASES STORAGE
F
C
DRUMMED WASTE STORAGE AND DISPOSAL
DRUMMED WASTE STORAGE
B
DRUMMED WASTE AND TRANFORMERS STORAGE
LEGEND
TIRE COVERAGE SOURCE: ANOKA COUNTY SURVEYORS OFFICE, AERIAL PHOTOS.
N

Figure 3



1
2
3
4
5
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A
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C
D
E
F
LEGEND
- AREAS TO BE REMEDIATED UNDER 1E-04 EXCESS CANCER RISK.
NOTE: BASE MAP LEGEND IS SHOWN ON SITE MAP
BORING LOCATION
SURFICIAL SOIL SAMPLE LOCATION
CONTOUR INTERVAL 2 FEET

Figure 4

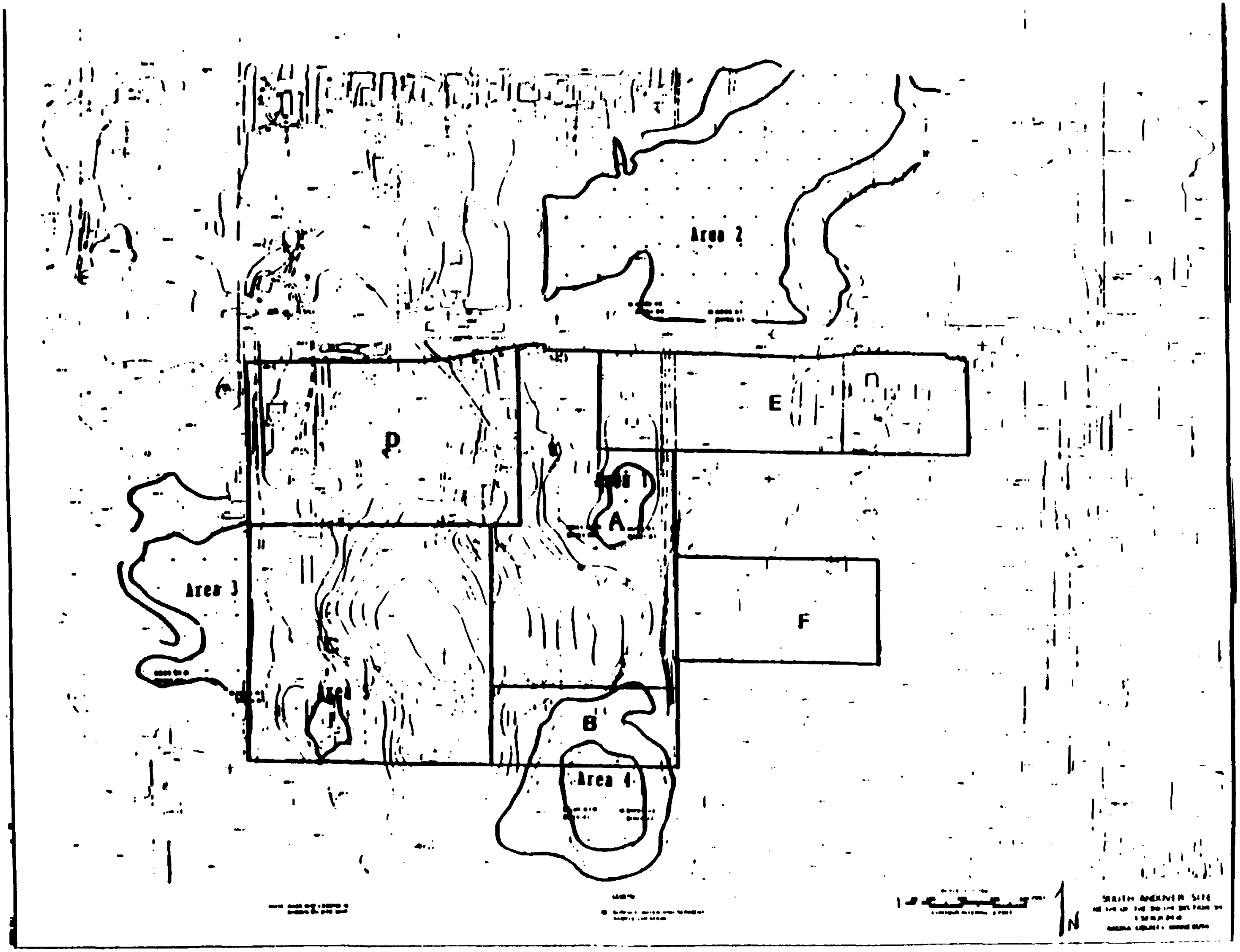

Figure 5 (-site Surface Water Featur(

Table 1

SUMMARY OF DETECTED INORGANIC COMPOUNDS
SURFACE WATER
South Andover RI/FS
1990

Compound	U.S. EPA Ambient Water Quality Criteria (For Protection of Aquatic Life) ppb Acute	U.S. EPA Ambient Water Quality Criteria (For Protection of Aquatic Life) ppb Chronic	MPCA Surface Water Quality Standards ppb Acute	MPCA Surface Water Quality Standards ppb Chronic	Detected, ppb	Field Blank Blanks
Aluminum	NE	NE	2,145	125	43.B - 695 (SW04)	ND
Arsenic	360	190	720	70	2.1B - 6.6JB (SW04)	ND
Barium	NE	NE	NE	NE	26.4B - 374J (SW04)	ND
Beryllium	130	5.3	NE	NE	2.3B - 3.1B (SW04)	ND
Cadmium	1.8[a]	0.66[a]	146.1[a]	1.95[a]	3.0B - 8.0 (SW01)	ND
