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REMOVAL ACTION WORK PLAN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

AUGUST 1999
REF. NO. 4770 (17)
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LIST OF ACRONYMS/SHORT FORMS

AI	-	Additional Investigation
ARARs	-	Applicable or Appropriate and Relevant Requirements
BGS	-	Below Ground Surface
CERCLA	-	Comprehensive Environmental Response, Compensation and Liability Act
COCs	-	Contaminants of Concern
CRA	-	Conestoga-Rovers & Associates
CY	-	Cubic Yards
CZ	-	Clean Zone
DCC	-	Direct Contact Criteria
DOT	-	Department of Transport
EECA	-	Engineering Evaluation and Cost Analysis
EOC	-	Extent of Contamination
EQ	-	The Environmental Quality Company
EZ	-	Exclusion Zone
FIT	-	Field Investigation Team
GM	-	General Motors Corporation
GSI	-	Groundwater/Surface Water Interface
HASP	-	Health and Safety Plan
HS	-	Holtzman-Silverman Realty Company
MAGLCs	-	Maximum Allowable Ground Level Concentrations
MDNR	-	Michigan Department of Natural Resources
MDEQ	-	Michigan Department of Environmental Quality
NAAQS	-	Federal Natural Ambient Air Quality Standards
OSHA	-	Occupational Safety & Health Administration
PCBs	-	Polychlorinated Biphenyls
PID	-	Photoionization Detector
QAPP	-	Quality Assurance Project Plan
RA	-	Removal Action
RCRA	-	Resource Conservation and Recovery Act
SAP	-	Sampling and Analysis Plan
SOPs	-	Standard Operating Procedures
SVOCs	-	Semi-Volatile Organic Compounds
T&D	-	Transportation and Disposal
TSCA	-	Toxic Substances Control Act
U.S. EPA	-	United States Environmental Protection Agency
VOCs	-	Volatile Organic Compounds

1.0 INTRODUCTION

This Removal Action Work Plan (Work Plan) presents the scope of work to be completed under a Removal Action (RA) at the Textile Road Site (Site) located in Ypsilanti Township, Washtenaw County, Michigan. Conestoga-Rovers & Associates (CRA) has prepared this Work Plan on behalf of General Motors Corporation (GM) and Holtzman-Silverman Realty Company (HS) [collectively GM, HS, and any additional parties are referred to as the Cooperating Parties Group (Group)].

An Extent of Contamination Study (EOC) (CRA 1994a), and an Engineering Evaluation and Cost Analysis (EECA) (CRA 1994b) have been conducted at the Site. These activities were conducted pursuant to the requirements of an Administrative Order by Consent (Consent Order) entered into by the Group and the United States Environmental Protection Agency (U.S. EPA) which became effective on March 10, 1993.

An Additional Investigative (AI) Study (CRA 1995), was conducted by CRA to provide supplemental information to the EOC/EECA Reports. An addendum to the EECA report was prepared in February 1996 presenting a re-evaluation of the on-Site disposal cell and off-Site disposal RA alternatives for the Site. This latter report provided a detailed estimate of soil volumes with respective levels of polychlorinated biphenyls (PCBs) contamination.

1.1 GENERAL

The purpose of the Work Plan is to provide the Site conditions, drawings, specifications, and related information reflecting the RA.

The Work Plan summarizes the information obtained during Site characterization activities including:

i) review of geologic and hydrogeologic conditions at the Site; and

ii) summation of existing Site conditions and delineation of the nature and extent of PCB contamination.

This Work Plan includes all elements of a defined Scope of Work, expanded to a final level of detail addressing:

i) Site preparation activities;

ii) construction support facilities;

iii) environmental controls;

iv) Site safety and contingency plan;

v) soil excavation, handling, and backfilling;

vi) off-Site transportation and disposal requirements;

vii) quality assurance project plans; and

viii) Removal Action schedule.

In addition, construction specifications and construction drawings are included with the Work Plan. These documents were written after due consideration and re-evaluation of the RA alternatives. Off-Site disposal and on-Site consolidation of contaminated soil was selected as the most cost-effective of the environmentally protective alternatives based upon recent approval of a Toxic Substance Control Act (TSCA) disposal permit at a local Michigan landfill operated by The Environmental Quality Company (EQ).

1.2 SITE BACKGROUND

The Site was originally used for agricultural purposes. Ford Motor Company (Ford) sold the property to Elma and Lenor Schultz in the 1940s. The Schultz's subsequently sold the property to Lamar Thumm in 1947. Lamar Thumm initiated gravel extraction operations in approximately 1947. Filling activities at the Site were ceased in May 1973. Gravel sales from existing stockpiles continued until September 1973.

Attention was drawn to the Site in March 1983 when a local resident informed the Michigan Department of Natural Resources (MDNR) of the presence of 55-gallon drums. The drums were subsequently removed and a number of environmental investigations were completed.

The Site background is summarized in further detail in the report entitled *"Summary of Prior Site Investigations and Identification of Data Gaps Report"* (CRA, 1992) which was presented under separate cover.

1.3 SITE DESCRIPTION

1.3.1 LOCATION

The Site is an inactive industrial property located to the southeast of the corner of Textile Road and Bunton Road in Ypsilanti Township, Washtenaw County, Michigan. The location of the Site is presented on Figure 1.1. The Site is bounded to the north by Textile Road, to the west by Bunton Road, to the east by a Ford Motor Company facility, and to the south by an agricultural property. A Site plan is presented on Figure 1.2.

1.3.2 EXISTING CONDITIONS

The Site is generally flat with occasional fill mounds (also referred to as hummocks) located across the Site. Three man-made ponds are located on the Site as shown on Figure 1.2. The ponds were formed after sand and gravel was removed from beneath the groundwater table.

The surface materials at the Site consist of various amounts of earth fill, building rubble, and native soils. The majority of the surface soils are covered with relatively heavy vegetation, including trees, shrubs, and grass.

A gravel road traverses the Site from the entrance point off of Textile Road, southward to the area of the ponds. The gravel road forks at several locations to permit access to various parts of the Site. A cinder block building exists near the entrance point off of Textile Road.

Access to the Site is restricted by the presence of a security fence which completely encloses the Site. Entry to the Site is controlled at two locked truck gates located on each of the northern and southern fence lines.

1.3.3 LAND USE

The current local land use consists of industrial, gravel mining, agricultural, and mixed residential land uses. The Site has been utilized for industrial purposes since the 1940s.

The current zoning for the Site is a mix of commercial and residential. The northern portion of the Site, measuring 430 feet along Bunton Road and 1,019 feet along Textile Road, is zoned B-1: Local Business District. The portion of the Site zoned for

commercial land use consists of approximately 10 acres. The remaining approximately 51 acres of the property is zoned R-4: One Family Residential. The current Site zoning is illustrated on Figure 1.3.

The Group is currently discussing adjusting the commercial/residential zoning boundary with the Charter Township of Ypsilanti (Ypsilanti Township). The RA will be based on the zoning boundary in place at the time of the RA implementation. Any modifications to the zoning at the Site will be discussed with the U.S. EPA as soon as they are agreed to by Ypsilanti Township. The zoning boundary currently being discussed with Ypsilanti Township is presented on Figure 1.4.

1.4 SITE ENVIRONMENTAL SETTING

The purpose of this section is to provide a Site-specific description of the geology, hydrogeology, and hydrology identified at the Site.

1.4.1 SITE GEOLOGY

The Site geology presented in this section is based upon the regional geologic information and the stratigraphic information obtained from 50 boreholes and nine monitoring wells installed at the Site as part of the EOC and AI investigations.

The geology at the Site is divided into the overburden and bedrock. These are in turn subdivided to classify five stratigraphic units:

1. Overburden:
   - upper sand/fill - comprised of: topsoil; fill; sand; gravel; and clay;
   - glacial clay; and
   - lower sands - comprised of: sand; gravel; and silt.
2. Bedrock:
   - Antrim shale; and
   - limestone.

Overburden

The overburden is divided into three stratigraphic layers. The upper most layer consists of mixed sands, gravels, clays, and fill. This layer extends to a depth of 15 feet below

ground surface (BGS) at the north end and approximately 22 feet BGS at the south end of the Site.

A glacial clay deposit exists immediately below the fill material in the area. This clay unit is continuous across the Site. Borehole stratigraphic logs indicate this clay layer extends to a depth of approximately 28 feet BGS at the north end of the Site and 40 feet BGS at the south end of the Site. The thickness of this clay unit ranges from approximately 14 feet at BH5-93 to 18 feet at BH46-93. No evidence of glacial till was identified at the Site.

The lower sands unit is comprised of glacially derived sand, gravel and silt, located below the clay layer. This unit is areally extensive. It extends from depths of approximately 30 to 130 feet BGS and was observed to be approximately 90 feet thick at BH46-93.

Bedrock

The Antrim shale was the first bedrock unit encountered below the Site (at a depth of 130 feet BGS at BH46-93). Limestone bedrock is expected to underlie this shale.

1.4.2 SITE HYDROGEOLOGY

The Site hydrogeology has been characterized through the installation of six shallow and three deep monitoring wells, static water level measurements (in the monitoring wells and the ponds), single well response tests, and laboratory geotechnical tests. In general, the hydrostratigraphic units encountered at the Site are summarized as follows:

1. upper water table zone;
2. clay aquitard;
3. lower sands aquifer; and
4. bedrock shale aquitard.

The upper water table zone exists in the permeable unconsolidated upper sand/fill unit which has been identified to exist from ground surface to a depth of approximately 15 to 22 feet BGS.

During the drilling of the boreholes, a clay stratum was encountered at a depth of 15 to 22 feet BGS with a thickness of 14 to 18 feet. This clay stratum, lacustrine clay, exists

across the entire Site and has been identified throughout Wayne and Washtenaw Counties. Lacustrine clay typically exhibits a hydraulic conductivity of 10^{-7} to 10^{-10} cm/sec. (Freeze/Cherry, 1979). A U.S. EPA Field Investigation Team (FIT) identified an unconsolidated lacustrine clay deposit approximately 2 miles north of the Site. The FIT, in a report titled, "Extent of Contamination Study, Willow Run Site, Washtenaw and Wayne Counties, Michigan" (Jurczak, 1984), dated February 1984, determined the hydraulic conductivity to be on the order of 10^{-8} cm/sec. The hydraulic conductivity of samples collected from the clay stratum on Site were also determined to be on the order of 10^{-8} cm/sec. The thickness and low hydraulic conductivity of this clay stratum effectively serves to limit the downward migration of groundwater from the upper water table zone to the lower sands aquifer.

The lower sands aquifer exists beneath the clay aquitard in the lower sands unit. In the vicinity of the Site, this aquifer is non-Artesian, although it is generally Artesian in the Site region. The local non-Artesian nature of the aquifer may be due to the influence of groundwater extraction in the vicinity of the Site, or possibly, a locally-higher elevation of the stratigraphic contact of the lower sands and overlying glacial clay.

The thickness of the unsaturated lower sands zone ranges from approximately 14 feet at MW3D-93 (BH46-93) to 31 feet at MW2D-93 (BH5-93). The saturated lower sands aquifer zone was observed to be 77 feet thick at MW3D-93.

Underlying the lower sands aquifer is the bedrock shale aquitard formed by the Antrim shale. The Antrim shale was identified at a depth of approximately 130 feet BGS at MW3D-93 (BH46-93).

The groundwater elevation contours for the upper water table zone indicate a general groundwater flow direction of northwest. Based on the observed flow direction, it is expected that the shallow groundwater will ultimately discharge to Ford Lake.

The groundwater in the lower sands aquifer flows north with a slight eastward component indicated in the northern part of the Site. The clay aquitard is a low permeability unit which hydraulically separates the upper water table zone from the lower sands aquifer. The movement of groundwater within the aquitard is orders of magnitude lower than that in the more permeable sand zones.

1.4.3 HYDROLOGY

Precipitation and runoff remains on Site, draining into the existing low areas (such as ditches or depressions) and ponds. As a result, surface drainage waters do not flow directly off Site but become part of the ponds or upper water table zone flow regime. The following identifies the pond elevations on August 19, 1993:

Pond 1	700.4 feet AMSL
Pond 2	699.8 feet AMSL
Pond 3	700.3 feet AMSL

Off-Site ponds had the following elevations:

Pond to southwest of Pond 1	701.2 feet AMSL
Pond to west of Pond 2	700.7 feet AMSL
Pond to north west of Pond 2	700.2 feet AMSL
Pond west of Pond 3	699.0 feet AMSL

The elevations of these ponds are consistent with the groundwater flow directions.

1.4.4 CLIMATOLOGY

Detroit is situated in the Great Lakes Region and is under the climatic influence of the lakes. Extreme temperatures occur infrequently in the Detroit area. According to the Statistical Abstract of the United States (1985), the average annual rainfall is approximately 31 inches, and violent rainstorms are rare. The average windspeed is 10.1 miles per hour (452 cm/sec), and the wind direction is predominantly out of the west.

1.5 REPORT ORGANIZATION

This Work Plan is organized in the following manner:

Section 2.0 Site Characterization Activities

- presents the investigation activities that have been conducted in support of the RA

Section 3.0 Removal Action Activities

- presents a detailed description of the activities to be completed at the Site required by the RA

Section 4.0 Reports

- presents a description of the reports to be completed during the RA;

Section 5.0 Project Schedule

- presents a project schedule for the RA

Section 6.0 Site Operation, Maintenance, and Monitoring

- presents the Operation, Maintenance, and Monitoring requirements for the Site

Section 7.0 Groundwater Monitoring Program

- outlines the requirements of groundwater monitoring at the Site

Section 8.0 Regulatory Issues

- discuss compliance with ARARs and permit requirements for the RA

Section 9.0 References

- provides a list of references for the Work Plan

Also included in this Work Plan are a Sampling and Analysis Plan (SAP) (Appendix A), a Quality Assurance Project Plan (QAPP) (Appendix B); a Health and Safety Plan (HASP) (Appendix C); and the Project Specifications (Appendix D).

2.0 SITE CHARACTERIZATION ACTIVITIES

The following subsections describe Site characterization activities that have been completed at the Site in support of the RA.

2.1 SITE INVESTIGATION

Various environmental media have been sampled at the Site. Chemical analytical data for collected samples were presented in the EOC and AI studies. The chemical distribution in various on-Site environmental media is discussed below.

2.1.1 SURFACE AND BOREHOLE SOILS

During the EOC field activities 10 surface and 106 subsurface borehole soil samples were collected from Site locations. An additional 24 boreholes and 88 soil samples were taken during the subsequent AI. This latter study included the excavation of 11 test trenches. Sample locations are presented on Figure 2.1.

The samples were analyzed for various chemicals including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, pesticides, and inorganics. U.S. EPA Functional Guidelines for Evaluating Organic and Inorganic Analyses were used in the validation of all laboratory data. Comprehensive data reviews are provided in the EOC and AI documents. A summary of the soil sampling results from the EOC is presented below.

- Soil - Upper Sand/Fill

  Table 2.1 presents a summary of the EOC sample results which exceed applicable soil criteria in the Upper Sand/Fill unit. There are no VOCs, SVOCs, or pesticides which exceed the Michigan Act 451, Part 201 Generic Residential Soil Direct Contact Criteria (DCC). Arsenic concentrations exceed the Michigan Act 451, Part 201 Generic Residential Soil DCC value and Site-specific background concentrations, as provided in the EOC, in eight locations. Concentrations of arsenic detected at the Site did not exceed the Michigan Act 451, Part 201, Generic Commercial Category IV DCC at any locations. Arsenic was omitted from the EOC Report list of Chemicals of Concern (COCs) as a naturally occurring constituent. PCBs exceed applicable Michigan Act 451, Part 201 Generic Soil DCC Cleanup Criteria in areas to the north and west of Pond 1. Further discussion on the distribution of PCB contamination at

the Site is provided in Section 2.2. PCBs are the only COC identified for the Upper Sand/Fill Unit.

- Soil - Clay Layer

  No exceedances of the Michigan Act 451, Part 201 Generic Residential Soil DCC occurred in the clay layer located below the upper sand/fill for VOCs, SVOCs, or pesticides. Arsenic exceeded the Michigan Act 451, Part 201 Generic Residential Soil DCC of 6.6 mg/kg in two locations, however, the concentrations were below Site-specific background concentrations as presented in the EOC. No other inorganic compounds exceeded the Michigan Act 451, Part 201 Generic Residential Soil DCC or the Site-specific background concentrations provided in the EOC in the clay layer located below the upper sand/fill.

- Soil - Lower Sands

  No exceedances of the Michigan Act 451, Part 201 Generic Residential Soil DCC occurred in the lower sands unit located below the clay aquitard layer for VOCs, SVOCs, or pesticides. No inorganic compounds exceeded the Michigan Act 451, Part 201 Generic Residential Soil DCC or Site-specific background concentrations provided in the EOC in the lower sands unit located below the clay aquitard layer.

This summary was supported by the results of the AI study. No exceedances occurred for VOCs or SVOCs of the Michigan Act 451, Part 201 Generic Residential Soil DCC. PCB concentrations ranged from below detection to 290 mg/kg.

2.1.2 GROUNDWATER

The location of groundwater monitoring wells is provided on Figure 2.2. Groundwater was sampled and analyzed in rounds 1 and 2 for the EOC Report with the following results.

- Groundwater - Upper Water Table Zone

  Table 2.2 presents a summary of the EOC groundwater sample results which exceed applicable groundwater criteria in the Upper Water Table Zone. Constituents identified at levels elevated above the Michigan Act 451, Part 201 industrial/commercial groundwater cleanup criteria include vinyl chloride, PCBs, bis(2-ethylhexyl)phthalate, and beryllium. It should be noted that bis(2-ethylhexyl)phthalate results were qualified in the EOC as the constituent was detected in the method blank samples and was therefore not included as a COC in

the EOC. Vinyl chloride, PCBs, and beryllium were each detected in one of the four wells sampled in the Upper Water Table Zone.

Acetone was detected at a level which exceeded the Michigan Act 451, Part 201 Residential Drinking Water criteria in one well location during the second round of groundwater sampling. Acetone was considered a laboratory contaminant and not included as a COC in the EOC Report. Phenanthrene was detected at a level which exceeds the Michigan Act 451, Part 201 groundwater criteria for the protection of the groundwater surface water interface (GSI) in one sampling location.

Inorganic constituents identified at levels which exceed background groundwater concentrations as identified in the EOC study report include iron and manganese. Therefore, the Upper Water Table Zone COC's are: PCBs, vinyl chloride, phenonthiene, beryllium, iron, and manganese.

- Groundwater - Lower Sands Aquifer

  Bis(2-ethylhexyl)phthalate was detected at levels which exceed the Michigan Act 451, Part 201 Generic Industrial/Commercial Drinking Water criteria in both samples collected from the lower sands aquifer. As discussed above, bis(2-ethylhexyl)phthalate was detected in the method blank sample, and as a result, was not included as a COC in the EOC.

2.1.3 SEDIMENTS

Seventeen pond sediments were collected from nine locations identified on Figure 2.3. Analysis of these sediment samples produced the following results:

- no exceedances of Michigan Act 451, Part 201 Generic Residential Soil DCC; and
- PCBs were not detected.

In general, the shallow fill/sand to the north and west of Pond 1 was identified to contain PCBs (and associated constituents) at concentrations above the Michigan Act 451, Part 201 generic soil cleanup criteria or Site-specific background values. Groundwater in the affected soil/fill zone (i.e., upper water table zone) to the north and west of Pond 1 was also identified to contain constituents at concentrations above the Michigan Act 451, Part 201 groundwater criteria. The clay aquitard soils, lower sands soil, and pond sediments were identified to be unimpacted by Site-related constituents.

2.2 REMOVAL ACTION ALTERNATIVE SELECTION

The EECA developed, reviewed, and evaluated the following RA alternatives:

Alternative 1	No Action;
Alternative 2	Limited Action;
Alternative 3	Physical Site Containment;
Alternative 3A	Capping;
Alternative 3B	Capping and Groundwater Cutoff Wall;
Alternative 4	Source Removal/Treatment;
Alternative 4A	Solidification/Stabilization and Capping;
Alternative 4B	Solidification/Stabilization, Capping, and Groundwater Cutoff Wall;
Alternative 4C	Solvent Extraction, Solidification/Stabilization, and Capping;
Alternative 4D	Gas-Phase Chemical Reduction, Solidification/Stabilization, and Capping;
Alternative 4E	Low Temperature Thermal Desorption, Solidification/Stabilization, and Capping;
Alternative 4F	On-Site Incineration, Solidification/Stabilization, and Capping;
Alternative 5	Disposal;
Alternative 5A	On-Site Disposal; and
Alternative 5B	Off-Site Disposal.

These alternatives are described in detail in Section 7.0 of the EECA (CRA, 1995).

The detailed analysis of RA alternatives consisted of the refinement and further development of each proposed alternative against the following seven criteria:

- overall protection of human health and the environment;
- consideration of applicable or appropriate and relevant requirements (ARARs);
- short-term impacts and effectiveness;
- long-term effectiveness and permanence;
- reduction of toxicity, mobility and volume;
- implementability; and
- cost.

Additional Site activities during the AI study enabled further definition of the extent of contamination. Isoconcentration contours for PCBs at the 2 to 4, 6 to 8, and 10 to 12 feet BGS are presented on Figures 2.4, 2.5, and 2.6, respectively. In order to estimate the volume of soil containing PCBs the following assumptions were made:

- PCB analytical results for samples collected from the 2 to 4 feet BGS interval represent soil from 0 to 5 feet BGS;
- PCB analytical results for samples collected from the 6 to 8 feet BGS interval represent soil from 5 to 10 feet BGS; and
- PCB analytical results for samples collected from the 10 to 12 feet BGS interval represent soil from 10 to 15 feet BGS.

The estimated volume of soil containing PCBs ranging from 1.2 to 26 mg/kg, 26 to 50 mg/kg, and above 50 mg/kg are presented in Table 2.3. The total estimated volume of soil containing PCBs ranging from 1.2 to 26 mg/kg is 33,860 cubic yards (cy), the total estimate of soil containing PCBs ranging from 26 to 50 mg/kg is 5,100 cy, and the total estimated volume of soil containing PCBs above 50 mg/kg is 6,795 cy. The volume of the on-Site soil excavations were calculated by an AdCADD earthworks program. The program generates the volume between the existing estimated Site condition contours, as surveyed.

A report entitled *"A Re-evaluation of Selected Removal Action Alternatives, Addendum to EECA"* (CRA, 1996) for the Site was prepared by CRA and issued in February 1996. This document reviewed Alternate 5A - On-Site Disposal Cell and Alternate 5B - Off-Site Disposal. A local landfill operated by the EQ has recently received a TSCA disposal permit from U.S. EPA. This significantly reduces the cost for the Off-Site Disposal alternative.

In July 1997, the U.S. EPA published a Proposed Plan for the Site which recommended excavation and off-Site disposal as the best cleanup alternative for the Site. A public meeting and comment period followed publication of the Proposed Plan. During the public comment period, Ypsilanti Township raised the issue of the interplay between the property zoning and the cleanup standards proposed. The EOC and Proposed Plan were both developed based on the Ypsilanti Township Future Land Use Plan, which contemplates that the future land use of the Site will be for "Light Industrial" purposes, rather than for a mix of commercial and residential use, as outlined in the current zoning plan. As a result of discussions between Ypsilanti Township, the U.S. EPA, and the Group, the U.S. EPA has issued a revised Proposed Plan to permit a more flexible

redevelopment of the property. This Work Plan has been prepared to be consistent with the U.S. EPA revised Proposed Plan. The new plan consists of excavation and off-Site disposal of material contaminated above applicable commercial cleanup criteria, and excavation and on-Site consolidation of the remaining material containing PCBs above applicable residential cleanup criteria on the portion of the Site which is to be developed for commercial purposes.

3.0 REMOVAL ACTION ACTIVITIES

3.1 GENERAL

This section presents the rationale and sequence of tasks for the RA. CRA, as Engineer, will provide overall project coordination with direction from the Group, provide oversight services during implementation of RA, collect and manage related data, and develop and prepare the Final Report. CRA will coordinate and manage the procurement of all contractors including: Removal Action Contractor; subcontractor analytical laboratory; and off-Site waste disposal facilities.

The U.S. EPA will be notified of the name and qualifications of each contractor and key subcontractors who will conduct activities at the Site at least 5 days prior to each contractor's mobilization to the Site or as otherwise agreed to by U.S. EPA.

Following procurement of the necessary contractors, work activities to be implemented during the RA will include the following:

- development and implementation of a Site-specific Health and Safety and Contingency and Emergency Response Plan;
- mobilization of construction facilities, material, equipment, and personnel necessary to perform the work;
- provision and maintenance of construction facilities and temporary controls;
- Site preparation including:
  - work zone identification,
  - the provision of utilities,
  - construction of decontamination facilities,
  - construction of staging facilities,
  - construction of access roads, and
  - clearing and grubbing of existing vegetation (as required);
- provision of Site security;
- implementation of environmental controls;
- survey and layout of soil excavations areas;
- excavation of contaminated soil;
- staging/characterization of contaminated soil;
- verification of soil cleanup levels;

- backfilling/grading of excavated areas with appropriate material;
- transportation and disposal of waste material at appropriate disposal facilities in accordance with State and Federal regulations;
- placement of a material cover in areas of the Site zoned commercial at the time of the RA implementation which continue to contain material above Michigan Act 451, Part 201 Residential Cleanup Criteria;
- removal of miscellaneous debris and disposal at appropriate off-Site facilities; and
- RA closeout activities including:
  - surficial cleanup of tracked areas,
  - on-Site restoration,
  - decontamination of Site equipment and facilities,
  - management of wastewaters, and
  - demobilization of construction facilities and equipment from the Site.