Calcium	NE	NE	NE	NE	15,100 - 56,200 (SW02)	385B
Chromium	16	11	32[b]	11[b]	2.0JB - 7.0JB (SW01)	ND
Cobalt	NE	NE	NE	NE	5.6B - 9.5B (SW04)	ND
Copper	9.2[a]	6.5[a]	68.2[a]	15.1[a]	7.7JB - 39.3 (SW01)	ND
Iron	NE	NE	NE	NE	122J - 6,890 (SW04)	23.4JB
Lead	34	1.3	396[a]	7.7[a]	1.2B - 6.6 (SW04, SW01)	ND
Magnesium	NE	NE	NE	NE	3,990JB - 13,400 (SW01)	71.4JB
Manganese	NE	NE	NE	NE	9.8B - 619 (SW04)	ND
Mercury	2.4	0.012	4.9	0.0069	0.28 (SW02)	ND
Nickel	1,100[a]	56[a]	5,098[a]	213[a]	10.1JB (SW03)	ND
Potassium	NE	NE	NE	NE	1,150JB - 9,260J (SW01)	ND
Selenium	260[a]	35	40	5	2.0B - 3.0B (SW04B)	ND
Sodium	NE	NE	NE	NE	6,640J - 39,400J (SW02)	99.9B
Thallium	140	40	NE	NE	1.8JB (SW04)	ND
Vanadium	NE	NE	NE	NE	2.1B - 6.8B (SW04)	ND
Zinc	130[a]	47[a]	421[a]	191[a]	16.8JB - 219JB (SW04)	22.5J
Cyanide	22	0.52	NE	NE	2.3B - 7.5B (SW0[illegible])	ND

NE: No level established.
J: Value "estimated" due to minor QC deviations.
B: Value above instrument detection limit, but below contract required detection limit.
[a]Based on water hardness equal to 50 mg/l $CaCO_3$.
[b]Chromium +6.
Values in parentheses are sample locations of highest detected concentrations.
MPCA Site-Specific Surface Water Quality Standards are from the Water Quality Division, MPCA.