A Final Report will be prepared to include these findings, as described in Section 4.2.

The Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) to be utilized during the implementation of the RA are presented respectively in Appendices A and B.

The Site Health and Safety Plan (HASP) (Appendix C) will be implemented prior to work being performed on Site which involves the handling of waste material. The Project Specifications, which provide the specific details for implementation of the RA, are presented in Appendix D.

3.2 COMMUNITY RELATIONS

In general, the role of the selected contractor will be to provide technical support to the Group and U.S. EPA concerning on-Site activities for published information and during public meetings. Any questions regarding Site activities made to the selected contractor, outside of those posed by subcontractors to the selected contractor in performing their responsibilities, will be referred to the Group, or the U.S. EPA for response.

A sign, measuring at least 4 feet by 8 feet, will be located in an accessible, visible location near the main access gate to the Site. The sign will describe the ongoing activities at the Site.

3.3 SITE ACCESS

No Site access issues are anticipated to implement the RA.

3.4 CONSTRUCTION SUPPORT FACILITIES

3.4.1 SITE OFFICE

The selected contractor will be required to provide office trailers for use by the Group and U.S. EPA, in addition to any contractor-required office space. The office trailer locations will be indicated on the selected contractor's Site Layout Plan, and proposed locations are shown on Figure 3.1.

3.4.2 EMERGENCY FIRST-AID FACILITY

The selected contractor will be required to supply and maintain a first-aid facility, which complies with the requirements of 29 CFR 1910.141, during the RA.

3.4.3 FIRE FIGHTING EQUIPMENT

The selected contractor will be required to provide necessary fire fighting equipment to ensure the safety of Site personnel. Details of the fire fighting equipment will be proposed by the selected contractor in the contractor's Site-specific HASP. Coordination will be established with the local Fire Department to respond to emergencies.

3.4.4 DECONTAMINATION FACILITIES

Prior to commencing work in the Exclusion Zone (EZ) at the Site, the selected contractor will be required to supply and operate a personnel hygiene/decontamination facility. The selected contractor will also maintain an equipment decontamination pad at the Site.

3.4.4.1 PERSONNEL HYGIENE/DECONTAMINATION FACILITY

The selected contractor will be required to supply and operate a personnel hygiene/decontamination facility which complies with the requirements of 29 CFR 1910.141.

Wastewater from the personnel hygiene/decontamination facility will be pumped to designated storage tanks for treatment on Site or disposed of off Site.

3.4.4.2 EQUIPMENT DECONTAMINATION FACILITY

An existing decontamination facility is located at the entrance to the Site as shown on Figure 1.2. Additional decontamination facilities will be constructed by the selected contractor in accordance with the details on Figure 3.2, as required.

The selected contractor will have sufficient pumping equipment and piping, to pump all wastewater from the decontamination pad to contractor-supplied wastewater storage tank(s) for treatment on Site or disposal off Site.

All equipment leaving the EZ, will be decontaminated using high-pressure, low-volume hot water and Alconox detergent (or equivalent), if necessary, and will be inspected by the Group's representative prior to entering the Clean Zone (CZ).

Sediments collected on the decontamination pad will be collected and transferred to the material stockpile designated for transportation and off-Site disposal.

3.4.5 PORTABLE SANITARY FACILITIES

Portable toilet facilities will be provided and maintained by the selected contractor in an area outside the EZ. Sanitary wastes will be removed and disposed of off Site, on a periodic basis, in accordance with applicable laws and regulations.

3.4.6 UTILITIES

The contractor will be required to locate and verify the capacity of all aboveground and underground utilities, prior to commencing field activities.

3.4.6.1 POWER

Standard electrical service is available at the entrance to the Site. Any additional power requirements should be available from the trunk line. Power distribution and connections required to perform the work will be installed by the selected contractor.

Backup power shall also be provided by the selected contractor for safety equipment and emergency lighting, as required.

3.4.6.2 POTABLE WATER

The necessary piping to connect the potable water supply to the treatment system, and the personnel hygiene/decontamination facility will be supplied and installed by the selected contractor.

3.4.6.3 SITE COMMUNICATION

Overhead phone lines are available for connection at the entrance to the Site. Portable two-way radios will be available for Site communications, during the performance of the RA, and for any operations in which direct visual and verbal contact is not feasible. The selected contractor will be required to provide two-way radios for use by the Group's representatives, the Site Safety Officer and the security personnel, as necessary. Suitable warning signals such as horns or whistles will be designated for emergencies.

3.4.7 ACCESS ROADS

Access roads will be constructed, as necessary, on Site to allow contaminated material to be loaded onto transportation vehicles and provide a route for transportation vehicles to pass through the decontamination area prior to leaving the Site.

The selected contractor's earth moving operation will be organized to minimize the contamination of imported granular material used for the construction of access roads. Imported granular materials used for the construction of access roads, if any, which contacts contaminated soil, will be transported off Site for disposal, or used as common backfill on Site, as appropriate, based on sampling and characterization of the material. The use of imported granular material will be minimized and will be subject to the Groups approval.

3.4.8 PARKING

Sufficient space for parking for Site personnel will be established by the selected contractor at a suitable on-Site or off-Site location. In the event the established parking area becomes encumbered by specific Site related operations, temporary alternate space will be provided.

3.5 CLEARING AND GRUBBING

The areas associated with access to the soil removal area will be cleared, as required. Cleared vegetation will be chipped on Site and used to support Site restoration activities.

3.6 SITE SECURITY

The existing perimeter fence will be used as a security fence during the RA period. The selected contractor will be responsible for maintaining Site security at all times during the RA construction activities. The selected contractor will inspect, maintain, and repair the perimeter fencing regularly to ensure protection of the public and Site security. The fence will be left in place at the conclusion of the RA.

Warning signs have been erected inside the fence line spaced approximately 100 feet apart along the entire fence line.

The access gates into the Site will be kept closed and locked to prevent uncontrolled and/or unauthorized access to the Site. The access gates will be locked at all times when the Site is unattended.

During active soil handling or until staged soil material are removed from the Site, security will be provided including, as required, a security officer. The security officer will:

i) Limit vehicular access to the Site to authorized vehicles and personnel only.

ii) Provide initial screening of all Site personnel and visitors. A list of authorized personnel and the name of their employer will be available at the Site offices.

iii) Maintain a security log in which documentation is provided of all Site personnel, visitors and deliveries and any security incidents. This log will include the date, name, address, company, time in and time out for each employee and visitor. If unauthorized personnel are observed on Site and refuse to vacate the premises, appropriate law enforcement officials will be contacted for appropriate legal actions.

iv) Maintain a visitor log at the Site. Visitors will not be allowed to enter without the knowledge of the RA contractor and approval of CRA. All visitors will be required to complete training in accordance with the HASP prior to gaining access to the secured areas.

v) Check that all installations are secure and intact on a daily basis. If warning signs are found to be removed, the situation will be brought to the attention of the Group's representative and will be rectified at the earliest possible opportunity.

3.7 ENVIRONMENTAL CONTROLS

3.7.1 FUGITIVE PARTICULATE CONTROL

The selected contractor will prepare a Soil Excavation and Handling Plan which will outline fugitive particulate control measures in accordance with the provisions of Rule 373 of the Michigan Air Pollution Control Commission General Rules. The particulate control measures will be designed to limit the emissions of particulate matter less than 10 microns (PM_{10}) in size which are likely to remain airborne and be carried off Site.

During the performance of the RA, the selected contractor will be responsible for the control of fugitive particulates generated by excavation, transportation, and backfilling of soil. This may involve specific material handling procedures, water misting, or the use of a dust palliative such as calcium chloride. These, or other particulate control measures would be implemented immediately if PM_{10} concentrations determined from particulate monitoring, downwind of the fugitive particulate source, exceeds the action level.

3.7.2 EROSION CONTROL

Site drainage and runoff from contaminated on-Site areas will be directed towards the on-Site drainage collection system. Drainage will also be controlled from on-Site material stockpiles.

In areas where slopes exceed 5 percent grade and at the material stockpiles, soil erosion will be controlled by the selected contractor through the use of siltation fences, straw bales, riprap, sod, or erosion mats, as directed by the Group.

3.7.3 STORMWATER CONTROL

The selected contractor will be required to control stormwater runoff in order to meet the following requirements:

i) direct all stormwater runoff from contaminated areas to the existing on-Site surface water runoff collection and treatment system;

ii) prevent surface water runoff from flowing from contaminated areas to clean areas;

iii) minimize on-Site ponding in excavated areas through use of earthen berms and/or proper grading and by expediting backfilling of excavations; and

iv) ensure that RA activities do not impact stormwater runoff quality.

The selected contractor may also protect excavated areas by the use of polyethylene or similar tarpaulins.

The selected contractor will be required to contain and collect stormwater from the decontamination pad by providing curbing and positive drainage to a collection sump. This stormwater will be transferred from the sump to the selected contractors wastewater treatment system. All wastewater will be managed according to a Wastewater Management Plan to be submitted by the selected contractor.

3.8 SITE-SPECIFIC HEALTH AND SAFETY AND CONTINGENCY AND EMERGENCY RESPONSE PLAN

A Site-specific Health and Safety and Contingency and Emergency Response Plan (HASP) is required to ensure that all remedial construction activities are performed

safely and in accordance with applicable regulatory requirements, and that all persons on Site, the general public, and the environment are protected from exposure to Site-related contaminated material during implementation of the RA constructions activities at the Site. Each contractor involved in RA construction activities at the Site will be required to develop, implement, and maintain their own Site-specific HASP for activities they will perform at the Site.

The basis for the selected contractor's HASP will be the Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926). The HASP will also reflect U.S. EPA guidance's regarding procedures required to insure safe operations at sites containing hazardous or toxic materials.

At a minimum the HASP will address the following:

i) worker medical surveillance;

ii) worker training and Site orientation;

iii) Site Safety Officer designation and responsibilities;

iv) work areas designations;

v) the planned movement of labor, equipment and materials from and between work areas as work progresses;

vi) personnel and equipment decontamination facilities including planned disposal of decontamination waters and wastes;

vii) air monitoring program(s) for the various work areas;

viii) confined space entry program and procedures (if confined space work is anticipated);

ix) personal protective equipment to be used;

x) personal hygiene and decontamination procedures;

xi) respirator protection program and procedures;

xii) emergency and first-aid equipment;

xiii) dust and particulate emission control;

xiv) monitoring and mitigation of worker heat and cold stress;

xv) safety meetings;

xvi) Site communications and posted notices; and

xvii) Site security.

The HASP will be maintained at the Site at all times during the performance of the RA and will be made available to all Site personnel and visitors permitted to enter the exclusion zone.

The selected contractor will prepare an on-Site contingency and emergency response plan to ensure that there are specific sets of standard operating procedures (SOPs) to be followed for different types of emergencies. The plans will be designed to safeguard on-Site personnel, the public, and the environment in the event of an emergency. The plans will be incorporated into the selected contractor's HASP.

The on-Site contingency and emergency response plan will, as a minimum, specify the SOPs for the following potential emergencies:

i) injury to on-Site personnel including contact with contaminated materials;

ii) encountering drums, barrels or canisters during excavation;

iii) detecting excessive gases or vapors as defined in the HASP in an excavation area;

iv) fire on the Site;

v) the unlikely event of a leak of toxic gases from unknown sources such as rupturing of compressed gas cylinders during excavation; and

vi) severe weather events.

The development of this plan will include a meeting with appropriate authorities to discuss and develop the SOPs. An off-Site Emergency Response Coordinator will be identified in the meeting through whom all information and coordination will occur in the event of an emergency. Appropriate authorities may include the Charter Township of Ypsilanti, Fire Department, Hospital, State and City Police, State Department of Transportation, County Health Department, Michigan Occupational Safety and Health Administration and Civil Defense officials.

3.9 SOIL EXCAVATION, HANDLING AND BACKFILLING

3.9.1 SOIL EXCAVATION

The limits of on-Site soil excavation are presented on Figure 3.3. The limits of excavation are based upon U.S. EPA and Group sampling activities and represent the anticipated volume of on-Site soil and material to be addressed during the RA as discussed in Section 2.2 of this Work Plan.

The selected contractor will be required to perform Site excavation activities according to the project specifications (Appendix D). These specifications establish guidelines by which the selected contractor will perform excavation activities to achieve the following requirements:

i) perform tasks in an orderly and safe manner such that the movement and double handling of materials is minimized;

ii) schedule all excavations and movement of soils such that contaminated materials will not be transported over clean areas;

iii) excavation should, where possible, proceed from high ground to lower areas to prevent stormwater runoff being directed from a contaminated area to a clean area;

iv) grade excavation areas to direct stormwater runoff away from excavations; and

v) carry out measures necessary for dust emission control from excavation, soil handling, and transportation activities.

The scheduling of excavation activities will be coordinated so that activities may be completed as early as practical in the RA based on weather/seasonal conditions and the Group's consideration so as to allow expedited restoration of affected areas.

Prior to initiating excavation in Areas 3 and 4, a soil berm will be constructed approximately 50 feet south of the north shore line of Pond 1 as shown on Figure 3.1. The berm will serve to prevent surface water from entering the excavations in the areas immediately north of Pond 1. Following completion of excavation, the northern portion of Pond 1 will be backfilled with clean material to the soil berm constructed to control surface water during excavation (approximately 50 feet).

The strategy and sequencing for excavation and verification sampling of the soils, is as follows:

1) Remove and clear all miscellaneous surface debris in and around the areas to be excavated;

2) Excavate all soils from the discrete depth intervals to the limits of excavation shown on Figure 3.3;

3) Segregate the excavated material into approximate 500 cubic yard stockpiles at the temporary soil stockpile facility, or place excavated material directly into transportation units where applicable, based on the estimated extent of

contamination from previous investigations, visual screening, and screening with a field photoionization detector (PID) of the degree of contamination. Stockpiled material will be sampled based on the sampling procedures outlined in the SAP to determine the appropriate action for the disposal or consolidation of material once the amount of stockpiled materials has reached approximately 500 cubic yards (or less if decided by the selected contractor). Stockpiles will be covered overnight and during precipitation, and will be segregated according to concentration of PCBs. Stockpiles, which are being characterized for off-Site disposal, will be removed from the Site as quickly as possible, and no later than 10 days following excavation. The actions considered for the stockpiled material will consist of the following:

i) PCB concentration less than 1.2 mg/kg; stockpile soil for general backfilling purposes,

ii) PCB concentration 1.2 mg/kg to 26 mg/kg; stockpile material for on-Site consolidation purposes,

iii) PCB concentration 26 mg/kg to 50 mg/kg; dispose of material at Michigan Type II (Act 451, Part 115) landfill, and

iv) PCB concentration >50 mg/kg; dispose of material at TSCA permitted landfill;

It should be noted that material identified on Figures 2.4 and 2.5, as containing PCBs in excess of 50 mg/kg will be placed directly into transportation units for off-Site disposal, as applicable.

4) The open limits of excavation will be screened visually and with a field PID to determine if additional excavation is warranted prior to verification sample collection;

5) Collect verification soil samples under U.S. EPA oversight (conducted by Group's representative) from excavation sidewalls and base to determine if remaining soils meet or exceed the specified cleanup criteria. The verification samples may be split with the U.S. EPA representative, at the discretion of the U.S. EPA;

6) Extend the horizontal and vertical limits of excavation, if necessary, in the areas where verification soil samples indicate that remaining soils are above specified cleanup criteria. The horizontal and vertical extent of additional excavation will be determined by the Group's representative, in consultation with the U.S. EPA's on-Site representative (if required), and will be based upon an evaluation of the parameters which exceed the specified cleanup criteria and their respective concentrations;

7) Collect any groundwater encountered during excavation and any surface water which enters the excavation for treatment at the on-Site wastewater treatment facility or for off-Site disposal at an appropriate facility as discussed in Section 3.13. All wastewater treated on-Site will be tested prior to discharge to Site surface water according to the protocols outline in Section 2.4 of the SAP. Treated water which does not meet discharge requirements will be sent off-Site for treatment/disposal. The selected contractor may wish to install a dewatering system to lower the groundwater in the vicinity of the excavation areas and reduce the amount of groundwater entering the excavation. The dewatering system will be installed such that it does not interfere with identified areas of contaminated soil;

8) Repeat steps 3) and 4) until verification soil sampling demonstrates that remaining soils are below specified cleanup criteria;

The selected contractor will only be allowed to backfill material that meets the cleanup criteria and has been demonstrated to meet the verification and cleanup standards and all quality assurance requirements of the approved QAPP.

3.9.2 SOIL HANDLING

Soil handling will be kept to a minimum to minimize potential fugitive emissions. Soil handling will be limited to necessary screening/segregation of debris that may not be directly placed into transportation units. Whenever possible, the selected contractor will place excavated soil directly into transportation units to minimize fugitive emissions and multiple handling. However, a temporary staging area will be provided by the contractor for waste characterization purposes, if required. Care will be taken when transporting potentially contaminated soils off Site to prevent tracking of contaminated soil.

Soil excavation will be initiated, with additional field screening, using the delineation of PCB concentrations on Figures 2.4, 2.5, and 2.6. As discussed in Section 3.9.1, excavated material will be stockpiled on-Site according to the outlined procedures, and according to the anticipated PCB concentration from Site investigations and field screening. Material will be stockpiled, for characterization into the following stockpiles:

i) material with PCB concentration of less than 1.2 mg/kg;

ii) material with PCB concentration of 1.2 mg/kg or greater to less than 26 mg/kg;

iii) material with PCB concentration of 26 mg/kg or greater to less than 50 mg/kg; and

iv) material with PCB concentration of 50 mg/kg or greater.

Composite samples of each stockpile will be collected to verify the field screening for PCB concentration and proper waste characterization, if applicable. Each stockpile will be maintained so that material one stockpile will not come into contact with other stockpiles. In the event that material from one stockpile comes into contact with another stockpile, the material in question will be added to the stockpile which has the higher PCB concentration for disposal or on-Site consolidation. It should be noted that material identified on Figures 2.4 and 2.5 as containing PCBs in excess of 50 mg/kg will be placed directly into transportation units for off-Site disposal, as applicable.

Debris encountered within an excavation will initially be generally characterized based upon the PCB content of the soils from which it was excavated.

Any debris encountered within an excavation from soils which are designated for off-Site disposal will be managed similarly unless the article(s) has a salvage value and may be readily decontaminated or unless the article(s) may not be accepted for disposal at the selected off-Site disposal facility(ies). If the debris cannot readily be crushed (i.e., large concrete or metal pieces), the debris will be decontaminated by scraping off soil and/or steam cleaning and then staged for verification sampling in accordance with the SAP. Subsequently, based on verification sampling results, the debris will be further decontaminated, or sent off Site for salvage or disposal (Type II or TSCA) as appropriate.

The selected contractor will transport any PCB-contaminated debris which cannot readily be decontaminated to an off-Site permitted facility approved by the Group and U.S. EPA. The actual handling procedures for debris may be refined during the RA based upon the selected contractor's suggestions and the types of debris being encountered. Debris will be decontaminated by the selected contractor according to the decontamination procedures outlined in Subpart S of 40 CFR Part 761, as appropriate. Following decontamination, or determination of PCB concentration, the debris will be transported to an appropriate disposal facility or sent off-Site for reuse, if applicable under 40 CFR 761.

Material failing any of the Site-specific cleanup criteria, but containing less than 50 ppm PCB and meeting TCLP criteria may be disposed at a Michigan Type II (Act 451, Part 115) landfill. Material containing PCBs at a concentration greater than or equal to 50 ppm must be disposed of at a permitted TSCA facility. All material characterization requirements will comply with the receiving facilities operating permit.

3.9.3 SOIL CLEANUP GOALS/VERIFICATION SAMPLING

Throughout the soil excavation and material-handling phase, verification sampling will be conducted to evaluate the limits of the excavation. Soil samples will be analyzed for PCBs to determine if the applicable Michigan Act 451, Part 201 generic cleanup criteria for PCBs has been achieved. The cleanup criteria to be employed during verification sampling consist of the following:

- material located west of Pond 1, in the portion of the Site zoned residential, contaminated with PCBs will be excavated to the Michigan Act 451, Part 201 Generic Residential Soil DCC for PCBs of 1.2 mg/kg (i.e., excavation area 5);
- material located in the northwest corner of the Site contaminated with PCBs will be excavated to the Michigan Act 451, Part 201 Generic Residential Soil DCC for PCBs of 1.2 mg/kg (i.e., excavations areas 1 and 2); and
- remaining areas containing material contaminated with PCBs, which consists of the areas immediately north of Pond 1, will be excavated to the Michigan Act 451, Part 201 Generic Commercial Category IV Soil DCC for PCBs of 26 mg/kg (i.e., excavation areas 3 and 4).

When verification sample results indicate PCB concentrations in the soil are less than the applicable Michigan Act 451, Part 201 Generic Soil DCC, additional soil verification samples will be collected and analyzed for the VOC and SVOC COCs identified in the Upper Water Table Zone groundwater. The frequency and location of PCB verification soil sampling will be conducted in accordance with the Michigan Department of Environmental Quality (MDEQ) Guidance Document, "*Verification of Soil Remediation*" (MDEQ, 1994). The additional verification samples will be collected at the following frequency based on excavation area:

Excavation Area	**No. of Additional Verification Samples**	**Verification Analysis**
Excavation Area 1	2	Vinyl Chloride, Phenanthrene
Excavation Area 2	1	Vinyl Chloride, Phenanthrene
Excavation Area 3	2	Vinyl Chloride, Phenanthrene
Excavation Area 4	2	Vinyl Chloride, Phenanthrene
Excavation Area 5	2	Vinyl Chloride, Phenanthrene

The additional verification sample results will be compared to the Michigan Act 451, Part 201 Generic soil criteria for the protection of the GSI for vinyl chloride (300 µg/kg) and phenanthrene (2,300 µg/kg).

In order to determine which guidance should be applied to verification sampling at the Site, the area of the base and sidewalls for each excavation location was estimated using the largest limit for each excavation, as shown on Figure 3.3. Table 3.1 presents a summary of the area of the base (area of floor) and sidewalls for all excavation locations. Due to the close proximity of areas 3 and 4, the two areas have been combined to estimate the required verification sampling. As shown in Table 3.1, excavation area 2 is less than 10,890 ft^2 and is considered a small site. The area of excavation areas 1, combined 3 and 4, and 5 fall in the medium site size of 10,890 to 130,680 ft^2.

The small site cleanup verification guidance for excavation remedies is based on a biased sampling strategy to verify that soil contamination has been remediated. The biased sampling approach recommends that verification soil samples be collected from areas most likely to still exceed specified cleanup criteria. The location of the soil sample points relies on a site-specific analyses of contaminant distribution and the soil types encountered.

The guidance document specifies the minimum number of excavation floor and sidewall samples required to be collected in order to demonstrate verification using a point-by-point comparison with the appropriate specified cleanup criteria. If the specified cleanup criteria are exceeded at any point, additional excavation at that point may be required until the specified cleanup criteria are achieved. The Guidance Document specifies the minimum number of floor and sidewall samples that should be collected from small excavation Sites. According to the Guidance Document, 3 samples are required for a floor area of 900 square feet and 10 side well samples are required for a side well area of 5,440 square feet. Therefore, 13 samples are required from excavation area 2.

The medium site cleanup verification guidance for excavation remedies is based on a sampling grid network. The approach recommends the establishment of a sampling grid based on the sidewall and floor area at the excavation. For area 1, combined 3 and 4, and 5 the sampling grid interval calculated based on the guidance ranges from 15 to 40 feet. The minimum interval for medium sites is 15 feet. The exact guide layout will be established based on the final excavations.

The guidance document specifies that a minimum of 12 samples, or 25 percent of the grid stations, whichever is larger, be sampled and analyzed to allow a large enough data

pool for statistical analysis. The grid stations will be selected at random using the random number table and procedures for selection of random sample locations provided in the guidance document.

Samples collected for PCB analysis will be processed with a rapid turnaround time (approximately 24 to 48 hours). Following the receipt of analytical data, the 95 percent confidence level concentration will be determined subject to the requirements for statistical validity identified in MDEQ's guidance document. If required, additional excavation and sampling will be conducted. Additional verification sampling requirements are presented in the guidance document.

Following completion of the excavation and verification sampling, one surface water sample will be collected from the north end of Pond No. 1 and analyzed for the COCs identified in the Upper Water Table Zone to confirm that excavation activities have not impacted site surface water.

3.9.4 BACKFILLING/FINAL GRADING

Excavations will be backfilled with material that has been stockpiled and determined acceptable for the intended backfill location during excavation activities. Additional material required to complete excavations to grade will be taken from borrow areas along the shoreline of Pond 1. The borrow material will be removed from Pond 1 such that the final shoreline is contoured to be consistent with the proposed Site development. Material which contains PCBs in concentrations in the 1.2 mg/kg to 26 mg/kg range will be used to backfill excavation areas 3 and 4, which are located on the portion of the Site zoned B-1: Local Business. All other excavations will be backfilled with excavated material that is determined to contain PCBs in concentrations less than 1.2 mg/kg or which is collected from on-Site borrow areas.