A/RP/SANDOVER/AQ7

Table 2

SUMMARY OF DETECTED INORGANIC COMPOUNDS
SEDIMENT
South Andover RI/FS
1990

	Range of Concentrations Detected, ppm
Aluminum	1,850 - 12,500J (SD04)
Arsenic	1.3B - 5.1JB (SD04)
Barium	11.1JB - 192 (SD01)
Calçium	1,040B - 16,200 (SD02)
Chromium	3.4 - 17.7 (SD04)
Cobalt	1.6B - 14.8B (SD01)
Copper	3.2JB - 54 (SD04)
Iron	1,700J - 40,500J (SD01)
Lead	1.2J - 442J (SD01)
Magnesium	558B - 6,570 (SD02)
Manganese	21.5 - 825 (SD01)
Nickel	6.7B - 18.4B (SD01)
Potassium	174JB - 910JB (SD04)
Selenium	0.33JB - 2.8JB (SD04)
Silver	1.8B (SD02)
Sodium	799JB - 5,140JB (SD04)
Thallium	4.8B (SD01)
Vanadium	3.6B - 27.3B (SD04)
Zinc	9.8 - 290 (SD01)
Cyanide	0.65 - 2.5J (SD01)

J: Value "estimated" due to minor QC deviations.
B: Value above instrument detection limit but below contract required detection limit.

Values in parentheses are sample locations of highest detected concentrations.

Table 3

SUMMARY OF DETECTED PESTICIDE/PCB COMPOUNDS
SEDIMENT AND SURFACE WATER
South Andover RI/FS
1990

Range of Concentrations Detected, ppb

Pesticides/PCB	Sediment
4,4'-DDD	130 (SD04)
4,4'-DDT	120-140 (SD04)

J: Value "estimated" due to minor QC deviations.
B: Compound detected in associated laboratory blank.

Values in parentheses are sample locations of highest detected concentrations.

A/RP/SANDOVER/AQ7

Table 4

COMPARISON OF SOILS CHEMISTRY AND TCLP RESULTS
South Andover Superfund Site
Second Operable Unit
Andover, Minnesota

Contaminant	TCLP[1] (mg/l)	TS 13[2] Soil Sample (mg/kg)	TS 13[2] TCLP (mg/l)	TS 17[3] Soil Sample (mg/kg)	TS 17[3] TCLP (mg/l)	TS 20[4] Soil Sample (mg/kg)	TS 20[4] TCLP (mg/l)
Acetone	--	0.0045	0.056	0.0115	0.075	0.013	0.091
Aluminum	--	26,285	0.204	5,895	0.196	5,300	0.685
Barium	100.0	81.3	0.706	59.25	1.350	37.2	1.510
Cadmium	1.0	7	0.0035	0.4	0.003	0.7	0.0175
Calcium	--	--	23.1	--	136.0	--	38.6
Cobalt	--	2.125	0.0063	8.9	0.04	2.975	0.024
Copper	--	--	0.383	--	0.0119	--	1.880
Di-n-butylphthalate	--	0.1975	--	0.28	0.004	0.02	--
Heptachlor (and its hydroxide)	0.008	--	0.0001	--	0.00028	--	0.00013
Iron	--	4,185	0.0161	14,570	8.58	5,680	0.197
Lead	5.0	356.55	0.0977	27	0.0094	291.35	0.341
Magnesium	--	--	53.4	--	38.5	--	9.98
Manganese	--	--	0.142	--	--	--	5.43
Methylene Chloride	--	0.0035	0.027	0.0045	0.024	0.003	0.027
Nickel	--	51.35	0.0276	14.75	0.0661	9.975	0.0448
Potassium	--	--	8.72	--	--	--	--
Sodium	--	--	605.0	--	602.0	--	601.0
Toluene	--	0.003	0.003	0.0045	--	0.0075	--
1,1,1-Trichloroethane	--	0.003	--	0.004	--	0.003	0.004
Xylenes(total)	--	0.003	--	0.004	0.002	0.003	0.004
Zinc	--	--	2.21	--	0.30	--	6.10

(1) Maximum allowable concentrations of contaminants in Toxicity Characteristic Leaching Procedure (TCLP) leachate. Dashes indicate this is not a parameter under TCLP.

(2) Trench sample TS 13 data. Dashes indicate not detected in sample.

(3) Trench sample TS 17 data. Dashes indicate not detected in sample.

(4) Trench sample TS 20 and duplicate data. Maximum between sample and duplicate is presented. Dashes indicate not detected in sample.

A/RP/SANDOVER/AWB

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