Fill material will be placed in excavations and compacted using appropriate compaction equipment as direct by the Group's representative. Figure 3.4 provides a proposed final grading plan for the Site. The actual final grading may be modified during completion of the RA once the exact volume of material excavated and disposed of off Site or staged for on-Site consolidation is determined. The final grades will be established to match the existing grades outside the limits of excavations and promote surface water drainage to existing ponds.

Following completion of backfilling activities, the portions of the Site which continue to house material containing PCBs above 1.2 mg/kg (the consolidation area), will be

covered with additional material from the borrow area, to form a protective layer and eliminate possible direct contact with the material. Six to 8 inches of topsoil will be placed over the entire consolidation area and all excavation areas to enable the establishment of a vegetative cover. The entire consolidation area and excavation areas will be seeded and mulched to establish vegetative cover. The consolidation and cover area will be located on the portion of the Site which is zoned commercial at the time of the RA implementation.

3.10 TRANSPORTATION AND DISPOSAL

The selected remedial contractor will be required to prepare and submit a Transportation and Disposal (T&D) Plan to the Group.

The T&D Plan will describe procedures to be employed during the RA to ensure compliance with all appropriate Federal, State and local regulations for any contaminated material that is removed, transported, and disposed at off-Site permitted facilities.

The key elements of the contractors T&D Plan will include:

i) appropriate U.S. EPA and Department of Transport (DOT) licensed and approved vehicles;

ii) driver training and certification;

iii) designated transportation coordinator to ensure appropriate scheduling;

iv) development of transportation routing plan (primary and potential secondary routes to each approved disposal facility);

v) development of emergency response plan to respond in the event of an off-Site spill or threat of release;

vi) vehicle inspection and maintenance program;

vii) providing all appropriate notifications regarding transportation of contaminated materials; and

viii) check and obtain verification as to the compliance status of the off-Site disposed facilities.

3.11 FUGITIVE AIR EMISSIONS MONITORING

The selected contractor will be required to monitor for fugitive air emissions from soil excavation, handling, and backfilling operations.

VOC and fugitive particulate (PM_{10}) at work zone boundary locations will be monitored in accordance with Section 19.0 of the HASP. If the PM_{10} concentrations at the Site boundary exceed a predetermined action level, particulate control measures will be employed. PCB air monitoring will be conducted at the Site boundary to confirm the results of the PM_{10} monitoring as discussed in Section 3.12.

The selected contractor will conduct Site boundary monitoring for PM_{10} and VOCs to establish a baseline (i.e., background) to evaluate the impacts of Site activities on air quality prior to initiating RA activities. The baseline monitoring shall be conducted on a regular basis for a minimum of 3 days prior to initiation of excavation activities.

Action levels have been established to determine when mitigation measures are necessary. Mitigation measures may include engineering controls, modifying work methods, or other measures. The applicable action levels are presented in Section 19.4 of the HASP. The following summarizes the action levels to determine when mitigation measures are necessary.

	Respirable Dust	*Total Organic Vapor*
Work Zone	2.5 mg/m^3	10 ppm
Site Perimeter	0.1 mg/m^3	1 ppm

3.12 PERIMETER AIR MONITORING

The Engineer will undertake a perimeter air monitoring program to evaluate potential public exposure to fugitive air emissions resulting from the RA at the Site. The perimeter air monitoring program is in addition to air monitoring being conducted by the selected contractor as described in Section 3.11.

Perimeter air monitoring will consist of VOC, fugitive (PM_{10}), and PCB monitoring as outlined in Section 19.0 of the HASP. Action levels for VOC and PM_{10} to determine when mitigation measures are necessary are also provided in the HASP and Section 3.11. The action level for PCB monitoring to determine when mitigation measures are necessary is 1,200 $\mu g/m^3$ as discussed in the HASP.

At a minimum, one upgradient and two downgradient sampling locations will be utilized. As necessary, based upon the complexity of site RA activities and the magnitude and direction of wind related to potential off-Site receptors, a third downwind sample location will be utilized. Sampling locations will be established immediately inside the perimeter fencing by the Group's representative, subject to the approval of U.S. EPA's Site representative.

Air monitoring will be conducted for a minimum of three days prior to the initiation of excavation activities to establish baseline (i.e., background) levels. Upon initiation of excavation activities, air monitoring will be conducted on a twice daily basis for VOCs and PM_{10}. This frequency may be decreased, subject to the approval of the U.S. EPA in consultation with the U.S. EPA, if results confirm that RA activities are protective of the public. PCB perimeter air monitoring will be conducted on a 24-hour basis following initiation of excavation activities. PCB air monitoring shall be terminated following four consecutive 24-hour periods of monitoring below the Site action levels.

3.13 WASTEWATER MANAGEMENT

The contractor shall provide an on-Site surface water runoff collection and on-Site treatment system to treat the following wastewater:

i) surface water;

ii) water collected from construction dewatering;

iii) groundwater entering excavation areas; and

vi) wastewater from the personnel and equipment decontamination facilities.

The permitting, design, construction, operation, and maintenance of the treatment system and all the necessary piping and appurtenances to transport the wastewater will be the responsibility of the selected contractor.

The selected contractor will submit a Wastewater Management Plan which, at a minimum, will specify the following:

i) storage tank sizes, piping and pump requirements;

ii) surface water controls to minimize contact with contaminated soils;

iii) emergency procedures in the event of a leak or spill of wastewater; and

iv) details of additional wastewater treatment processes, if required.

As an alternate, the contractor may elect to provide off-Site transportation and disposal of wastewater. Storage tanks will be located on Site for collection and interim storage. The contractor will be responsible for all pumping, piping, and related connections. The integrity of the storage tanks will be maintained and inspected daily.

Representative samples of the wastewater will be collected and profiled at a permitted, commercial treatment facility. All transportation and disposal facilities will require pre-approval by the Group.

In the event that the wastewater cannot be treated on-Site to meet surface water discharge requirement, the wastewater will be sent off-Site to a commercial treatment facility.

4.0 REPORTS

4.1 PROGRESS REPORTS

Written progress reports will be submitted monthly, beginning 30 calendar days after the date of approval of the Work Plan. These progress reports will be submitted until termination of the RA, unless otherwise directed by the U.S. EPA. The monthly progress reports will contain the following:

- a description of all significant developments during the reporting period;
- a description of work performed and any problems encountered;
- analytical data received during the reporting period; and
- developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

4.2 FINAL REPORT

A Final Report will be submitted to U.S. EPA for review 60 calendar days after the completion of all RA activities. This Final Report will contain the following:

- a summary of actions taken to complete the RA;
- a listing of quantities and types of materials removed off Site or handled on Site;
- a summary of the analytical results of all sampling and analysis performed;
- a summary of any field observations made during sampling activities;
- a description of the nature and extent of any contamination encountered at the Site;
- a discussion of removal and disposal options considered for materials removed;
- a listing of the ultimate destinations of the materials removed;
- copies of all manifests for the materials removed; and
- appendices containing relevant documentation generated during the RA.

The Final Report will include the start and completion dates of each removal activity.

The Final Report will include the following certification signed by a person who supervised or directed the preparation of the report:

"Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete."

5.0 PROJECT SCHEDULE

A project schedule is presented on Figure 5.1. The schedule presents project tasks in a sequence that will expeditiously implement Site RA activities. These activities will:

1) minimize the potential threat of direct human contact with hazardous substances and/or contaminated soil;
2) completion of a soil removal program; and
3) Institute site controls and groundwater monitoring program.

6.0 SITE OPERATION MAINTENANCE, AND MONITORING

A Site-specific Operation Maintenance, and Monitoring Plan (OM&M Plan) will be developed to monitor groundwater and to ensure the safe and effective implementation, operation, and maintenance of the cover system associated with the consolidation area. A draft OM&M Plan will be prepared and submitted to the U.S. EPA for approval prior to implementation of the RA. The final OM&M Plan shall be completed and submitted to the U.S. EPA prior to completion of the RA.

The OM&M program shall address inspection and maintenance issues associated with the cover system. The cover system will be constructed of soil material and vegetative cover to prevent direct contact with contaminated material remaining on Site. The cover system will have no operational requirements.

The OM&M Plan shall address the following:

- inspection requirements, including frequency and recording keeping requirements;
- maintenance requirements, such as maintenance of vegetative cover and routine repair of cover damage due to erosion, wildlife, deep-rooted weeds, or other foreign vegetation;
- problem identification and corrective actions;
- remedial works;
- sampling frequency and analyses of groundwater monitoring wells;
- maintenance record; and
- O&M reporting requirements.

Additional monitoring requirements, outside of those discussed for groundwater in Section 7.0, are not required for the Site.

The OM&M Plan will outline a specific inspection and maintenance schedule. The inspection and maintenance schedule will continue for a period of 3 to 5 years or to such a time that a permanent cover system, such as asphalt or concrete, is installed which does not require inspection and maintenance, as approved by the U.S. EPA. The inspection and maintenance program will be periodically evaluated to determine if changes to the frequency and type of inspection and maintenance are warranted. Any proposed changes to the OM&M Plan will be submitted to the U.S. EPA for review and approval prior to implementation.

7.0 GROUNDWATER MONITORING PROGRAM

Following completion of the RA, a groundwater monitoring program will be implemented. The purpose of the groundwater monitoring program is to evaluate the effectiveness of the RA. Based on the groundwater sample data collected during the EOC Study, sample collection from the five shallow groundwater monitoring wells will be required to meet the objectives of the monitoring program. The proposed groundwater monitoring locations are presented on Figure 7.1.

Monitoring will be conducted on a quarterly basis for the first year, semi-annual basis for the second year, and on annual basis thereafter subject to U.S. EPA review and approval of the data for each event. The monitoring will be conducted for a period of 30 years or until such time that U.S. EPA agrees the groundwater monitoring can be discontinued. Groundwater samples will be analyzed for the COCs identified in Section 2.0. Sampling protocols are provided in Section 2.5 of the SAP. Groundwater analytical protocols are provided in the QAPP.

Groundwater analytical results will be compared to the pertinent Michigan Public Act 451, Part 201 groundwater standards. The monitoring program will be evaluated following each sampling event to determine if changes to the program are warranted. If the parameter is below applicable standards in all monitoring wells for two consecutive sampling events, that parameter will be removed from the analyte list. The following provides the systematic review process which will be utilized to evaluate groundwater monitoring data above applicable standards:

1. If the parameter concentration is above applicable standards in one or more monitoring wells, monitoring of the parameter will be continued to verify the trend of the monitoring data (i.e., increasing, decreasing, or remaining the same). The evaluation of the trend will be based on a statistical analysis;
2. If the parameter concentration is above applicable standards and is maintaining an equilibrium, or reducing, the monitoring program will be continued subject to a yearly review; and
3. If the parameter concentration is above applicable standards and is increasing, the monitoring program will be continued while development of a groundwater contingency program is evaluated.

The monitoring data will be evaluated for trends for the various constituents with respect to time. The approach for evaluation of trends will be to fit a straight regression line to the data and to determine if the slope of the regression line is significantly

different from zero. The trend analysis will be performed only for those wells and constituents where a significant percentage of the analytical results are above detection limits. This evaluation will indicate data trends that can be incorporated into the monitoring program annual review.

An annual report will be prepared which will document sampling activities, present analytical results, and provide an evaluation of the data with respect to the performance of the RA.

8.0 REGULATORY ISSUES

8.1 COMPLIANCE WITH ARARs PLAN

This plan is provided to assure that ARARs are properly incorporated into the RA for the Textile Road Site. All controlling parameters as required by the ARARs will be identified and addressed during the RA.

The following provides a more general account of the significant ARARs which will or may be implemented:

i) TSCA (15 USC Sect. 2601 et seq.) sets forth standards applicable to materials containing PCBs with a concentration exceeding 50 ppm;

The off-Site treatment/disposal of PCB contaminated soil and debris with concentrations exceeding 50 ppm will be required to meet 40 CFR 761.60.

ii) RCRA generator standards in 40 CFR 262 and Michigan Act 451, Part 111, which sets forth standards applicable to generators of hazardous waste.

iii) RCRA transporter standards in 40 CFR 263 and Michigan Act 451, Part 111, set forth standards applicable to transporters of hazardous waste.

Transporters of hazardous waste will maintain the proper permits and adhere to the applicable Standards for proper identification number, reporting and manifest system. Transporters will be evaluated for compliance with U.S. EPA and DOT requirements prior to transportation of waste.

iv) RCRA land disposal restrictions in 40 CFR 268 which set forth prohibition and restrictions on land disposal, including treatment standards for certain waste.

Material failing the appropriate TCLP criteria will require stabilization prior to off-Site disposal or, alternatively, may be stabilized at the off-site disposal facility.

v) Michigan Solid Waste Management Regulations (Act 451, Part 115) regulates the storage, treatment, transportation and disposal of solid waste.

vi) Federal National Ambient Air Quality Standards (NAAQS).

The NAAQS specify the maximum concentration of a pollutant which is to be permitted in the ambient air, as an average over a specified time period. The NAAQs will be maximum allowable ground level concentrations (MAGLCS).

vii) State Air Regulations incorporated in the Michigan Air Pollution Act (Act 348).

viii) OSHA general industry standard in 29 CFR 1910.120 specify occupational safety and health standards for hazardous waste activities under CERCLA.

All personnel involved with on-Site activities at the Site will adhere to the HASP, which strictly follows the requirements set forth in 29 CFR 1926 specifying the 8-hour time weighted average concentration for various substances.

Following the predetermined Site air monitoring program, ambient air will be monitored. The Site health and safety officer will be responsible for assuring compound specific time weighted averages for on-Site worker exposure are not exceeded.

ix) OSHA recordkeeping and reporting in 29 CFR 1904 set forth recordkeeping and reporting for employers.

All pertinent records for on-Site workers regarding medical monitoring, fit testing and training will be maintained by their perspective employer. Records will be kept for the stipulated time frame with required annual updates. Records will be available for review to authorized agencies upon request.

8.2 PERMIT REQUIREMENT PLAN

The Permit Requirement Plan is required to satisfy permitting requirements for the RA at the Textile Road Site. The plan considers U.S. EPA, MDEQ, and local agency requirements as they apply to activities associated with the RA. It is recognized that under Section 121(e) of CERCLA actual permits are not required for CERCLA actions which occur within the area of contiguous contamination; however, the substantive requirements of applicable permitting authorities must be met.

The following is a list of permitting authorities which must be satisfied for the completion of the RA at the Site:

i) Ypsilanti: Combined Utility Authority

- permit requirements if on-Site wastewater treatment is discharged to the local sanitary sewer system; and

ii) Ypsilanti Township: Erosion Control Plan

- a Soil Excavation and Handling Plan will be prepared to include erosion control requirements consistent with the requirements of Ypsilanti Township prior to implementation of excavation activities.

9.0 REFERENCES

CRA, 1992 "Summary of Prior Site Investigations and Identification of Data Gaps Report", EOC/EECA Study, Textile Road Site, Waterloo, Ontario, November 1992.

CRA, 1994a "Task 8, Extent of Contamination (EOC) Study Report, Textile Road Site", Waterloo, Ontario, February 1994.

CRA, 1994b "Engineering, Evaluation, and Cost Analysis (EE/CA) Report, Textile Road Site", Waterloo, Ontario, November 1994.

CRA, 1995 "Additional Investigation Study Report, Textile Road Site", Waterloo Ontario, December 1995.

CRA, 1996 "Re-Evaluation of Select Removal Action Alternatives: Addendum to EE/CA, Textile Road Site", Waterloo, Ontario, February 1996.

Freeze, R.A. and J.A. Cherry "Groundwater", Pontice-Hall, New Jersey. 1979.

Jurczak, E.J., 1984 "Extent of Contamination Study, Willow Run Creek Site, Washtenaw and Wayne Counties", U.S. EPA Field Investigation Team, TTD No. R05-8168-06A, February 1984.

MDEQ, 1994 "Guidance Document Verification of Soil Remediation", Environmental Response Division, Waste Management Division, April 1994, Revision 1.

TABLE 2.1

SUMMARY OF EOC SAMPLE RESULTS
EXCEEDING APPLICABLE SOIL CRITERIA IN UPPER SAND/FILL UNIT
TEXTILE ROAD SITE, WASHTENAW COUNTY, MICHIGAN

Parameter	*# Occurrences/ Analyses*	*Range (mg/kg)*	*Background*		*Michigan Type B (3) (mg/kg)*	*Michigan Type C (3) (mg/kg)*	*Direct Contact Criteria (4)*		*Site COC*
			State Default	*Site-Specific(2)*			*Generic Residential (mg/kg)*	*Generic Commercial Cat. IV (mg/kg)*	
PCBs									
Aroclor-1254 (1)	42/95	0.041-310	NA	NA	1.0	7.5	1.2	26	Yes
Aroclor-1260 (1)	10/95	0.044-24	NA	NA	1.0	7.5	1.2	26	Yes
VOCs									
None									
BNAs									
Benzo(a)anthracene (1)	6/14	0.36-3.0	NA	NA	0.33	2.1	14.0	680	No
Benzo(b)fluoranthene (1	6/14	0.022J-1.6J	NA	NA	0.33	2.1	14.0	680	No
Benze(a)pyrene (1)	3/14	0.055-0.65	NA	NA	0.33	2.1	1.4	68	No
Chrysene (1)	5/14	0.026J-0.26J	NA	NA	0.33	2.1	1,400	68,000	No
Hexachlorbenzene (1)	2/14	0.024J-0.85	NA	NA	0.8	9.4	6.2	310	No
Inorganics									
Arsenic	16/16	3.6J-65	5.8	9.6	0.72	29.0	6.6	330	No (5)

Notes:

(1) - Parameter identified as COC in EOC Study Report.
(2) - Site-Specific Background values as calculated and presented in EOC Study Report.
(3) - Michigan Type B/C cleanup values consistent with MERA Operation Memorandum #8 & #14 as referenced in the EOC Study Report.
(4) - Michigan Act 451, Part 201 Generic Cleanup Criteria, May 1999.
(5) - Omitted from EOC Study Report COC list as naturally occurring constituent.

[ ] - Exceeds associated soil cleanup level.

TABLE 2.2

SUMMARY OF EOC SAMPLE RESULTS
EXCEEDING APPLICABLE GROUNDWATER CRITERIA IN UPPER WATER TABLE ZONE
TEXTILE ROAD SITE, WASHTENAW COUNTY, MICHIGAN

Parameter	*# Occurrences/Analyses* *Round 1*	*Round 2*	*Range (mg/L)*	*Background Site-Specific (2)*	*Michigan Type B (3)*	*Michigan Type C (3)*	*Residential Drinking Water (4)*	*Ind/Comm Drinking Water (4)*	*GSI Criteria (4)*	*Site COC*
PCBs										
Aroclor-1254 (1)	1/6	1/6	0.0084-0.012	NA	0.0002	0.0002	0.0005	0.0005	IP	Yes
VOCs										
Acetone	4/6	8/6	0.014-1.7	NA	0.7	2.1	0.73	2.1	1.7	No (5)
Benzene (1)	1/6	1/6	0002-0.003	NA	0.0012	0.012	0.005	0.005	0.2	No
Vinyl Chloride (1)	1/6	1/6	0.009-0.014	NA	0.001	0.001	0.002	0.002	0.015	Yes
BNAs										
Benzo(k)fluoranthene (1)	1/6	–	0.005	NA	0.005	0.005	0.012	0.048	NA	No
Bis(2-ethylhexyl)phthalate	4/6	6/6	0.003JB-0.42B	NA	0.0025	0.006	0.006	0.006	IP	No (5)
Phenanthrene	2/6	1/6	0.003J-0.011J	NA	0.025	0.075	0.026	0.075	0.005	Yes
Inorganics (Filtered)										
Beryllium	–	1/6	0.0053	0.0025	NV	NV	0.004	0.004	1.2	Yes
Iron	6/6	6/6	0.25-10	0.65	ID	ID	0.3	0.3	NA	Yes
Manganese (1)	6/6	6/6	0.020-0.82	0.106	0.17	0.5	0.05	0.05	NA	Yes

Notes:

(1) - Parameter identified as COC in EOC Study Report.
(2) - Site-Specific Background values as calculated and presented in EOC Study Report.
(3) - Michigan Type B/C cleanup values consistent with MERA Operation Memorandum #8 & #14 as referenced in the EOC Study Report.
(4) - Michigan Act 451, Part 201 Generic Cleanup Criteria, May 1999.
(5) - Omitted from EOC Study Report COC list as laboratory contaminant.
NV - No Value
ID - In Development

[ ]- Exceeds associated groundwater cleanup level.

TABLE 2.3

ESTIMATED VOLUME OF SOIL CONTAINING PCBs
TEXTILE ROAD SITE, REMOVAL ACTION WORK PLAN
WASHTENAW COUNTY, MICHIGAN

Depth	*Volume (CY)*		
(ft. BGS)	*1.2 to 26 mg/kg*	*26 to 50 mg/kg*	*50+ mg/kg*
0 - 5' (1)	13,495	3,200	4,040
5 - 10' (2)	17,850	1,900	2,755
10 - 15' (3)	2,515	--	--
TOTAL	33,860	5,100	6,795

Notes:

CY Cubic yards.
(1) Assumed soil at a depth of 0 to 5 feet bgs is represented by samples collected from 2 to 4 feet bgs.
(2) Assumed soil at a depth of 5 to 10 feet bgs is represented by samples collected from 6 to 8 feet bgs.
(3) Assumed soil at a depth of 10 to 15 feet bgs is represented by samples collected from 10 to 12 feet bgs.

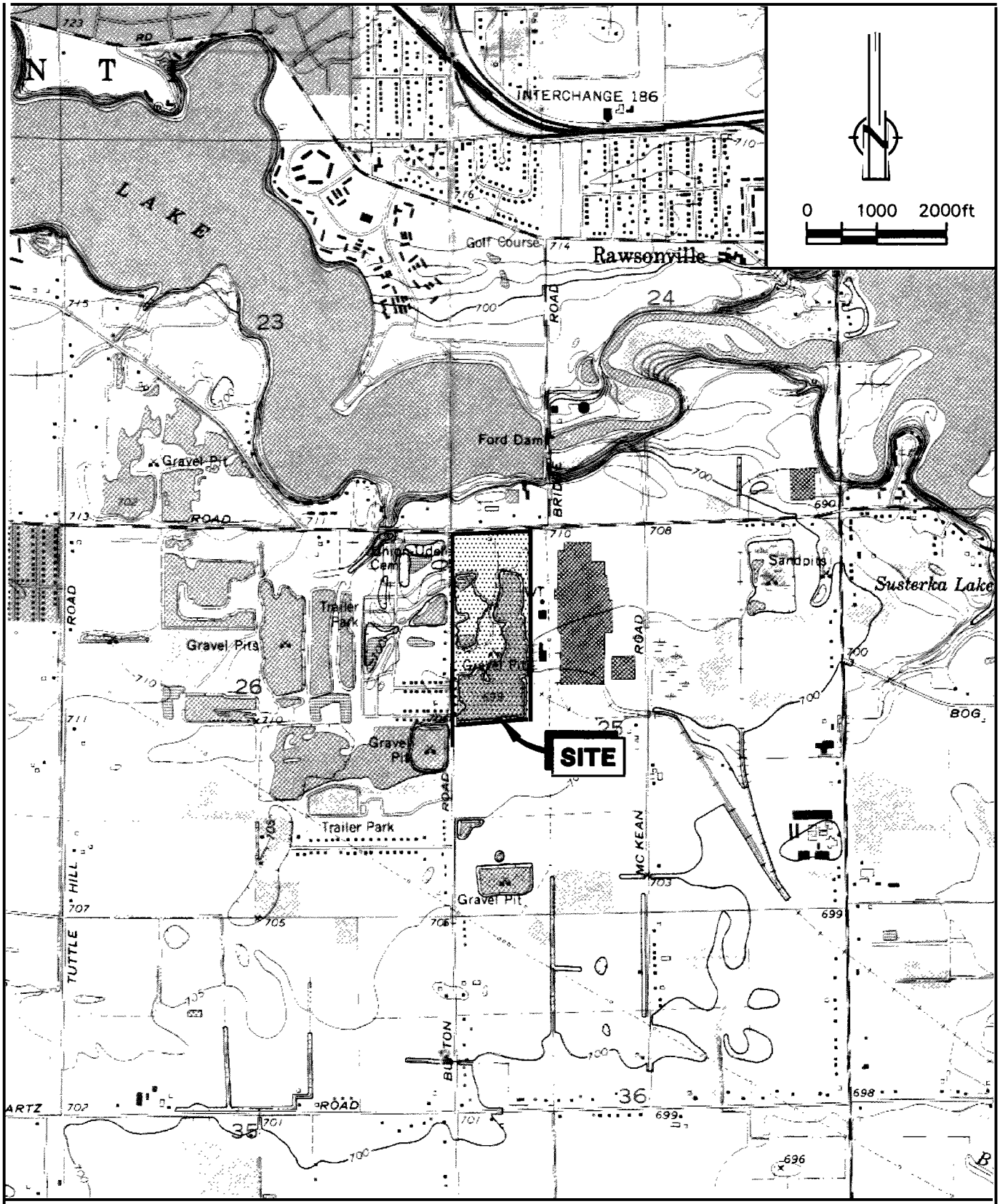
TABLE 3.1

VERIFICATION SAMPLING EXCAVATION AREA SUMMARY
TEXTILE ROAD SITE, REMOVAL ACTION WORK PLAN
WASHTENAW COUNTY, MICHIGAN

Excavation Area	*Expected Excavation Depth (ft)*	*Estimated Floor Area (ft^2)*	*Estimated Sidewall Area (1) (ft^2)*	*Total Estimated Area (ft^2)*	*Type of Cleanup*
1	10	29,700	15,300	45,000	Medium
2	10	900	5,440	6,340	Small
3	10	--	--	--	
4	10	--	--	--	
3&4	10	45,000	22,000	67,000	Medium
5	10	19,500	11,200	30,700	Medium

Notes:

(1) Assume 2 horizontal to 1 vertical slope on sidewalls.



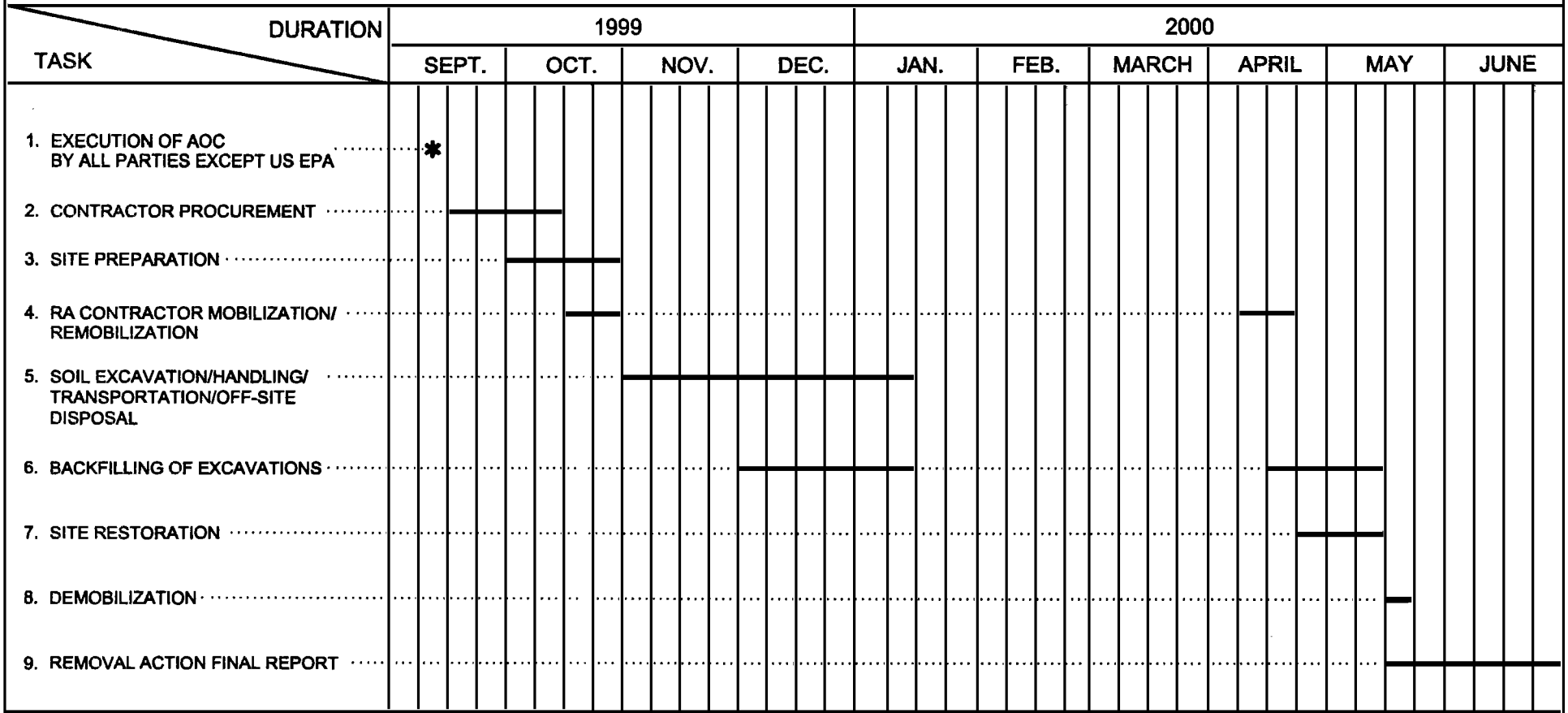
SOURCE: USGS QUADRANGLE MAP,
YPSILANTI EAST, MICHIGAN

CRA

figure 1.1

SITE LOCATION
TEXTILE ROAD SITE
Washtenaw County, Michigan

04770-00(017)GN-WA015 JUL 30/1999



LEGEND

CONTINUOUS ACTIVITY

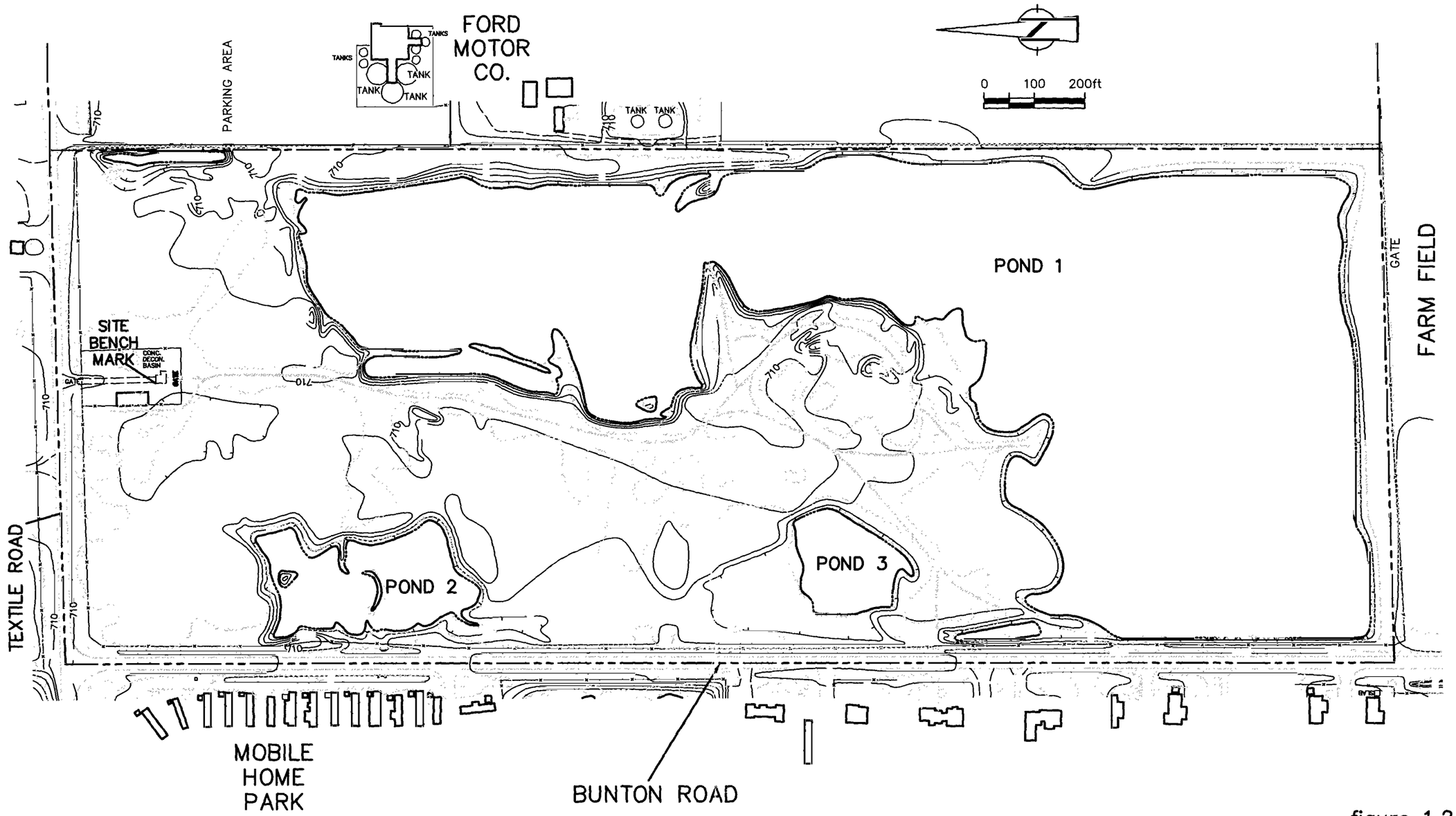
EVENT

figure 5.1

PROJECT SCHEDULE
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-50(MEMO051)GN-WA001 SEP 16/1999


FORD
MOTOR
CO.
TANKS
TANK
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TANK
TANK
PARKING AREA
0
100
200ft
L
710
718
710
710
710

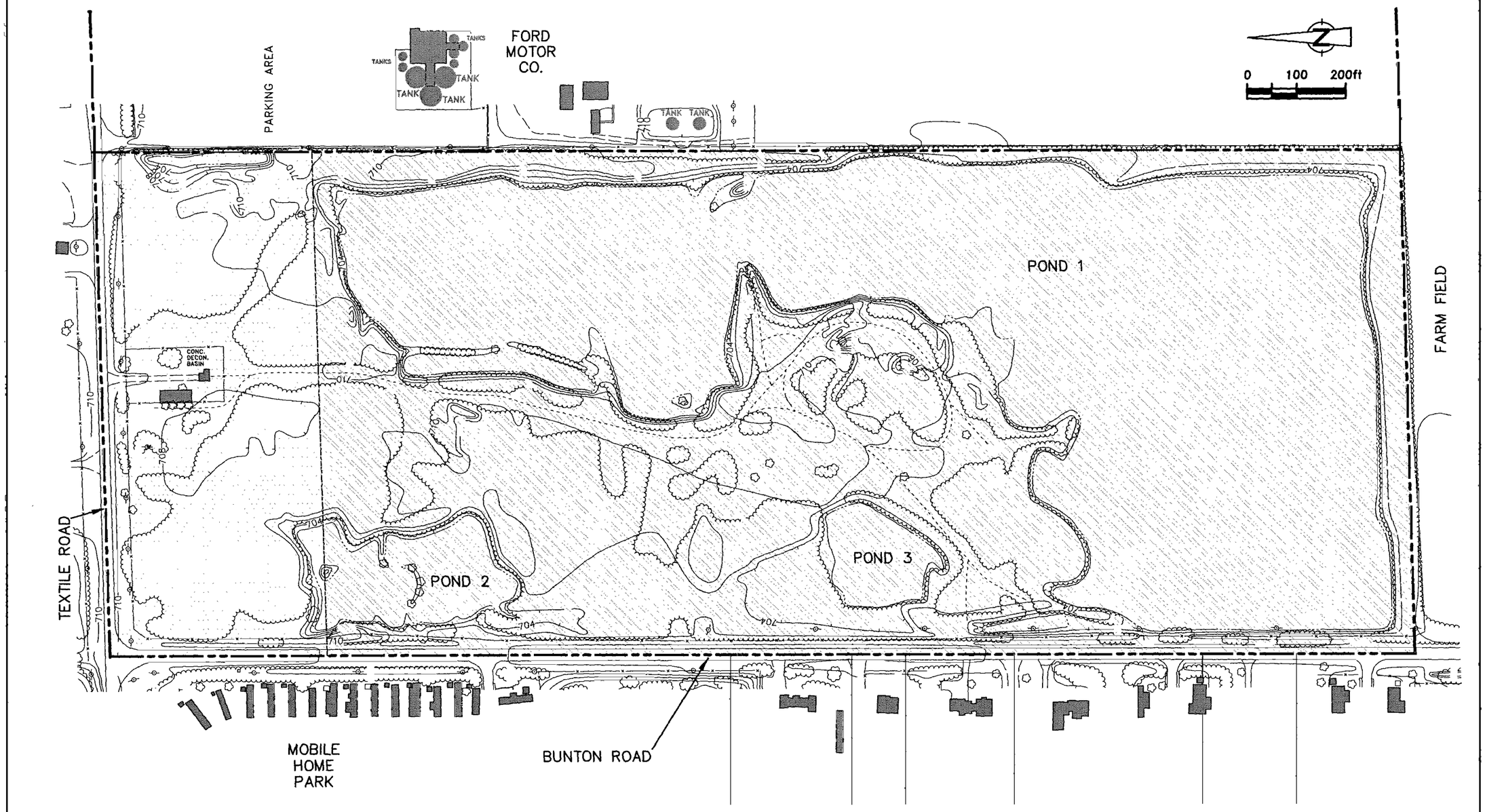


figure 1.3
CURRENT ZONING PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-00(017)GN-WA014 NOV 11/98

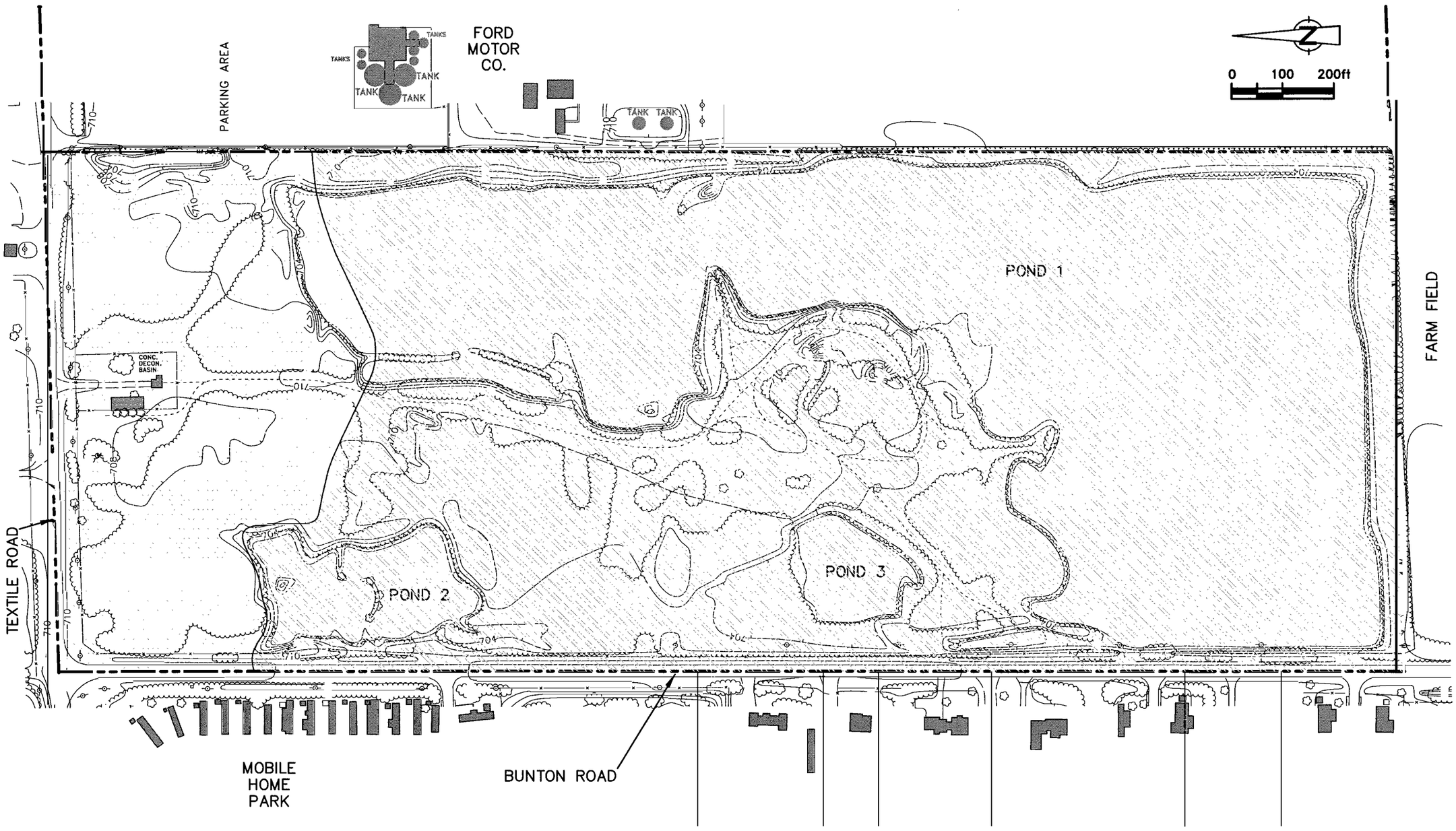
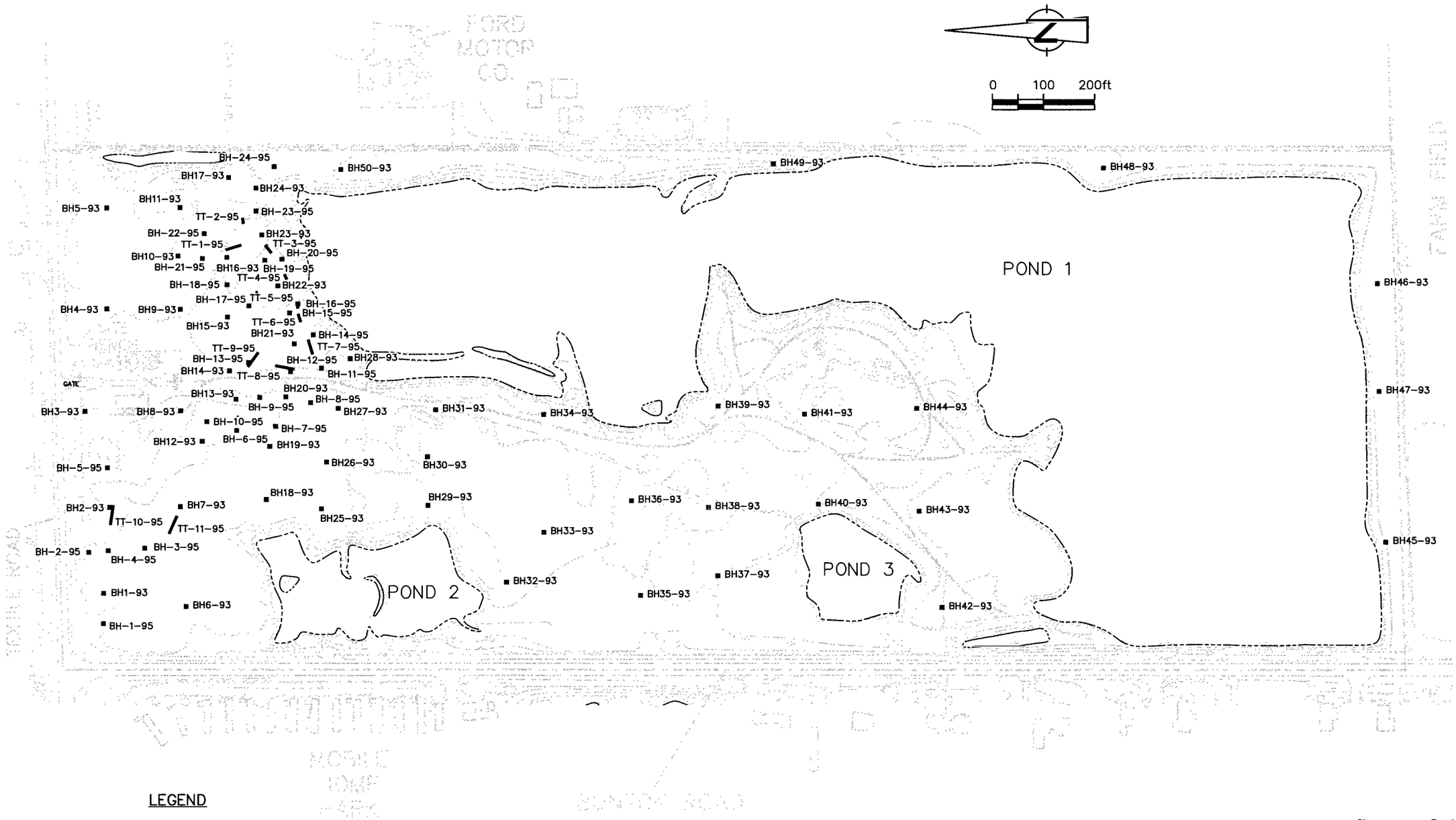


figure 1.4

PROPOSED FUTURE LAND USE PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-00(017)GN-WA014 JUL 14/1999



LEGEND

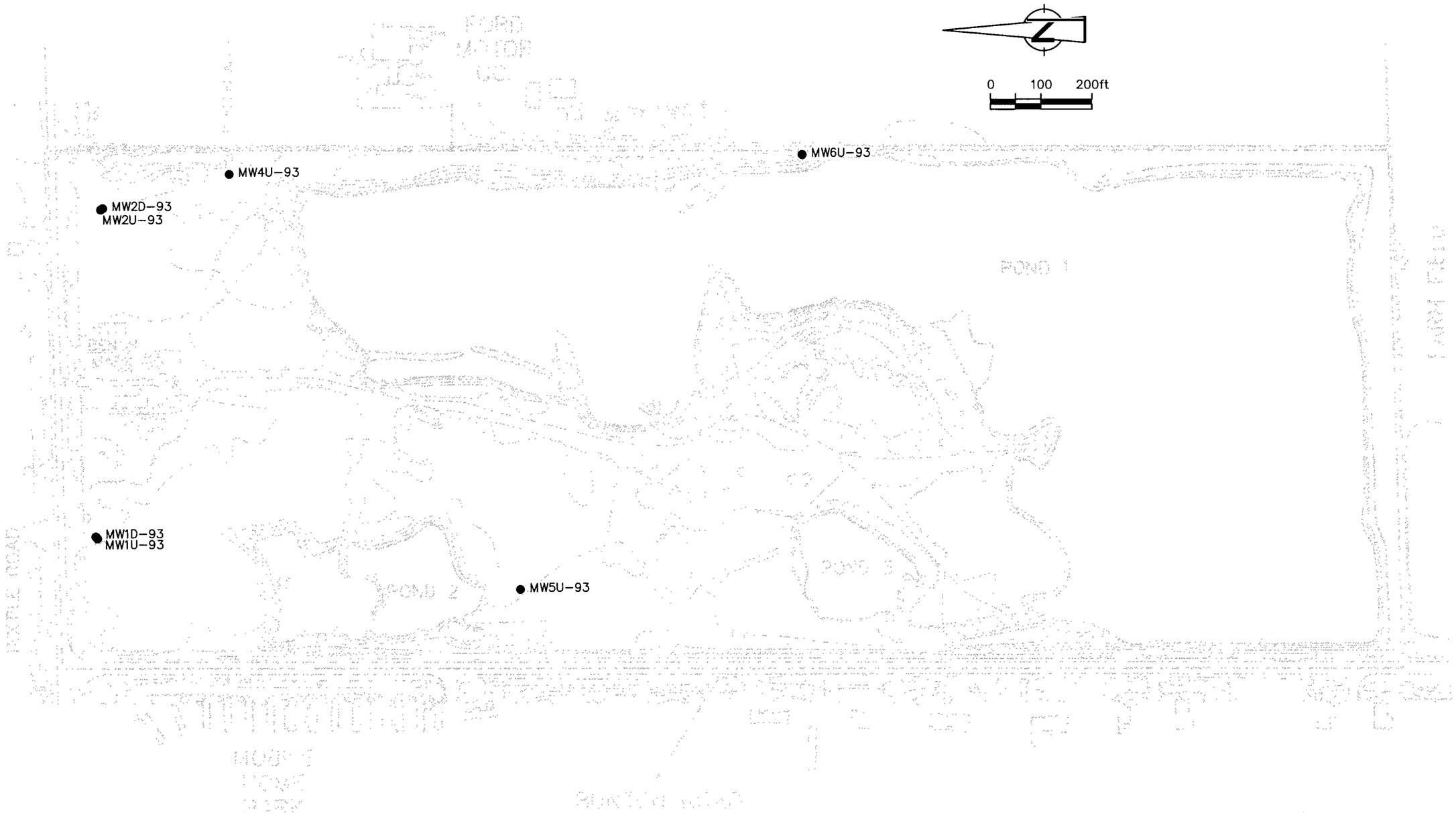
- BH1-93 EOC BOREHOLE LOCATIONS (1993)
- BH-1-95 ADDITIONAL INVESTIGATION BOREHOLE LOCATIONS (1995)
- ADDITIONAL INVESTIGATION TEST TRENCH LOCATIONS (1995)

figure 2.1

EOC AND AI BOREHOLE AND TEST TRENCH LOCATIONS
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-00(017)GN-WA002 NOV 11/98



LEGEND

● MW5U-93 MONITORING SAMPLE LOCATION

figure 2.2

GROUNDWATER MONITORING WELL LOCATIONS
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-00(017)GN-WA003 NOV 11/98

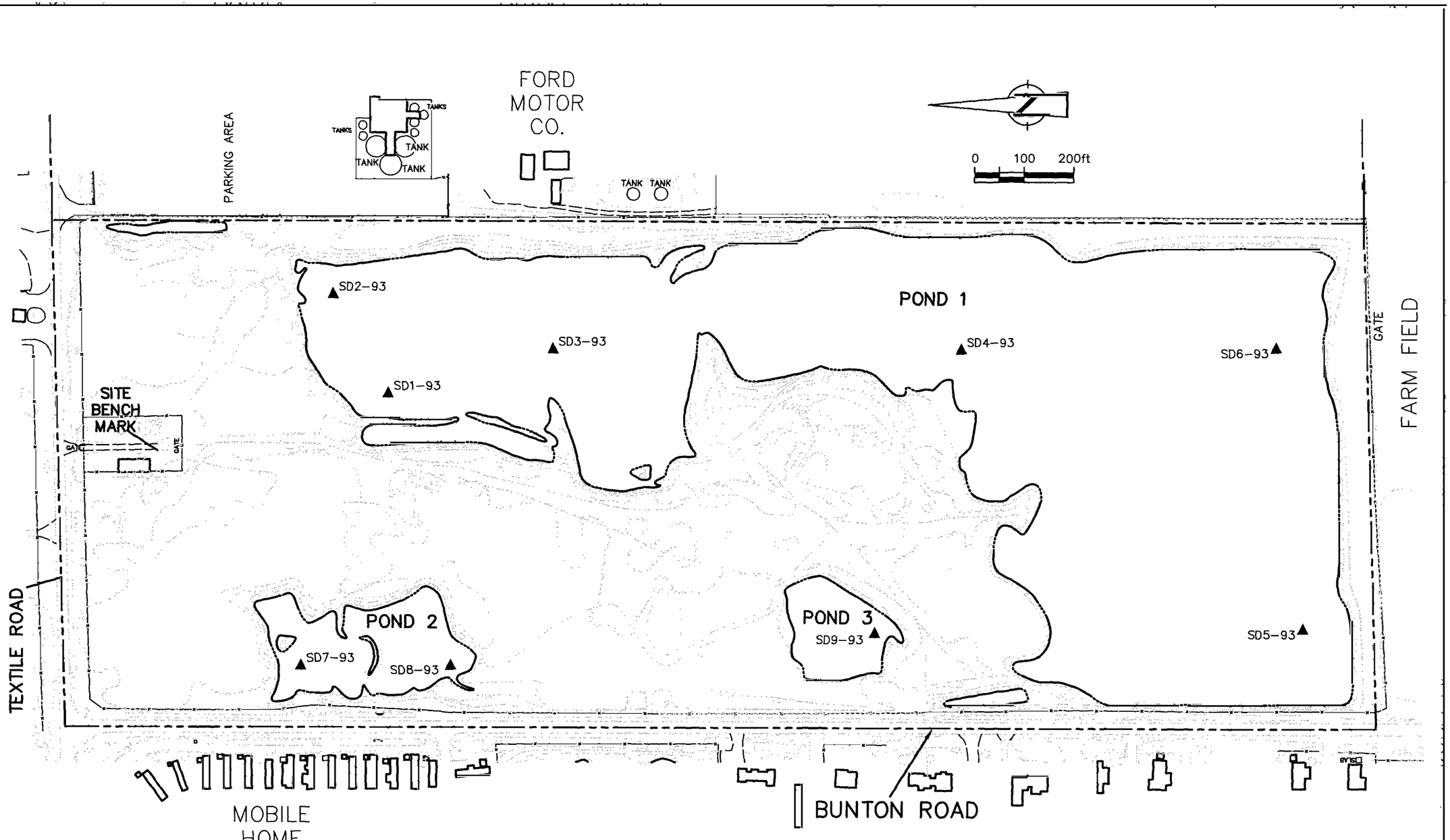
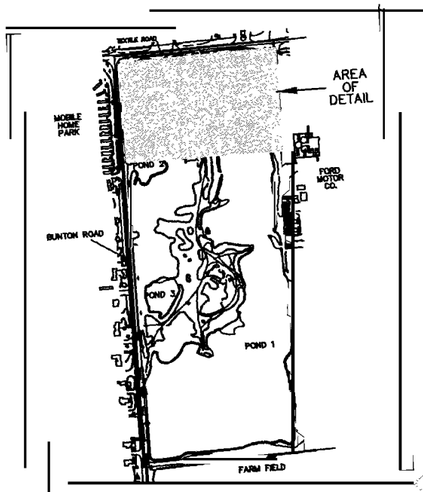


figure 2.3
POND SEDIMENT SAMPLE LOCATION
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770-00(017)GN-WA004 NOV 11/98



KEY MAP

LEGEND

26 PCB ISOCONCENTRATION LINE 26 mg/kg

EOC BOREHOLE LOCATIONS (1993)

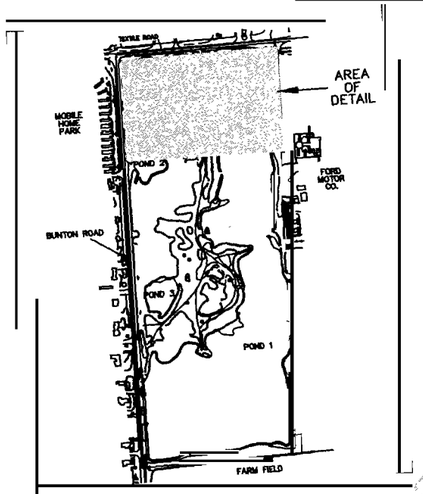
ADDITIONAL INVESTIGATION BOREHOLE LOCATIONS (1995)

figure 2.4

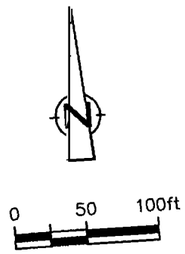
PCB ISOCONCENTRATION CONTOURS IN SOIL
2–4 FEET BELOW GROUND SURFACE
TEXTILE ROAD SITE
Washtenaw County, Michigan

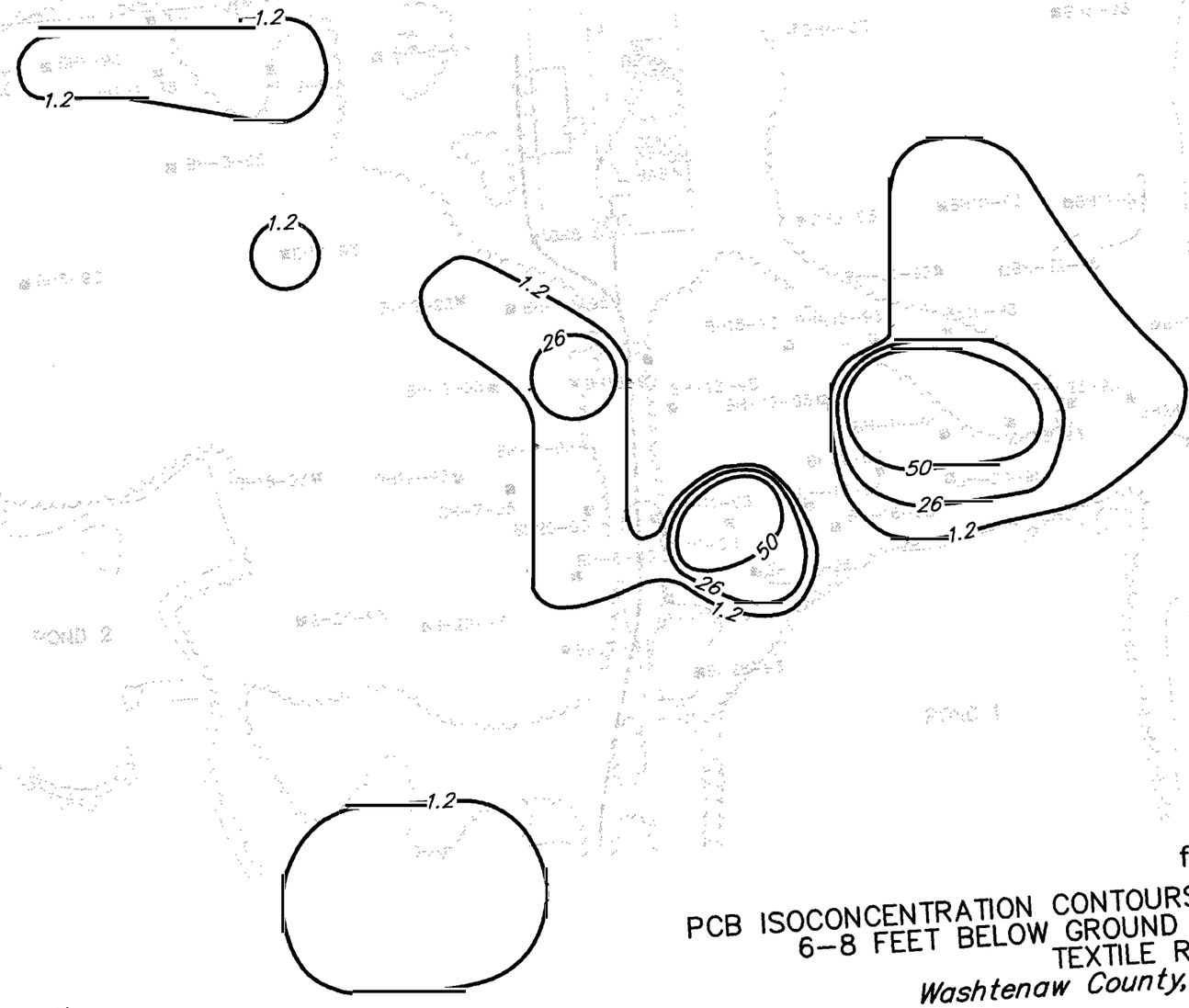
CRA

04770–00(017)GN–WA005 NOV 11/98



KEY MAP





LEGEND

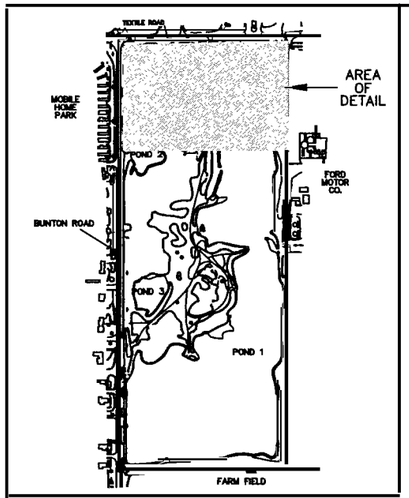
26 PCB ISOCONCENTRATION LINE 26 mg/kg

EOC BOREHOLE LOCATIONS (1993)

ADDITIONAL INVESTIGATION BOREHOLE LOCATIONS (1995)

figure 2.5

PCB ISOCONCENTRATION CONTOURS IN SOIL
6–8 FEET BELOW GROUND SURFACE
TEXTILE ROAD SITE
Washtenaw County, Michigan



KEY MAP

0 50 100ft

NOTES:

1) CONCENTRATION IN mg/kg

2) PCB CONCENTRATION IN SOIL @ 10–12' BGS

3) SOIL SAMPLES @ 10–12' BGS NOT COLLECTED FOR EOC (1993)

LEGEND

ADDITIONAL INVESTIGATION BOREHOLE LOCATIONS (1995)

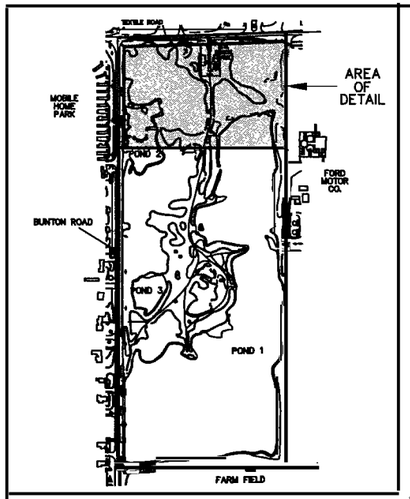
2.3 PCB ISOCONCENTRATION LINE

figure 2.6

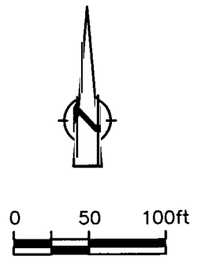
PCB ISOCONCENTRATION CONTOURS IN SOIL
10–12 FEET BELOW GROUND SURFACE
TEXTILE ROAD SITE
Washtenaw County, Michigan

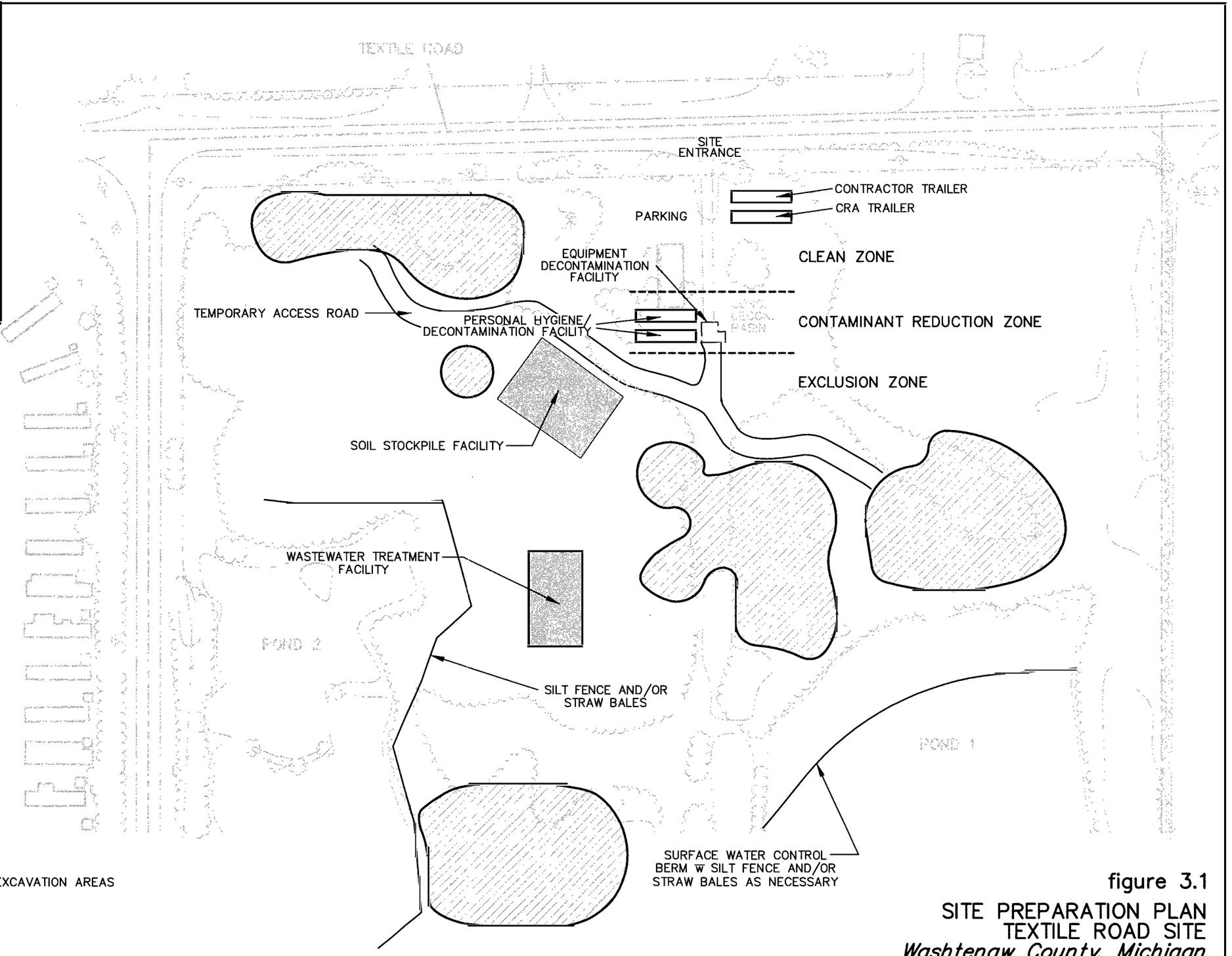
CRA

04770–00(017)GN–WA007 NOV 11/98



KEY MAP





LEGEND

ESTIMATED EXCAVATION AREAS

figure 3.1

SITE PREPARATION PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

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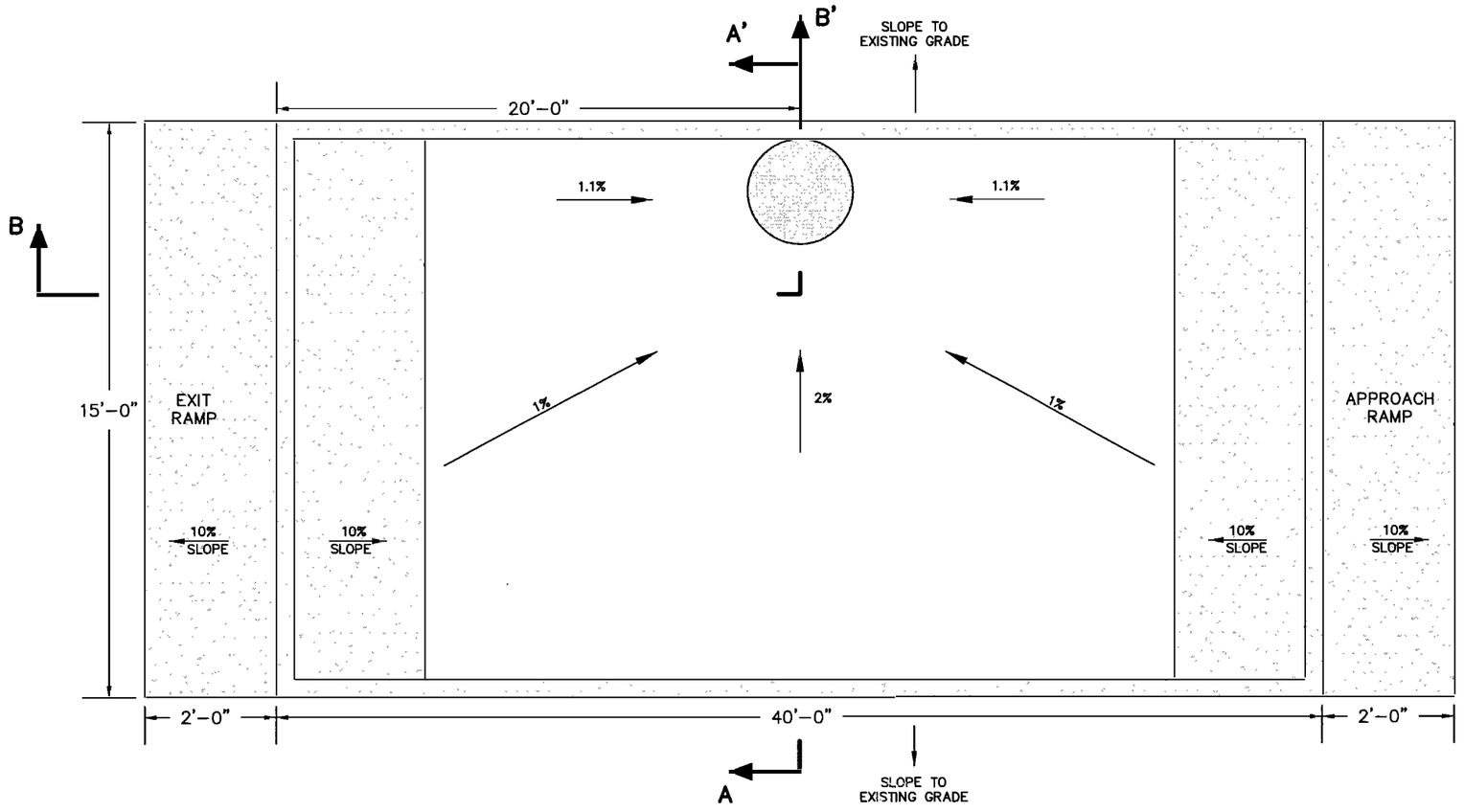
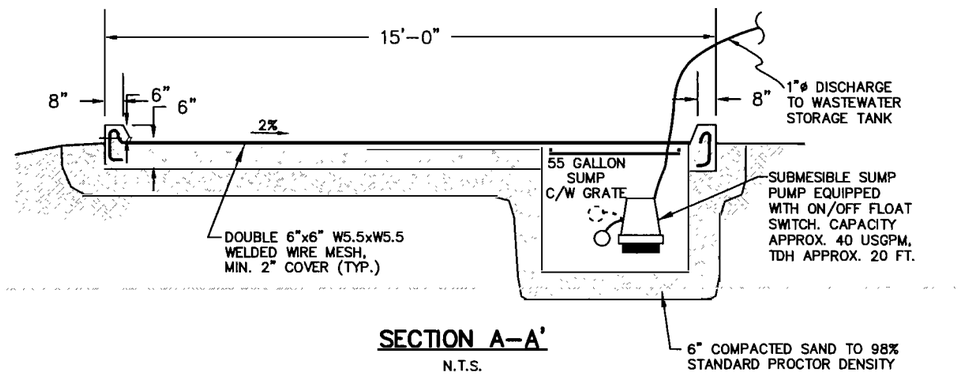
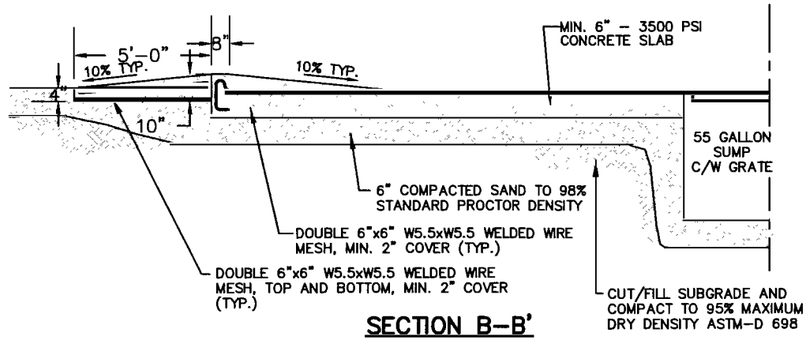


PLAN VIEW
N.T.S



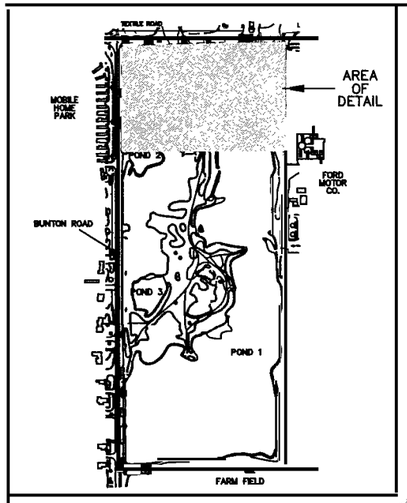
SECTION A-A'
N.T.S.



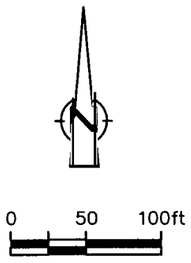
SECTION B-B'
N.T.S

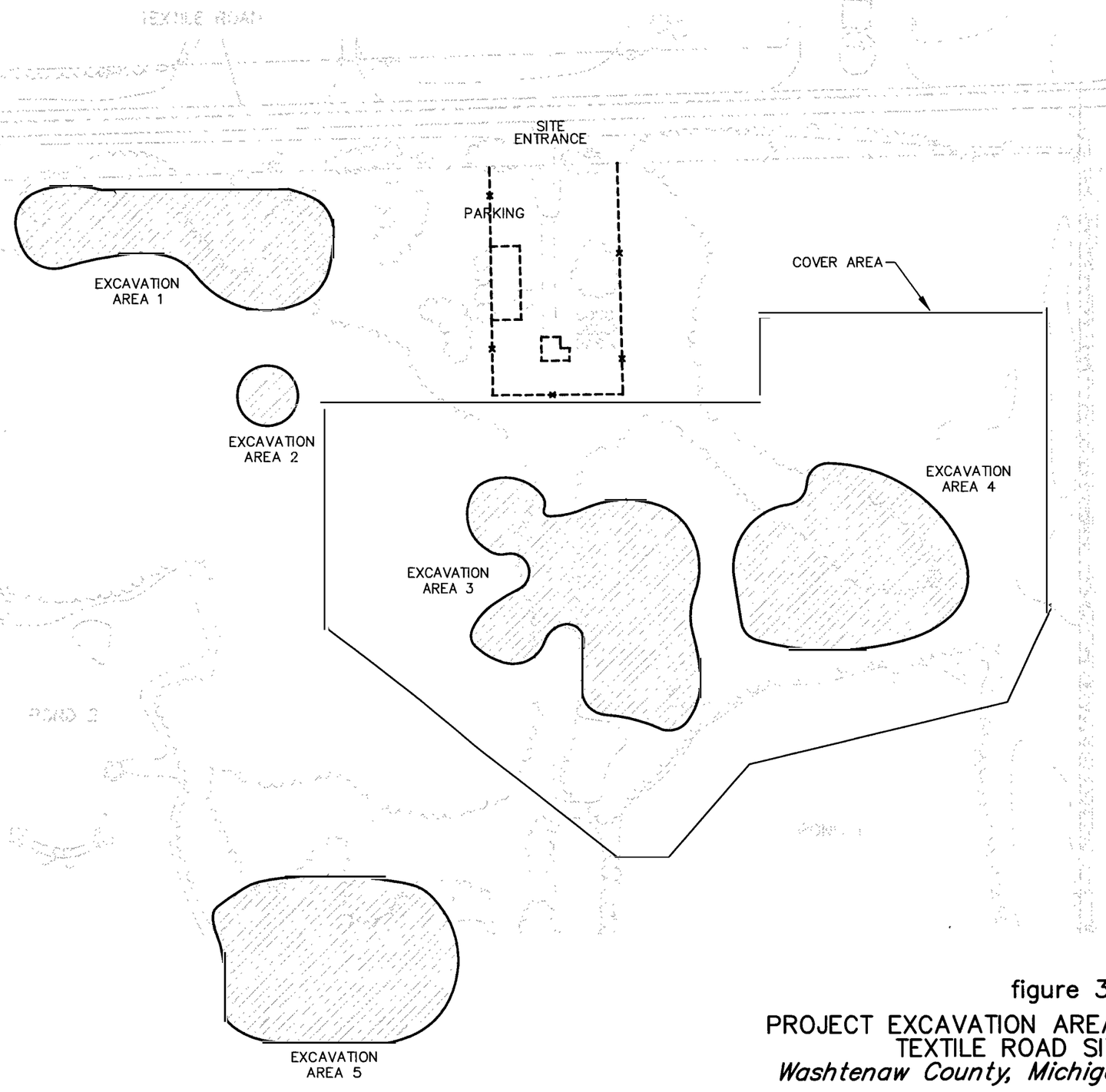
figure 3.2
TYPICAL EQUIPMENT DECONTAMINATION FACILITY
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA



KEY MAP





LEGEND

ESTIMATED EXCAVATION AREAS

TO BE REMOVED

CRA

figure 3.3

PROJECT EXCAVATION AREAS
TEXTILE ROAD SITE
Washtenaw County, Michigan

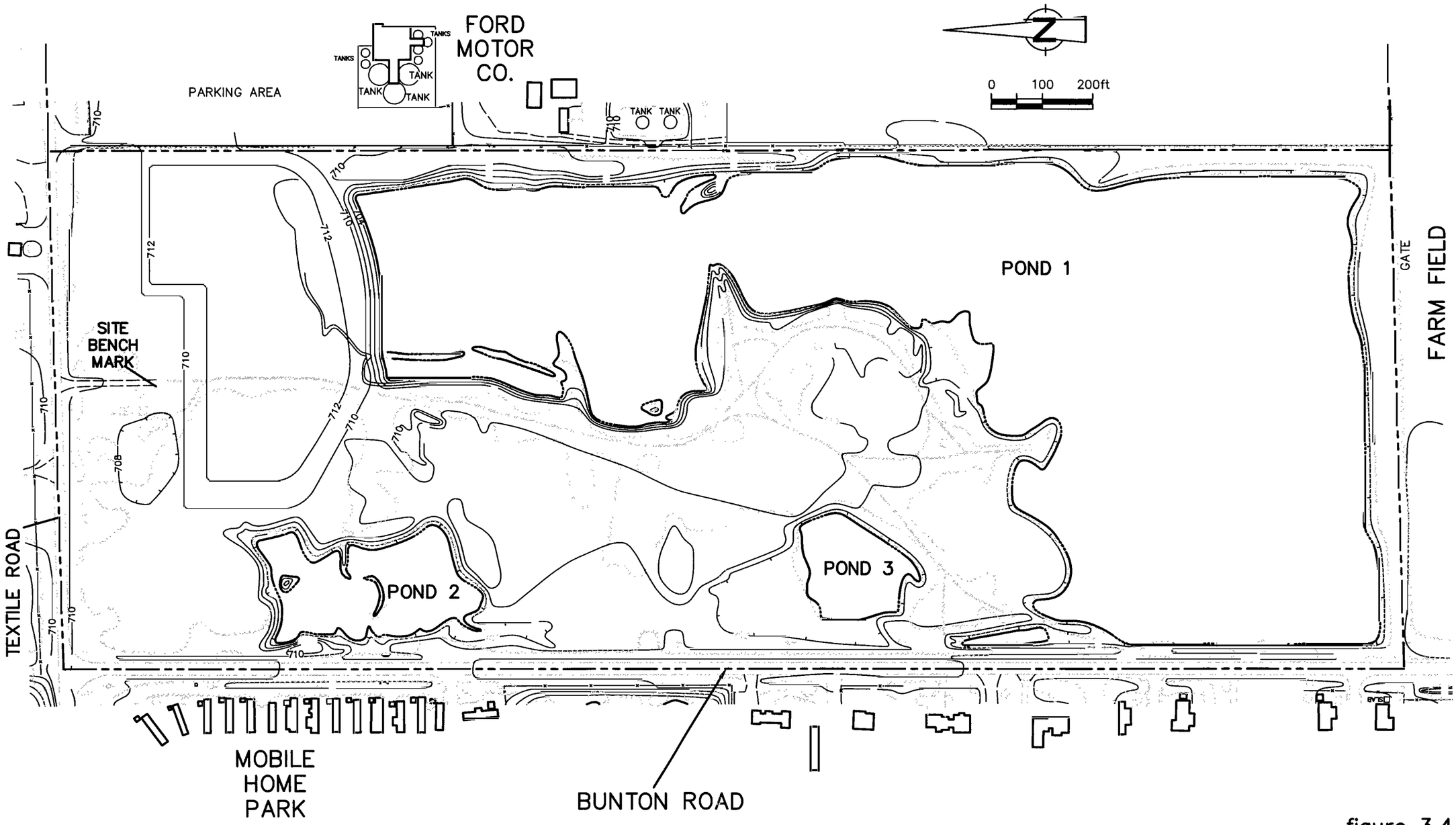


figure 3.4

GRADING PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

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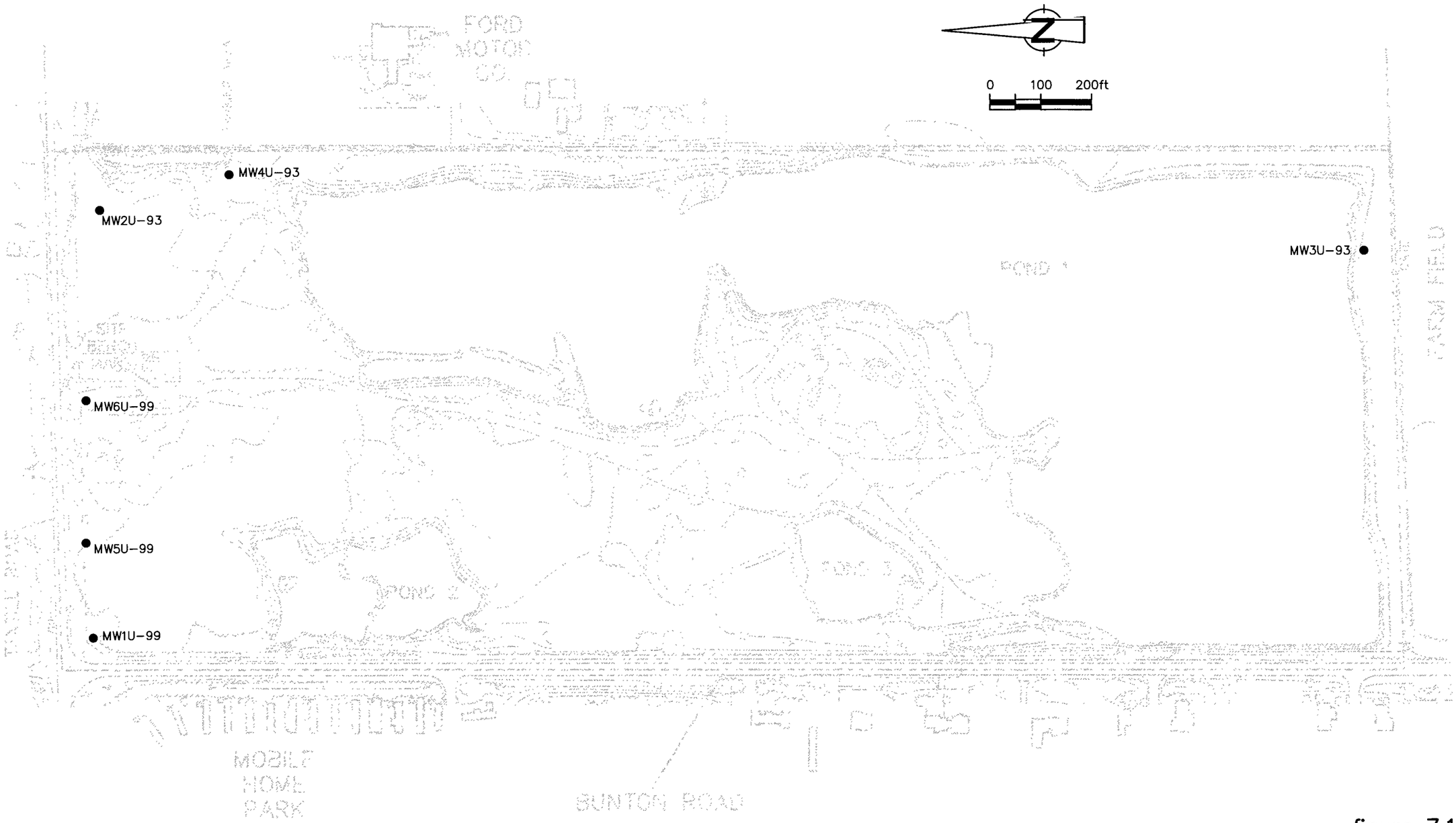

LEGEND

● MWU–93 PROPOSED UPPER WATER TABLE ZONE MONITORING SAMPLE LOCATION

figure 7.1

PROPOSED GROUNDWATER MONITORING LOCATIONS
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

04770–00(017)GN–WA013 JUL 14/1999

APPENDIX A

SAMPLING AND ANALYSIS PLAN (SAP)

APPENDIX A

SAMPLING AND ANALYSIS PLAN (SAP)

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

JULY 1999
REF. NO. 4770 (20)
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LIST OF ATTACHMENTS

ATTACHMENT A SOIL SAMPLE DATA SHEET

2.0 SAMPLING PROCEDURES

The sample collection activities to be performed will require the collection of soil and wastewater samples for chemical analysis. Details of the sample collection procedures are presented in the following subsections.

2.1 GENERAL SAMPLING PROTOCOLS

The following general sampling protocols will be adhered to during all sampling activities:

1. all sampling instruments and equipment will be cleaned in accordance with the protocols presented in Section 6.0 prior to sampling at each location;
2. a new pair of disposable latex gloves will be used at each location to be sampled for chemical analyses. Additional glove changes will be undertaken as conditions warrant;
3. all sampling generated wastes such as gloves, tyveks, etc. will be collected and disposed of off Site at a Subtitle D landfill; and
4. all samples collected for off-Site chemical analysis will be prepared and shipped to the laboratory in accordance with the protocols presented in Section 6.0 of the QAPP and in Section 3.0, herein.

Additional protocols specific to each sampling method are presented in the following sections.

2.2 VERIFICATION SOIL SAMPLING

Verification soil sampling locations/depth intervals will be selected as discussed in Section 3.9.3 of the Work Plan. Verification soil sampling will be conducted according to the following protocols:

1. prior to use at each sampling location, the sampling equipment will be cleaned according to the protocol presented in Section 6.0;
2. verification soil samples will be collected using a stainless steel trowel or spoon. Samples will be collected from the exposed base or sidewall of the excavations and placed directly into the appropriate sample containers; and

3. verification soil samples will be labeled noting the location, depth interval, date, time, and sampler's initials. A hard-cover bound field book will be maintained to record all soil samples and sampling events. In addition, the soil sampling activities will be recorded on the "Soil Sampling Data Sheet" presented in Attachment A.

2.3 STOCKPILE SOIL SAMPLING

Sampling of stockpiled soil will be performed to characterize the soil for disposal purposes. The soil will have been already disturbed during excavation and mixed to a degree, therefore, the procedures used to obtain representative samples from in situ soils are not applicable in this situation. The stockpile will be divided into quadrants with one sample being collected from each quadrant to form a composite sample, according to the following protocols:

1. prior to use at each stockpile to be sampled, the sampling equipment will be cleaned according to the protocol presented in Section 6.0;
2. stockpiled soil samples will be collected using a stainless steel trowel or spoon. Samples will be collected from approximately 1 foot below the surface of the stockpiled soil;
3. the four discrete soil samples collected from each quadrant will be emptied into a clean stainless steel bowl and homogenized prior to collecting the composite analytical sample, with the exception of samples for VOC analyses. Samples for VOC analyses will be transferred directly to the appropriate sample containers prior to homogenizing the sample; and
4. samples will be labeled noting the location, date, time, and sampler's initials. Sample details will be recorded in the hard-cover bound field book. In addition, the stockpile sampling activities will be recorded on the "Soil Sampling Data Sheet" presented in Attachment A.

2.4 WASTEWATER SAMPLING

Wastewater sampling is discussed in Section 3.13 of the Work Plan. Wastewater samples will be collected according to the following protocols:

1. wastewater effluent samples will be collected from the sampling ports in the wastewater treatment system directly into the appropriate sample containers if

on-Site wastewater treatment is selected as the wastewater management method by the selected contractor;

2. wastewater samples will be collected as grab samples from on-Site storage containers directly into the appropriate sample containers if off-Site wastewater management is chosen by the selected contractor; and

3. wastewater samples will be labeled noting the location, date, time, and sampler's initials. Sample details will be recorded in a hard-cover bound field book.

2.5 GROUNDWATER MONITORING WELL SAMPLING

The requirements of the groundwater monitoring program are discussed in Section 7.0 of the Work Plan.

Groundwater samples will be collected immediately following development or purging. All sampling equipment will be cleaned prior to use, following the sequence outlined in Section 6.0.

The following protocols will be utilized during all groundwater sampling activities.

i) new disposable latex gloves will be used when sampling groundwater from each well. Additional glove changes will be made prior to collection of each sample;

ii) the depth to water will be measured and recorded in each well to the nearest 0.01 foot using an electric tape. The electric tape will be cleaned prior to use in each well as outlined in Section 6.0.

iii) prior to sampling, each well will be purged to remove a minimum of three and a maximum of five times the standing water volume in the well, or until dry. Purging will be completed using a bailer or a low flow pump to minimize turbulence (e.g., bladder pump or a Grundfos pump). In the event that a well is purged dry prior to achieving three well volumes, groundwater will be permitted to recover to a level sufficient for sample collection. The time that the well was purged dry will be noted and well recovery will be monitored. Upon recovery, a precleaned close-top, teflon, bottom-filling bailer will be used for sample collection. Prior to use in the initial and all subsequent monitoring wells, the bailer will be precleaned as described in Section 6.0. All waste groundwater not used for sampling will be discharged on Site at the point of generation;

iv) field measurements of pH, conductivity, temperature, and turbidity will be recorded following removal of each standing well volume and prior to sample

collection. Calibration of field instruments will be undertaken prior to use each day and the calibration recorded in the field notes;

v) after the well has been purged or immediately after well development, groundwater samples will be collected from the low flow pump or poured from the cleaned bailer;

vi) containers for sample collection and preservation requirements will be determined as required by the analytical parameters. All sample bottles will be provided by the laboratory and will be prepared using standard laboratory-validated washing procedures. The sample bottles will be delivered to the Site in sealed containers;

vii) a blind field duplicate sample will be collected at a minimum frequency of 1 in 10 groundwater samples, with a minimum of one sample per round;

viii) samples for matrix/spike duplicate analysis will be collected at a minimum frequency of 1 per 20 samples, with a minimum of one sample per round. Samples will be collected from the well as outlined in (v) above, but in twice the normal volume. The analysis request sheets sent to the laboratory will indicate the sample ID of the matrix spike/matrix spike duplicate sample;

ix) a rinsate blank (bailer blank) sample will be collected at a minimum frequency of 1 in 10 groundwater samples, with a minimum of one sample per round. The bailer blank sample will consist of deionized water poured into, and then sampled out of, a bailer cleaned using the prescribed rinse sequence (presented in Section 6.0). This will provide a quality assurance check on the field decontamination procedures employed on the bailers between wells. Due to long-term monitoring, sampling equipment that will come into contact with possibly contaminated groundwater will be dedicated to each well;

x) a laboratory-supplied trip blank sample will be included in each sample shipment cooler containing samples for volatile organics analyses; and

xi) all disposable gloves, nylon ropes, and other solid waste materials will be collected for off-Site disposal. All decontamination fluids will be containerized and stored on Site pending final disposal. Groundwater will be discharged to the ground surface in the vicinity of the well as long as no contamination of the monitoring well has occurred. If contamination is identified in a well, purge waters will be collected and treated off Site.

2.6 SURFACE WATER SAMPLING

The requirements of the surface water verification sampling are discussed in Section 3.9.3 of the Work Plan.

Surface water will be collected as a grab sample from Pond 1. All sampling equipment will be cleaned prior to use, following the sequence outlined in Section 6.0.

The following protocols will be utilized during all surface water sampling activities.

i) new disposable latex gloves will be used when sampling surface water from each sample location;

ii) containers for sample collection and preservation requirements will be determined as required by the analytical parameters. All sample bottles will be provided by the laboratory and will be prepared using standard laboratory-validated washing procedures. The sample bottles will be delivered to the Site in sealed containers;

iii) when collecting surface water samples, direct dipping of the sample container into the stream is acceptable unless the sample bottles contain preservatives. If the bottles are preserved, then precleaned unpreserved bottles should be used to collect the sample. The water sample should then be transferred to the appropriate preserved bottles;

iv) when collecting samples, submerse the inverted bottle to the desired sample depth and then tilt the opening of the bottle upstream to fill. Wading may cause bottom sediment deposits to be re-suspended and therefore could result in a biased sample. The sample may also be collected through the use of a disposal Teflon bailer or low flow pump using a 'fixed" suction line, secured to prevent sediment collection;

v) a laboratory supplied trip blank sample will be included in each sample shipment cooler containing samples for volatile organics analyses; and

vi) all disposable gloves, nylon ropes, and other solid waste materials will be collected for off-Site disposal. All decontamination fluids will be containerized and stored on Site pending final disposal. Groundwater will be discharged to the ground surface in the vicinity of the well as long as no contamination of the monitoring well has occurred. If contamination is identified in a well, purge waters will be collected and treated off Site.

3.0 SAMPLE LABELING AND CONTROL

3.1 SAMPLE LABELING

A unique sample numbering system will be used to identify each sample collected. All individual sample containers for each sample location will be labeled and will contain the same unique sample number. This system will provide a tracking number to allow for the retrieval and cross-referencing of sample information. A listing of the sample identification numbers with written descriptions of the sample location, sample type, and date will be maintained by the sampling personnel. Details of the sample numbering system are provided in Section 5.2 of the QAPP.

3.2 CHAIN-OF-CUSTODY FORMS

Chain-of-custody forms will be used to track all samples from time of sampling to the arrival of samples at the laboratory. Details on the chain-of-custody protocols are presented in Section 5.2.3 of the QAPP.

3.3 SAMPLE CONTAINERS AND HANDLING

Required sample containers, sample preservation methods, maximum holding times, filling instructions, and shipping protocols are provided in Section 5.2.4 of the QAPP.

4.0 ANALYTICAL PROTOCOLS

Samples collected for chemical analysis will be analyzed for the parameters identified in Table 1.1, in accordance with the methods/protocols as outlined in the QAPP, presented as Appendix B of the RA Work Plan.

5.0 HANDLING OF MATERIALS GENERATED DURING RA CONSTRUCTION ACTIVITIES

Personal Protective Equipment (PPE) generated during the sampling activities will be collected and disposed of daily with excavated soils/sediments in a Suitable D Landfill. Decontamination rinses generated during the sampling activities will be collected and treated at the on-Site wastewater treatment facility.

6.0 EQUIPMENT CLEANING PROTOCOLS

All equipment used for the collection of samples for chemical analysis including trowels, spoons, etc. will be cleaned according to the following protocol:

- wash with non-phosphate detergent using a brush, if necessary;
- potable water rinse;
- rinse with isopropyl alcohol;
- thorough rinse with deionized water; and
- air dry.

All cleaned equipment will be placed on polyethylene sheeting or aluminum foil in order to avoid contacting a contaminated surface before use.

TABLE 1.1

SUMMARY OF SAMPLING AND ANLAYSIS PROGRAM
SAMPLING AND ANALYSIS PLAN
TEXTILE ROAD SITE
WASHTENAW C OUNTY, MICHIGAN

Task/Event	*Sample Matrix*	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*Quality Control Samples (1)*			*Total*
					Field Blanks	*Field Duplicates*	*MS/MSD MS/DUP (2)*	
Excavation Verification								
Soil Verification	Soil	PID Screen	PCB	86	0	9	5	100
Surface Water Verification	Surface Water	--	PCB & TCL VOC	1	0	0	0	1
Air Monitoring								
Real-Time Air Monitoring	Air	TSP & VOC	---					
Perimeter Air Monitoring	Air	--	PCB	4 (3)	1 (4)	1 (4)	1	6
Soil Characterization	Soil	PID Screen	PCB (5)	(6)	1/20	1/10	1/20	(6)
Wastewater Characterization	Water	pH	PCB (5)	(6)	1/10	1/10	1/20	(6)
Groundwater Monitoring	Water	pH/Temperature, Conductivity & Turbidity	TCL VOC, PCB & TAL Metals	5 (7)	1	1	1	8

Notes:

(1) - One trip blank sample will be shipped with each cooler of multiple investigative aqueous VOC samples.

(2) - Matrix spike/matrix spike duplicate (MS/MSD) and/or a MS/duplicate (MS/DUP) analyses are required for each batch of 20 samples submitted. A laboratory control sample and laboratory control sample duplicate (LCS/LCSD) will be processed with each batch of air samples submitted.

(3) - This quantity represents the daily quantity of investigative samples collected.

(4) - A field blank and a field duplicate will be collected on alternating days.

(5) - Additional parameters may be required for waste disposal approval, these parameters will be defined upon selection of disposal facility.

(6) - The actual quantity of sample collected will depend on Site activities.

(7) - This quantity represents the quantity of investigative samples collected per sampling round. Samples will be collected quarterly for the first year, semi-annually for two years and annually for years 3 and beyond.

ATTACHMENT A

SOIL SAMPLING DATA SHEET

SOIL SAMPLING DATA SHEET

PROJECT NAME _____ PROJECT NO. _____

SAMPLING CREW MEMBERS _____ SUPERVISOR _____

DATE OF SAMPLE COLLECTION _____

SAMPLE ID NUMBER	SAMPLE LOCATION	SAMPLE DEPTH (m. bgs)	TIME	SAMPLE METHOD	SOIL / SAMPLE DESCRIPTION	SITE CONDITIONS

ADDITIONAL COMMENTS _____

COPIES TO: _____

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

APPENDIX B

REMOVAL ACTION WORK PLAN
QUALITY ASSURANCE PROJECT PLAN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

JULY 1999
REF. NO. 4770 (18)
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LIST OF ACRONYMS AND SHORT FORMS

CCV	-	Continuing Calibration Verification
CRA	-	Conestoga-Rovers & Associates
DQO	-	Data Quality Objective
EPA - AA	-	"Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air", 2nd Edition, January 1999
GC	-	Gas Chromatography
MDEQ	-	Michigan Department of Environmental Quality
µg/kg	-	micrograms per kilogram
µg/L	-	micrograms per Liter
MS/MSD	-	Matrix Spike/Matrix Spike Duplicate
NIST	-	National Institute of Standards and Technology
°C	-	Degree Centigrade
PE	-	Performance Evaluation
%R	-	Percent Recovery
%RSD	-	Percent Relative Standard Deviation
PCB	-	Polychlorinated Biphenyls
Encotec	-	Laidlaw Environmental, Inc./Encotec
QA	-	Quality Assurance
QA/QC	-	Quality Assurance/Quality Control
QAO	-	Quality Assurance Officer
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
RA	-	Removal Action
RAS	-	Routine Analytical Services
RPD	-	Relative Percent Difference
RSD	-	Relative Standard Deviation
Site	-	Textile Road Site
SOPs	-	Standard Operating Procedures
SRM	-	Standard Reference Materials
SW-846	-	"Test Methods for Evaluating Solid Waste Physical/Chemical Methods", SW-846, 3rd Edition, and Promulgated Updates, November 1986
U.S. EPA	-	United States Environmental Protection Agency

QUALITY ASSURANCE PROJECT PLAN (QAPP)

PROJECT TITLE: Textile Road Site
Removal Action

PREPARED BY: CONESTOGA-ROVERS & ASSOCIATES (CRA)

Approved By: _____ Date:_____
General Motors Corporation (GM) and Holtzman-Silverman Realty Company (HS) (Group)

Approved By: _____ Date:_____
Project Manager - CRA
Glenn Turchan

Approved By: _____ Date:_____
Project Coordinator - CRA
Greg Carli

Approved By: _____ Date:_____
QA/QC Officer - Analytical Activities - CRA
Paul Wiseman

Approved By: _____ Date:_____
Field QA Officer - CRA

Approved By: _____ Date:_____
Project Manager – Project Laboratory
To Be determined (TBD)

Approved By: _____ Date:_____
QA Officer - Project Laboratory
TBD

Approved By: _____ Date:_____
On-Scene Coordinator – U.S EPA Region V
Mr. P.C. Lall

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1.0 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) requires that all environmental monitoring and measurement efforts mandated or supported by U.S. EPA participate in a centrally managed quality assurance (QA) program. These principles of data quality management also apply to Michigan Department of Environmental Quality (MDEQ) Act 451 (formerly ACT 307) program.

Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each party must prepare a written QA Project Plan (QAPP) covering each project it is to perform.

This QAPP presents the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with the Removal Action (RA) at the Textile Road Site in Washtenaw County, Michigan (Site). This QAPP also describes the specific protocols which will be followed for the scope of work for sampling, sample handling and storage, chain-of-custody, laboratory and field analysis.

All QA/QC procedures will be in accordance with applicable professional technical standards, U.S. EPA requirements, government regulations and guidelines, and specific project goals and requirements. This QAPP has been prepared by Conestoga-Rovers & Associates (CRA) on behalf of General Motors Corporation (GM) and Holtzman-Silverman Realty Company (HS) (Group). All QA/QC procedures are structured in accordance with applicable U.S. EPA requirements, regulations, guidance and technical standards, including "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations", EPA QA/R-5, Draft Interim Final, August 1994, and "Region 5 Model Superfund Quality Assurance Project Plan (QAPP)", U.S. EPA Region V, Revision 1, May 1996.

2.0 PROJECT DESCRIPTION

This QAPP has been developed for the Removal Action (RA) for the Textile Road Site in Washtenaw County, Michigan (Site). The project description is presented in the Removal Action Work Plan (RA Work Plan).

This QAPP for the RA Work Plan activities describes the QA/QC procedures to be followed during the collection and analysis of soil verification samples, soil characterization samples, wastewater and stormwater samples, and groundwater monitoring samples.

2.1 SAMPLING NETWORK AND RATIONALE

The sampling network and rationale is presented in the RA Work Plan Section 3.0. Groundwater monitoring is discussed in the RA Work Plan, Section 7.0.

2.2 PROJECT OBJECTIVES AND SCOPE

The scope of this project includes the collection of soil verification sample during excavation as described in the RA Work Plan.

2.3 PARAMETERS TO BE TESTED AND FREQUENCY

Sample matrices, analytical parameters and frequencies of sample collection are presented in Table 2.1.

2.4 DATA QUALITY OBJECTIVES (DQOs)

DQOs are qualitative and quantitative statements derived from the outputs of each step of the DQO process. The DQO process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity and quality of environmental data used in decision making are appropriate for the intended application.

TABLE 2.1

SUMMARY OF SAMPLING AND ANLAYSIS PROGRAM
TEXTILE ROAD SITE
WASHTENAW C OUNTY, MICHIGAN

Task/Event	*Sample Matrix*	*Field Parameters*	*Laboratory Parameters*	*Investigative Samples*	*Quality Control Samples (1)*			*Total*
					Field Blanks	*Field Duplicates*	*MS/MSD MS/DUP (2)*	
Excavation Verification								
Soil Verification	Soil	PID Screen	PCB	86	0	9	5	100
Surface Water Verification	Surface Water	--	PCB & TCL VOC	1	0	0	0	1
Air Monitoring								
Real-Time Air Monitoring	Air	TSP & VOC	---					
Perimeter Air Monitoring	Air	--	PCB	4 (3)	1 (4)	1 (4)	1	6
Soil Characterization	Soil	PID Screen	PCB (5)	(6)	1/20	1/10	1/20	(6)
Wastewater Characterization	Water	pH	PCB (5)	(6)	1/10	1/10	1/20	(6)
Groundwater Monitoring	Water	pH/Temperature, Conductivity & Turbidity	TCL VOC, PCB & TAL Metals	5 (7)	1	1	1	8

Notes:

(1) - One trip blank sample will be shipped with each cooler of multiple investigative aqueous VOC samples.

(2) - Matrix spike/matrix spike duplicate (MS/MSD) and/or a MS/duplicate (MS/DUP) analyses are required for each batch of 20 samples submitted. A laboratory control sample and laboratory control sample duplicate (LCS/LCSD) will be processed with each batch of air samples submitted.

(3) - This quantity represents the daily quantity of investigative samples collected.

(4) - A field blank and a field duplicate will be collected on alternating days.

(5) - Additional parameters may be required for waste disposal approval, these parameters will be defined upon selection of disposal facility.

(6) - The actual quantity of sample collected will depend on Site activities.

(7) - This quantity represents the quantity of investigative samples collected per sampling round. Samples will be collected quarterly for the first year, semi-annually for two years and annually for years 3 and beyond.

There are seven steps in the DQO process which include:

i) state the problem;

ii) identify the decision;

iii) identify inputs to the decision;

iv) define the study boundaries;

v) develop a decision rule;

vi) specify limits on decision errors; and

vii) optimize the design for obtaining data.

The DQOs derived from this process are used to develop a scientific and resource-effective sampling design. The DQOs for the RA Work Plan were developed in part using the U.S. EPA guidance document entitled "Data Quality Objectives Process for Superfund, Interim Final Guidance", EPA 540-R-93-071, September 1993. The type, quantity and quality of environmental data to be collected during the operation and monitoring period have been determined to be appropriate for the intended application.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

CRA, as contractor to General Motors Corporation (GM) and Holtzman-Silverman Realty Company (HS), has overall responsibility for the RA Work Plan activities at the Site. CRA will perform all sampling and field analyses. A qualified laboratory (project laboratory), as analytical subcontractor to CRA will perform all analyses of samples collected during the Site soil excavation verification activities.

All firms will provide project management as appropriate to their responsibilities. CRA will provide administrative oversight and QA/QC for all deliverables. CRA will maintain a file copy of all laboratory deliverables. All final project deliverables will be issued by CRA.

A summary of the key personnel with responsibilities follows:

General Motors Corporation (GM) and Holtzman-Silverman Realty Company (HS)

- overview of RA activities;
- final review of all deliverables: and
- approval of QAPP.

Glenn Turchan - Project Manager - CRA

- management of the CRA project team;
- participation in key technical negotiations with the Group and U.S. EPA;
- meetings with the U.S. EPA; and
- approval of QAPP.

Greg Carli - Project Coordinator - CRA

- overview of field activities;
- overview of laboratory activities;
- overall preparation and review of reports;
- technical representation of project activities;
- coordinate CRA's technical group; and
- approval of QAPP.

Paul Wiseman - QA/QC Officer - Analytical Activities - CRA

- system audits - laboratory activities;
- overview and review field QA/QC;
- coordinate supply of performance evaluation samples;
- review laboratory QA/QC;
- coordinate and oversee data validation and assessment;
- advise on data corrective action procedures;
- QA/QC representation of project activities; and
- approval of QAPP.

Field QA Officer - CRA

- management of field activities and field QA/QC;
- data assessment;
- technical representation of field activities;
- preparation of standard operating procedures (SOPs) for field activities;
- preparation of field reports; and
- approval of QAPP.

Project Manager – Project Laboratory

- coordinate laboratory analyses;
- supervise in-house chain-of-custody;
- schedule sample analyses;
- overview data review;
- overview preparation of analytical reports; and
- approval of the QAPP.

Operations Manager - Project Laboratory

- coordinate laboratory analysis;
- supervise in-house chain-of-custody;

- schedule sample analyses;
- oversee data review;
- oversee preparation of analytical reports; and
- approve final analytical reports prior to submission to CRA

QA Officer - Project Laboratory

- overview laboratory quality assurance;
- overview QA/QC documentation;
- conduct detailed data review;
- decide laboratory actions, if required;
- technical representation of laboratory QA procedures;
- preparation of laboratory SOPs; and
- approval of the QAPP.

Sample Custodian - Project Laboratory

- receive and inspect the incoming sample containers;
- record the condition of incoming sample containers;
- sign appropriate documents;
- verify chain of custody and its correctness;
- notify project manager and operations manager of sample receipt and inspection;
- assign a unique identification number and customer number, and enter each sample into the sample receiving log;
- with the help of the operations manager, initiate transfer of the samples to appropriate lab sections; and
- control and monitor access to samples and log all sample movements.

Primary responsibility for project quality rests with the CRA's QA/QC Officer - Analytical Activities. Ultimate responsibility for project quality rests with the CRA's Project Manager. Independent quality assurance will be provided by the laboratory's Project Manager and QA Officer prior to release of all data to the CRA.

Project progress reports will be the mechanism for communication between key management personnel. These reports will be issued by CRA. The laboratory will provide status updates by means of preliminary data telefacsimiles. Should unexpected delays or other problems with the laboratory analysis occur, these will be communicated directly to CRA's QA/QC Officer for resolution.

U.S. EPA RESPONSIBILITIES

The U.S. EPA On-Scene Coordinator Title (OSC) will be responsible for overview of this project. The OSC will also be responsible for providing approval of the QAPP.

External performance and system audits of the laboratory will be performed at the discretion of U.S. EPA.

Additionally, the U.S. EPA Quality Assurance Reviewer is responsible for reviewing and for providing final approval of the QAPP.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analyses and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of laboratory and field equipment and corrective action are described in other sections of this QAPP. The purpose of this section is to address the specific objectives for accuracy, precision, completeness, representativeness and comparability.

4.1 LEVEL OF QC EFFORT

Field blank, trip blanks, field duplicates and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling program. Field and trip blanks consist of analyte-free water for soil or water matrices, which will be submitted to the analytical laboratory to provide the means to assess the quality of the data resulting from the field sampling program. Field blank (rinsate) samples are analyzed to check for procedural contamination during the collection of soil and water samples at the Site which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Field duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. Matrix spikes are performed in duplicate for soil and water matrices. One matrix spike/matrix spike duplicate (MS/MSD) will be collected and analyzed for every 20 or fewer samples.

The general level of the QC effort for soil verification sampling will be one field duplicate per sampling event or a minimum of one per 10 verification samples. Field duplicate samples will be collected concurrently with original samples. The number of duplicate and field blank samples to be collected is provided in Table 2.1

MS/MSD samples for organic analyses are prepared from the soil verification samples. One MS/MSD sample will be collected/designated at a frequency of one per sampling event or a minimum of one per 20 samples. The number of MS/MSD samples to be collected are specified in Table 2.1.

The level of QC effort provided by the laboratory for the analysis of soil will be equivalent to the level of QC effort specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846 3rd Edition, and Promulgated Updates, November 1986 (SW-846); "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air", EPA-600/4-84-041, April 1984 (EPA-AA), and with the level specified in the laboratories Standard Operating Procedures (SOPs).

The level of QA effort for the field measurements of total suspended particulates (TSP) and volatile organic compounds (VOC) will consist of analyzing duplicate samples and verifying instrument calibration.

4.2 ACCURACY, PRECISION AND SENSITIVITY OF ANALYSES

The fundamental QA objective with respect to accuracy and precision of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols.

Accuracy will be determined by assessing the percent recoveries of matrix spikes samples and QC check samples. Precision will be determined by assessing the relative percent difference (RPD) determined from the percent recoveries of MS/MSD samples for organic analytes and the RPD between the sample and matrix duplicate for inorganic samples. The equations for determining percent recovery and RPD are presented in Section 13.1 by reference to Figure 13.1.

The targeted quantitation limits, as presented in Table 4.1 represents the level of sensitivity for the analyses. The units of measure for analytes in soil and water samples will be µg/kg and µg/L, respectively.

4.3 COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratories will provide data meeting the QC acceptance criteria for 90 percent or more for all samples tested using the referenced

TABLE 4.1

TARGETED QUANTITATION LIMITS (TQLS)
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Compound	*Targeted (1) Quantitation Limits* Air *(µg/Sample)*	*Water (µg/L)*	*Soil (µg/kg)*
Polychorinated Biphenyls (PCB)			
PCB-1016	1	0.2	330
PCB-1221	1	0.2	330
PCB-1232	1	0.4	330
PCB-1242	1	0.2	330
PCB-1248	1	0.2	330
PCB-1254	1	0.2	330
PCB-1260	1	0.2	330
Target Compound List (TCL) Volatile Organic Compounds (VOC)			
acetone		100	
benzene		1	
bromodichloromethane		1	
bromoform		1	
bromomethane		1	
butanone		50	
carbon disulfide		50	
carbon tetrachloride		1	
chlorobenzene		1	
chloroethane		1	
chloroform		1	
chloromethane		1	
cis-1,3-dichloropropene		1	
dibromochloromethane		1	
1,1-dichloroethane		1	
1,2-dichloroethane		1	
1,1-dichloroethene		1	
1,2-dichloroethene (total)		1	
1,2-dichloropropane		1	
ethylbenzene		1	
2-hexanone		50	
methylene chloride		5	
4-methyl-2-pentanone		50	
styrene		1	
1,1,2,2-tetrachloroethane		1	
tetrachloroethene		1	
toluene		1	
trans-1,3-dichloropropene		1	
1,1,1-trichloroethane		1	
1,1,2-trichloroethane		1	
trichloroethene		1	
vinyl chloride		1	
xylenes (total)		3	

TABLE 4.1

TARGETED QUANTITATION LIMITS (TQLS)
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Compound	*Targeted (1) Quantitation Limits* Air *(µg/Sample)*	*Water (µg/L)*	*Soil (µg/kg)*
Target Analyte List (TAL) Metals			
aluminum		50	
antimony		5	
arsenic		20	
barium		100	
beryllium		1	
cadmium		0.5	
calcium		5,000	
chromium		5	
cobalt		10	
copper		5	
iron		100	
lead		3	
magnesium		100	
manganese		20	
mercury		0.2	
nickel		25	
potassium		5,000	
selenium		5	
silver		0.2	
sodium		1,000	
thallium		2	
vanadium		20	
zinc		20	
cyanide (total)		5	

Notes:

(1) Please note that these are targeted quantitation limits and are presented for guidance only. Actual quantitation limits are highly matrix dependent and may be elevated due to matrix effects.

methods. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness (\%)} = \frac{\text{Valid (Usable) Data Obtained}}{\text{Total Data Planned}} \times 100$$

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of Site conditions. During development of this network, consideration was given to the historical Site operations, existing analytical data and physical setting and processes. The rationale of the sampling network is discussed in detail in the RA Work Plan. Representativeness will be satisfied by insuring that the RA Work Plan is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

Compliance of precision, accuracy, representativeness, completeness, comparability and sensitivity objective will be evaluated by the QA/QC Officer - Analytical Activities using the equation in Section 13.0 and Figure 13.1. Should the quality assurance objectives not be fully compliant with these specified in the QAPP, the impact or the entire data set will be evaluated and corrective actions (as discussed in Section 14.0) will be implemented, as necessary.

4.4 FIELD MEASUREMENTS

Measurement data will be generated in many field activities. These activities include, but are not limited to, the following:

Real-Time Air Monitoring

i) documenting time, location and weather conditions;

ii) collecting TSP and total VOCs data;

iii) determining TSP TWA; and

iv) verifying adherence to Site-specific action criteria.

Soil Verification Samples

i) documenting time, location and weather conditions; and

ii) screening soils samples with field PID (HNu).

The general QA objective for such measurement data is to obtain reproducible and comparable measurements to a degree of accuracy that is possible with the use of standardized procedures. Accuracy and precision for the field measurements will be monitored by analyzing calibration check solutions and duplicate samples in duplicate calibration check solution measurements. Evaluation of field quality assurance objective compliance will be the responsibility of the Field QA Officer. Should the QA objectives not be met, corrective action (as described in Section 14.0) will be implemented, as necessary.

5.0 SAMPLING PROCEDURES

5.1 EQUIPMENT CLEANING

All sampling equipment which may come in contact with potentially contaminated materials shall be decontaminated prior to field use and after each sample is collected to prevent cross-contamination of the samples. Duplicate samples shall be collected concurrently with original samples, therefore, sampling equipment will not be decontaminated before collection of the duplicate. Decontamination of equipment will be performed as follows:

i) clean water and non-phosphate detergent wash using a brush, if necessary, to remove all visible foreign matter;

ii) rinse thoroughly with potable/deionized water;

iii) rinse with pesticide residue grade isopropyl alcohol;

iv) rinse thoroughly with deionized water;

v) allow the equipment to air dry on a clean polyethylene sheet as long as possible; and

vi) wrap in aluminum foil until use.

Following final rinse, openings will be visually inspected to verify they are free of particulates and other material which may contribute to possible sample cross-contamination.

Fluids used for cleaning will not be recycled. All wash water, rinse water and decontamination fluids will be containerized and stored on Site pending disposal.

5.2 FIELD SAMPLING

5.2.1 SAMPLE LABELING

Each sample will be labeled with a unique sample number that will facilitate tracking and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: A-4770-MMDDYY-XXX-001

A - designates types of sample (S-Soil, WW-waste water, GW-groundwater, SW-surface water)
4770 - Site reference number
MMDDYY - designates date of collection presented as month/day/year
XXX - sampler's initials
001 - sequential number starting with 001 at the start of the project

Field QC samples also will be numbered with a unique sample site number, consistent with the numbering system described above to prevent laboratory bias of field QC samples.

5.2.2 FIELD LOG

The field logbook will be a bound document with consecutively numbered pages. The entries for each day will commence on a new page which will be dated. All entries will be made only in waterproof black ink. Corrections will be made by marking through the error with a single line, so as to remain legible, and initialing this action followed by writing the correction.

The following information will be recorded in the field logbook for each sample collected:

i) site location identification;
ii) unique sample identification number;
iii) date and time (in military time format) of sample collection;
iv) weather conditions;
v) designation as to the sample matrix;
vi) designation as to the means of collection (grab, bailer, etc.);
vii) brief description of the sample;
viii) name of sampler;
ix) analyses to be performed on sample; and

CRA
CONESTOGA–ROVERS & ASSOCIATES

SHIPPED TO (Laboratory Name):

REFERENCE NUMBER:

SAMPLER'S SIGNATURE: _____ PRINTED NAME: _____

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS	REMARKS
TOTAL NUMBER OF CONTAINERS						HEALTH/CHEMICAL HAZARDS	

RELINQUISHED BY: ① _____	DATE: TIME:	RECEIVED BY: ② _____	DATE: TIME:
RELINQUISHED BY: ② _____	DATE: TIME:	RECEIVED BY: ③ _____	DATE: TIME:
RELINQUISHED BY: ③ _____	DATE: TIME:	RECEIVED BY: ④ _____	DATE: TIME:

METHOD OF SHIPMENT: WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: _____ _____

RECEIVED FOR LABORATORY BY: _____

DATE: _____ TIME: _____

figure 5.1

CHAIN OF CUSTODY FORM
TEXTILE ROAD SITE
Washtenaw County, Michigan

TABLE 5.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Analyses	*Sample Containers (1)*	*Preservation*	*Maximum Holding Time from Sample Collection (2)*	*Volume of Sample*	*Shipping*	*Normal Packaging*
SOLID (Soil)						
PCB	One 4-ounce glass jar per analysis	Iced, 4° C	14 days for extraction 40 days after extraction for analysis	Fill to shoulder of jar	Overnight or Hand Deliver	Bubble Pack or Foam Chips
WATER (Wastewater, Surface Water & Groundwater)						
TCL VOC	Three 40 mL teflon-lined septum vials per analysis	HCl to pH<2 Iced, 4° C	14 days for analysis	Fill completely, no air bubbles	Overnight or Hand Deliver	Foam Liner
PCB	Two 1-liter amber glass bottles per analysis	Iced, 4° C	7 days for extraction 40 days after extraction for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Bubble Pack or Foam Chips
TAL Metals	One 1-liter plastic bottle	NH03 to pH<2 Iced, 4° C	6 months (mercury 28 days) for analysis	Fill to neck of bottle	Overnight or Hand Deliver	Bubble Pack or Foam Chips
SOLID (Air)						
PCB	One Polyurethane Foam Plug (PUF) & Glass Fiber Prefilter	Iced, 4° C	14 days for extraction 40 days after extraction for analysis	Dependent on Air flow and duration	Overnight or Hand Deliver	Bubble Pack or Foam Chips

Notes:

(1) Multiple parameters on a single sample may not require separate additional containers for each parameter.
(2) These are technical holding times, i.e., are based on time elapsed from time of sample collection.

x) any other relevant comments such as odor, staining, texture, filtering, preservation, etc.

5.2.3 CHAIN-OF-CUSTODY FORMS

Chain-of-custody records will be used to track all samples from time of sampling to the arrival of samples at the laboratory. Each sample container being shipped to the laboratory will contain a chain-of-custody form. The chain-of-custody form consists of four copies which are distributed to the sampler, to the shipper, to the laboratory and to the office file of the CRA. The sampler and shipper will maintain their copies while the other two copies are enclosed in a waterproof enclosure within the shipping container. The laboratory, upon receiving the samples, will complete the remaining copies. The laboratory will maintain one copy for its records. The executed original will be returned to the CRA with the data deliverables package. A typical chain-of-custody form is presented on Figure 5.1.

5.2.4 SAMPLE CONTAINERS AND HANDLING

Required sample containers, sample preservation methods, maximum holding times and filling instructions are provided in Table 5.1.

All samples will be placed in appropriate sample containers, labeled and properly sealed. The sample labels will include sample number, place of collection, date and time of collection and analyses to be performed. Samples will be cushioned within the shipping coolers by the use of vermiculite, foam chips and/or bubble wrap. Samples will be kept cool by the use of sealed plastic bags of ice. A trip blank will accompany each shipment of groundwater samples submitted for VOC analysis.

Samples will be shipped by commercial courier on a daily basis to project laboratory. The exception to this will be samples which are collected on a Sunday or holiday. For samples collected on a Sunday or holiday, additional ice will be placed in the coolers, the coolers will be sealed and kept in a designated secure area where it will be picked up by the courier on the next business day.

Two seals comprised of chain-of-custody tape will encompass the right and left sides of each shipping cooler prior to shipment to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Clear tape will be placed over the seals to ensure that they are not accidentally broken during shipment.

Upon receipt of the cooler at the laboratory, the cooler will be inspected by the Sample Custodian. The condition of the cooler and seal will be noted on the chain-of-custody form by the Sample Custodian.

The Sample Custodian will then check the contents of the cooler with those samples listed on the chain-of-custody form. Any damage to the samples or discrepancies in the accompanying documentation will be recorded in the remarks column of the chain-of-custody form, dated and signed. Any damage or discrepancies will be reported to the Project Manager who will contact CRA for resolution.

5.3 SAMPLING PROTOCOLS

Soil, wastewater, and groundwater will be obtained in accordance with the sampling protocol detailed in the Sampling and Analysis Plan (SAP).

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

It is U.S. EPA Region V policy to follow the chain-of-custody protocols as described in "NEIC Policies and Procedures", EPA-330/9-78-001-R, revised August 1991. This custody is in three parts: sample collection, laboratory analysis and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if it:

i) is in your possession;

ii) is in your view, after being in your possession;

iii) is in your possession and you place it in a secured location; or

iv) is in a designated secure area.

6.1 FIELD CHAIN-OF-CUSTODY PROCEDURES

The sample packaging and shipment procedures summarized below will insure that the samples will arrive at the laboratory with the chain-of-custody intact. The protocol for specific sample numbering using case numbers and traffic report numbers, if applicable, and other sample designations are included in Section 5.0.

6.1.1 FIELD PROCEDURES

The following chain-of-custody procedures will be used in the field:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.
2. All bottles will be labeled with unique sample numbers.
3. Sample labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions.

6.1.2 FIELD LOGBOOKS/DOCUMENTATION

Field logbook will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the Site could reconstruct a particular situation without reliance on memory.

The title page of each logbook will contain the following:

i) person to whom the logbook is assigned;

ii) logbook number;

iii) project name;

iv) project start date; and

v) end date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the Site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass direction and distance taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the data of calibration.

Samples will be collected following the sampling procedures presented in Section 5.0. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification number will be assigned during sample collection. Field QC samples, which will receive an entirely separate sample identification number, will be submitted blind to avoid laboratory bias of field QC samples.

6.1.3 TRANSFER OF CUSTODY AND SHIPMENT PROCEDURES

The following custody and shipping procedures will be followed:

1. Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.
2. Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.
3. Whenever samples are split with a source or government agency, a separate chain-of-custody record is prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this is noted in the "Received By" space.
4. All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and the pink and goldenrod copies will be retained by the sampler for returning to the sampling office.
5. If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

6.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

The Sample Custodian will assign a unique number to each incoming sample for use in the laboratory. The unique number and customer number will then be entered into the sample receiving log. The laboratory date of receipt will also be noted.

The project laboratories custody procedures and document control for those samples analyzed by the project laboratory will be consistent with their standard laboratory protocols.

6.3 STORAGE OF SAMPLES

After the Sample Custodian has prepared the sample receiving log, the chain-of-custody will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled location and will be maintained under the preservation requirements specified in Table 5.1 until completion of all analytical work or, as a minimum, for 30 days after receipt of the final report by the CRA.

6.4 FINAL EVIDENCE FILES CUSTODY PROCEDURES

Evidential files for the entire project will be maintained by the CRA's Project Manager and will consist of the following:

i) project plan;
ii) project log books;
iii) field data records;
iv) sample identification documents;
v) chain-of-custody records;
vi) correspondence;
vii) references, literature;
viii) final data packages;
ix) miscellaneous - photos, maps, drawings, etc.; and

x) final report.

The evidentiary file materials will be the responsibility of the evidentiary file custodian (CRA's Project Coordinator) with respect to maintenance and document removal and will be stored in a secured, limited access area.

The project laboratory will be responsible for maintaining analytical log books and laboratory data. Raw laboratory data files will be inventoried and maintained by the project laboratory for a period of 5 years, at which time the CRA will advise the laboratory regarding the need for additional storage.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy for all the instruments and measuring equipment which are used for conducting field tests and laboratory analyses. These instruments and equipment should be calibrated prior to each use or on a scheduled periodic basis.

7.1 FIELD INSTRUMENTS/EQUIPMENT

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual for each instrument to ensure that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notation on any prior equipment problem are not overlooked, and all necessary repairs to equipment have been carried out.

7.1.1 FIELD INSTRUMENT CALIBRATION

Calibration of the field instruments used during air monitoring will be conducted at least daily. The field equipment will be maintained, calibrated and operated in a manner consistent with the manufacturer's guidelines.

7.2 LABORATORY INSTRUMENTS

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain a properly trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of calibration will be kept as follows:

1. If possible, each instrument will have record of calibration permanently affixed with an assigned record number.
2. A label will be affixed to each instrument showing description, manufacturer, model numbers, date of last calibration and by whom calibrated (signature), due date of next calibration and compensation or correction figures, as appropriate.
3. A written stepwise calibration procedure will be available for each piece of test and measurement equipment.
4. Any instrument that is not calibrated to within the manufacturer's original specification will display an appropriate warning tag.

Specific calibration procedures will be detailed in the respective methods and the associated laboratory SOPs, which may be provided upon request.

All standard materials will be traceable to U.S. EPA or National Institute of Standards and Technology (NIST) reference standards, if available. Each calibration standard will receive a reference number that is traceable to the lot number of the reference standard from which it was prepared.

8.0 ANALYTICAL PROCEDURES

The samples collected for chemical analyses will be analyzed using the preparation and analysis methods listed in Table 8.1. Laboratory SOPs are periodically reviewed and updated. The laboratory will submit to CRA any SOPs that are revised during the performance of the Removal Action.

TABLE 8.1

SUMMARY OF ANALYTICAL METHODS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Parameter (1)	*Analytical Method (2)*
Air Samples	
PCB	EPA-AA TO-4 & SW-846 8082
Soil and Sediment Samples	
PCB	SW-846 8082
Groundwater, Wastewater & Surface Water Samples	
PCB	SW-846 8082
TCL VOC	SW-846 8260
TAL Metals	SW-846 6000-7000 Series

Notes:

(1) Parameter
PCB = Polychlorinated Biphenyls
TCL = Target Compound List
VOC = Volatile Organic Compounds
TAL = Target Analyte List

(2) SW-846 - "Test Methods For Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, 3rd Edition and Promulgated Updates, November 1986.
EPA-AA - "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air", 2nd Edition, January 1999.

9.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

This section presents the internal quality control checks and frequency procedures which will be employed for field and laboratory measurements.

9.1 FIELD QC

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments.

Quality control of field sampling will involve collecting field blanks and field duplicates in accordance with the applicable procedures and frequencies described in Sections 4.1 and 5.0, and the level of effort indicated in Table 2.1.

9.2 LABORATORY QC

Specific procedures related to internal laboratory QC samples (namely, matrix spikes, surrogate spikes, blanks, QC check samples and matrix spike duplicates) are detailed in the following subsections.

The internal QC checks for the methods of analyses will follow the appropriate methods specified in Table 8.1 and the laboratories SOPs.

9.2.1 CALIBRATION STANDARDS

All primary standard materials will be traceable to U.S. EPA or NIST reference standards, if possible. Each calibration standard will receive a reference number that is traceable to the lot number from the primary reference standard from which it was prepared. The procedures for preparing calibration standards are contained within the laboratories SOPs.

9.2.2 INSTRUMENT PERFORMANCE CHECKS - ORGANICS

The compliance requirements for satisfactory instrument performance are established to ensure that the instrument is capable of producing acceptable quantitative data. Instrument tuning for gas chromatography/mass spectrometry (GC/MS) methods of analysis ensure that adequate mass resolution and, to some degree, sensitivity are achieved. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an analysis run, while the continuing calibration checks document that the initial calibration is still valid, and that satisfactory maintenance and adjustment of the instrument on a day-to-day basis is achieved. The specific acceptance criteria and action requirements for these checks will be as specified by the respective methods presented in Table 8.1 and the SOPs.

9.2.3 METHOD BLANK SAMPLES

A method blank sample will be analyzed by the laboratory at a frequency of one blank per 20 analyses or, in the event that an analytical round consists of less than 20 samples, one method blank sample will be analyzed. The method blank sample, an aliquot of analyte-free water, will be carried through the entire analytical procedure.

9.2.4 LABORATORY CONTROL SAMPLES AND QC CHECK SAMPLES

Laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) or QC Check Samples serve as a monitor of the overall performance of all steps in organic and inorganic analysis including the efficiency of the preparation procedure. The LCS or QC Check Samples are generally prepared from standards that are from a different source from the calibration standards or are standard reference materials (SRM). The criteria used to evaluate the LCS or QC check sample data will be as specified in the referenced method and applicable SOPs.

9.2.5 MATRIX SPIKE/MATRIX SPIKE DUPLICATES - ORGANIC ANALYSES

A matrix spike and matrix spike duplicate (MS/MSD) sample set will be analyzed at a minimum frequency of one per sampling event. Acceptance criteria and compounds that will be used for matrix spikes are identified in the applicable SOPs. Percent spike recoveries will be used to evaluate analytical accuracy while percent difference between the matrix spike and matrix spike duplicate will be used to assess analytical precision.

9.2.6 SURROGATES

Surrogates are used in all GC and GC/MS analyses. Every blank, standard, and environmental sample including MS/MSD samples will be spiked with surrogate compounds prior to purging volatiles or extracting semi-volatiles.

Surrogates will be spiked into samples according to the appropriate analytical methods. Surrogate spike recoveries will fall within the control limits specified by the method for all analytes concentrations that are within the quantitation limits without dilution or method specific corrective action will occur. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantitation limit; assessment of analytical quality in these cases will be based in the quality control information from the LCS, matrix spike and matrix spike duplicate samples.

9.2.7 REAGENT CHECKS

Reagents prepared for instrumental methods of analysis will be monitored by method blank samples and QC check samples, where appropriate.

9.2.8 BLIND CHECK SAMPLES

As supplied by the U.S. EPA, an analytical batch may contain a blind check sample. In general, the blind check sample may be obtained from U.S. EPA and supplied to the

CRA. The analytes employed in this check sample will be a representative subset of the analytes of interest.

The percent recovery of analytes from the check samples will be calculated as defined in Section 13.2.

10.0 DATA REDUCTION, VALIDATION AND REPORTING

The project laboratory will perform analytical data reduction and review in-house under the direction of the project laboratory QA Officer. The project laboratory QA Officer will be responsible for ensuring that any data qualified by the laboratory is consistent with establish QA policies. Data reduction, review and reporting by the project laboratory shall be conducted as detailed in the following procedure:

1. Raw data produced and checked by the responsible analyst is turned over for independent review by another analyst.
2. The area supervisor or his designee reviews the data for attainment of quality control criteria and established by the QAPP.
3. The area supervisor will decide whether any sample reanalysis is required.
4. Upon completion of all reviews and acceptance of the raw data by the supervisor, a report will be generated and sent to the Project Manager.
5. The laboratory Project Manager will complete a thorough inspection of all reports.
6. Upon acceptance of the preliminary reports by the Project Manager, final reports will be generated and signed by the Operations Manager or his designee.
7. A thorough review of a percentage of all data packages is performed by the laboratories QA Officer or his designee.

Field data from direct-reading instruments (pH/temperature, dissolved oxygen, conductance and turbidity) will not require reduction. Laboratory data reduction will be performed using the equations in the analytical methods referenced in Table 8.1.

The QA/QC Officer - Analytical Activities will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, field blank data and recovery data for surrogate and matrix spikes. The material will be checked for legibility, completeness, correctness and the presence of requisite dates, initials, and signatures. The results of these checks will be assessed and reported to the CRA's Project Manager noting any discrepancies and their effect upon the acceptability of the data. All information garnered for QA/QC checks will be discussed in a QA/QC Validation report.

Validation of the analytical data will be performed by the CRA QA/QC Officer - Analytical Activities based on the applicable evaluation criteria outlined in "U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-94/012, February 1994 and "U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA-540/R-94-013, February 1994. The assessment of analytical and field data will include checks for adherence to laboratory QA procedures and accuracy and precision criteria; and the presence of transmittal errors and anomalously high or low parameter values. The results of these data validations will be reported to the Project Manager, noting any problems and their effect upon the acceptability of the data.

Data produced from field measurements and sample collection activities that are used in the project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. In addition, field data will be reviewed for anomalously high or low values that may appear to be inconsistent with other data.

Laboratory data packages for chemical analyses will consist of the following deliverables:

i) a case narrative that includes a description of any unusual action or conditions;

ii) dates of sample receipt, extraction/digestion and analysis;

iii) laboratory and field sample identification numbers;

iv) samples results in tabular format;

v) method blank sample summaries;

vi) surrogate compound recovery data and matrix spike/matrix spike duplicate recovery data and control limits;

vii) check sample data; and

viii) executed chain-of-custody forms.

The laboratory will maintain all supporting documentation (standard and sample chromatograms, initial and continuing calibration summaries, inorganic raw data) for the analyses with the project fields and will submit this data to CRA upon request. The data packages will be stored with the evidentiary files as described in Section 6.4.

11.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits of both field and laboratory activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures established in Sections 5.0 and 8.0 of this QAPP. The audits of field and laboratory activities include two separate independent parts; internal and external audits. Performance audits consist of sending performance evaluation samples to the laboratories for analysis and evaluation, while system audits determine whether the requirements of the QAPP are being followed.

11.1 FIELD AUDITS

Internal audits of field activities (sampling and measurements) will be conducted by the CRA Field QA Officer. The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc. These audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the remediation. The audits will involve review of field measurement records, instrumentation calibration records and sample documentation.

Any external audits will be conducted by U.S. EPA.

11.2 LABORATORY AUDITS

The internal performance and system audits of the laboratory may be conducted by CRA's QA/QC Officer - Analytical Services Paul Wiseman. The system audits, which may be conducted prior to project commencement and as necessary thereafter based on the results of performance evaluation samples routinely analyzed by the laboratory, will include examination laboratory documentation of sample receiving, sample log-in, sample storage, chain-of-custody procedure, sample preparation and analysis, instrument operating records, etc. The performance audits may be conducted on a quarterly basis. Blind QC samples may be prepared and submitted along with project samples to the laboratory for analysis throughout the project. The QA officer will

evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable performance.

Any external audits will be performed by the U.S. EPA, as required.

12.0 PREVENTIVE MAINTENANCE

All analytical instruments to be used in this project will be serviced by the laboratory personnel at regularly scheduled intervals in accordance with the manufacturers recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of the laboratory personnel will be performed by the equipment manufacturer or its designated representative.

Daily checks of each instrument will be by the analyst who has been assigned responsibility for that instrument. This will include changing gas chromatography instrumentation inlet liners, tuning gas chromatography/mass spectrometry instrumentation, checking operation of data systems, checking for leaks, etc. Manufacturer's recommended procedures will be followed in every case.

All maintenance will be recorded in a bound logbook kept with each instrument.

Table 12.1 presents routine preventive maintenance for laboratory and field instruments and critical spare parts to be kept on-hand to minimize downtime.

TABLE 12.1

ROUTINE PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES TEXTILE ROAD SITE WASHTENAW COUNTY, MICHIGAN

Instrument	*Maintenance Procedures/Schedule*	*Spare Parts in Stock*
Gas Chromatograph	1. Change septa weekly or as often as needed. 2. Change gas line dryers as needed. 3. Replace GC injector glass liner weekly or as often as needed. 4. Replace GC column as needed. 5. Clean/replace GC detector as needed. 6. Check to ensure that gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 7. Check to ensure the pressure on the primary regulator never run below 100 psi.	1. Syringes 2. Septa 3. Detectors 4. Glass liner 5. GC column

13.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

The following sections include the procedures and formulae utilized to assess the levels of precision, accuracy and completeness achieved during the associated sample analyses.

13.1 FIELD MEASUREMENTS

Field data will be assessed by the CRA Field QA Officer who will review the field results for compliance with the established QC criteria that are specified in the QAPP and the RA Work Plan. Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assessed on the basis of reproducibility by multiple readings of a single sample. Data completeness will be calculated using the following equation:

$$\text{Completeness} = \frac{\text{Valid (Usable) Data Obtained}}{\text{Total Data Planned}} \times 100$$

The required level of completeness will be 90 percent or greater.

13.2 LABORATORY DATA

Laboratory results will be assessed for compliance with required precision, accuracy, completeness and sensitivity as follows:

13.2.1 PRECISION

Precision of laboratory analysis will be assessed by comparing the analytical results between MS/MSD samples and the investigative/duplicate samples. The relative percent difference (%RPD) will be calculated for each pair of analyses using the equation on Figure 13.1

13.2.2 ACCURACY

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in Sections 4.0 and 9.0 of the QAPP using the analytical results of method blanks, reagent/preparation blank, MS/MSD samples, field blank and trip blanks. The percent recovery (%R) of matrix spike samples will be calculated using the equation on Figure 13.1.

13.2.3 COMPLETENESS

Completeness will be assessed by comparing the number of valid (usable) results (as determined by CRA's QA/QC Officer-Analytical Activities) to the total possible number of results using the formula presented in Section 13.1. The required level of completeness for laboratory analyses will be 90 percent or greater.

13.2.4 SENSITIVITY

The achievement of method detection limits depend on instrumental sensitivity and matrix effects. Therefore, it is important to monitor the instrumental sensitivity to ensure the data quality through constant instrument performance. The instrumental sensitivity will be monitored through the analysis of method blank, calibration check sample and laboratory control sample.

13.3 STATISTICAL EVALUATIONS

In examination of data and determination of its precision and accuracy, standard statistical formulae will be used.

13.3.1 ARITHMETIC MEAN

The arithmetic mean is the average obtained by dividing a sum by the number of its addends. A number of recovery results are averaged together to improve the accuracy of the measurement. Figure 13.1, equation 1 summarizes the formula to be used to

Equation 1 Determination of Arithmetic Mean ($\bar{X}$)

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

where n = number of measurements

X_i = value of measurements

Equation 2 Determination of Standard Deviation (σ_{n-1})

$$\sigma_{n-1} = \sqrt{\frac{\sum_{i=1}^{n} (X_i - \bar{X})^2}{n-1}}$$

where n = number of measurements

X_i = value of measurements

$\bar{X}$ = arithmetic mean

Equation 3 Determination of Percent Relative Standard Deviation (% RSD)

$$\% \text{ RSD} = \frac{\sigma_{n-1}}{\bar{X}} \times 100$$

where σ_{n-1} = standard deviation

$\bar{X}$ = arithmetic mean

Equation 4 Determination of Percent Recovery (% R)

$$\% \text{ R} = \frac{SSR - SR}{SA} \times 100$$

where SSR = Spiked Sample Result

SR = Sample Result or Background

SA = Spike Added

Equation 5 Determination of Relative Percent Difference (RPD)

$$RPD = \left(\frac{|R_1 - R_2|}{\left[\frac{R_1 + R_2}{2}\right]} \right) \times 100$$

where R_1 = value of first result

R_2 = value of second result

figure 13.1

STATISTICAL FORMULAE
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

determine the arithmetic mean. This equation will be used to determine the central tendency of duplicate results.

13.3.2 STANDARD DEVIATION

The standard deviation is the square root of the average squared difference between the individual values and the average value. A number of recovery results are evaluated to find the numerical variation in the data which is then used in the determination of the percent relative standard deviation. Figure 13.1 equation 2 summarizes the formula to be used to determine the standard deviation. This equation will be used to determine the dispersion of data about the mean.

13.3.3 PERCENT RELATIVE STANDARD DEVIATION (%RSD)

The percent relative standard deviation is the percentage obtained by dividing the standard deviation of the values by the arithmetic mean of the values and multiplying by 100. The %RSD is calculated on a series of measurements to evaluate an instruments analytical precision (e.g., initial calibration). Figure 13.1, equation 3 summarizes the formula to be used to determine %RSD. This equation will be used to determine the dispersion of data relative to the mean.

13.3.4 PERCENT RECOVERY (%R)

The percent recovery of a parameter is the percentage obtained by dividing the amount recovered by the true amount added and multiplying by 100. The percent recoveries of spiked samples are evaluated to establish the analytical accuracy of a measurement. Figure 13.1, equation 4 summarizes the formula to be used to determine the percent recovery. This equation is used to determine bias.

13.3.5 RELATIVE PERCENT DIFFERENCE (RPD)

The relative percent difference is the percentage obtained by dividing the difference between two numbers by their arithmetic mean and multiplying by 100. The RPD is

used to evaluate the analytical precision of two replicate measurements (e.g., matrix spike/matrix spike duplicate). Figure 13.1, equation 5 summarizes the formula to be used to determine RPD. This equation is used to determine variability of duplicate analyses.

13.4 OUTLIERS

Outlying data will not be assessed by statistical evaluations as insufficient data will be generated for each sample to statistically eliminate outliers. All data will be validated, qualified as necessary and reviewed for suspect data. Suspect data will only be eliminated during the data validation process.

14.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out of quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, and data validation and assessment. All corrective action proposed and implemented will be documented.

14.1 FIELD CORRECTIVE ACTION

Corrective action in the field may be necessary when the sample network is changed (i.e., more/less samples, sampling locations other than those specified), sampling procedures and/or field analytical procedures require modification, due to unexpected conditions. In general, the field sampling team may identify the need for corrective action. The field sampling team, in consultation with the Field QA Officer, will recommend a corrective action. The Field QA Officer will approve the corrective action which will be implemented by the field team. It will be the responsibility of the Field QA Officer to ensure the corrective action has been implemented.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. CRA's Field QA Officer - will identify deficiencies and recommended corrective action to CRA's Project Manager. Implementation of corrective actions will be performed by the Field QA Officer and field team. Corrective action will be documented in quality assurance reports to management.

14.2 LABORATORY CORRECTIVE ACTION

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with analysts and section leaders, it may be necessary for the laboratory QA Officer to approve the implementation of corrective action. The submitted SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These

conditions may include dilution of samples, additional sample extract cleanup or automatic reinjection/reanalysis when certain QC criteria are not met.

The calibration acceptance/rejection criteria presented in the SOPs presents examples of situations requiring corrective action for each analytical instrument. In addition, the laboratory's SOPs will provide a section on corrective action requirements.

The bench chemist will identify the need for corrective action. The Operations Manager or section leaders, in consultation with the laboratory supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The laboratory QA Officer will ensure implementation and documentation of the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action report and the case narrative report sent from the laboratory to CRA.

The need for corrective action may also be identified during systems or performance audits. In these cases, the need for corrective action will be identified by the auditor and the corrective action taken to resolve the problem will be documented by the laboratory QA Officer. The corrective action taken will depend upon the QA/QC criteria which was violated. All problems requiring corrective action, and the corrective action taken, will be reported to CRA's Project Manager.

14.3 CORRECTIVE ACTION DURING DATA VALIDATION AND DATA ASSESSMENT

The QA/QC Officer - Analytical Activities may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or re-injection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (e.g., the holding time for samples is not exceeded). When the QA/QC Officer - Analytical Activities identifies a corrective action situation, the CRA's Project Manager will be responsible for approving the implementation of corrective action, including resampling, during data assessment.

15.0 QUALITY ASSURANCE REPORT TO MANAGEMENT

Management will receive reports on the performance of the measurement system and data quality following each sampling round and on an annual basis.

Minimally, these reports will include:

i) assessment of measurement quality indicators (i.e., data accuracy, precision and completeness);

ii) results of system and performance audits; and

iii) QA problems, action taken and resolutions.

The QA/QC Officer - Analytical Activities will be responsible within the organizational structure for preparing these reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and details an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

16.0 REFERENCES

1. United States Environmental Protection Agency "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations", EPA QA/R-5, Draft Interim Final, August 1994.

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3. Unites States Environmental Protection Agency. "Preparation Aids for the Development of Category I Quality Assurance Project Plans", EPA/600/8-91/003, Risk Reduction Engineering Laboratory, Office of Research and Development, Cincinnati, Ohio, February 1991.

4. United States Environmental Protection Agency. "Data Quality Objectives Process for Superfund, Interim Final Guidance", EPA 540/R-93-071, Office of Solid Waste and Emergency Response, September 1993.

APPENDIX C

HEALTH AND SAFETY PLAN (HASP)

APPENDIX C

SITE HEALTH AND SAFETY PLAN
REMOVAL ACTION WORK PLAN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

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TABLE 18.1 EMERGENCY TELEPHONE NUMBERS

1.0 INTRODUCTION

This Health and Safety Plan has been prepared as part of the Removal Action Work Plan (Work Plan) for the Textile Road Site. The project involves a number of field activities in which personnel may come in contact with hazardous material(s). The field activities include:

1) Site preparation activities;
2) excavation of contaminated soils and debris;
3) soil, air, groundwater, and surface water sampling; and
4) backfilling and grading of excavated areas.

The routes of entry causing primary concern with these chemicals are through skin adsorption, inhalation and ingestion. The possible ingestion of these compounds will be controlled through proper hygiene practices.

This Health and Safety Plan (HASP) is designed to ensure:

1) that personnel working on Site are not exposed to hazardous materials which could adversely affect their health and safety;
2) that the health and safety of the general public and the environment is not compromised by off-Site migration of contaminated materials; and
3) compliance with applicable governmental and nongovernmental (American Conference of Governmental Industrial Hygienists (ACGIH)) regulations and guidelines.

All Site operations will be conducted in accordance with the provisions of the HASP. Cost and scheduling considerations will not be considered as justification for modifying this plan.

A Site Plan is presented on Figure 1.1.

2.0 BASIS

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) will provide the basis for this Health and Safety Plan. The Plan also reflects the position of the United States Environmental Protection Agency (U.S. EPA) and National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to ensure safe operations at sites containing hazardous or toxic materials.

3.0 SITE CHARACTERIZATION

The purpose of this section is to provide an overview of the physical and chemical characterization of the Textile Road Site. More detailed information regarding the physical and chemical characterization of the Textile Road Site is presented in Section 1.0 of the Remedial Action Work Plan (Work Plan).

Extensive sampling has been performed at the Textile Road Site to characterize the concentrations and distribution of contaminants at the Site. A summary of the contaminant concentrations found at the Textile Road Site is presented in Table 3.1. The primary chemicals of concern are identified in Table 3.2.

The Textile Road Site was identified to contain PCBs in five primary areas. Soil excavation will be conducted to remove all soil containing PCBs above the Michigan Act 451, Part 201 - generic commercial category IV cleanup criteria for PCBs of 26 mg/kg. Material exceeding 50 mg/kg will be disposed of at the Environmental Quality Company's (EQ) TSCA permitted disposal facility. Soil containing PCBs, ranging from 26 to 50 mg/kg will be disposed of at a Michigan Act 451, Part 115 Type II sanitary landfill. Material containing PCBs at levels greater than the Michigan Act 451, Part 201 Generic Residential Cleanup criteria of 1.2 mg/kg (but less than the industrial cleanup criteria), will be consolidated to one area of the Site. A detailed description of the RA can be found in Section 3.0 of the Work Plan.

An analysis of the potential hazards associated with proposed activities at the Textile Road Site is presented in Table 3.3.

4.0 RESPONSIBILITIES AND ADMINISTRATION

Selected Contractors will designate an on-Site individual to act as the Health and Safety Officer (HSO). The HSO will be responsible for decisions regarding when work will be stopped or started for health and safety considerations. The HSO will report directly to, and be under, the direction of a Certified Industrial Hygienist (CIH). The CIH will oversee operations as necessary to ensure that the work is performed in accordance with this plan. Specifically, the CIH will be responsible for the following:

1) implementation of a Site-specific HASP at the initiation of Site work;
2) a preconstruction training session of all on-Site personnel with regard to the Site-specific HASP and other safety requirements to be observed during remedial activities, including:
    a) potential hazards;
    b) personal hygiene principles;
    c) use of personal protective equipment (PPE);
    d) respiratory protection equipment usage and fit testing;
    e) emergency procedures for dealing with fire and medical situations; and
    f) heat stress principles; and
3) oversight of the Health and Safety Officer's activities on a part-time basis and be available on an as-needed basis for emergency situations.

The HSO will:

1) have a minimum of 2 years of Site-related working experience specific to the handling and excavation of contaminated soils;
2) have a sound working knowledge of State and Federal occupational safety and health regulations;
3) have formal educational and/or training in occupational safety and health;
4) be responsible for daily enforcement and monitoring of the HASP;
5) be responsible for assisting the CIH in the pre-construction training of all on-Site personnel;
6) be responsible for the maintenance and separation of "Exclusion" (potentially contaminated) and "Support" (uncontaminated) areas as described in Section 6.0;
7) be responsible for maintenance of the emergency contingency plan; and

8) be responsible for conducting Air Monitoring as defined in Section 19.0 of this HASP.

5.0 SITE-SPECIFIC HEALTH AND SAFETY PLAN

A Site-specific Health and Safety Plan will be executed by the selected Contractor for work performed at the Site. The executed plan will address, at minimum, all the requirements outlined in this Health and Safety Plan. A copy of the Site-specific Health and Safety Plan will be maintained on Site during all remedial activities.

6.0 WORK AREAS

Specific work areas will be delineated by fence or a flagged line as outlined below.

a) Exclusion Zone (EZ) - This zone will include all areas where potentially contaminated soils or materials are to be excavated, handled, spoiled or covered, and all areas where contaminated equipment or personnel travel.

The EZ will be clearly delineated in the field prior to commencing Site work, by temporary fencing with warning signs spaced around the perimeter of the Zone warning of a hazardous work area. Temporary Exclusion Zones outside of the Site fence will be delineated by temporary fencing when working in these areas.

b) Contaminant Reduction Zone (CRZ) - This zone will occur at the interface of the EZ and Support Zone and will provide access for the transfer of construction materials and Site dedicated equipment to the EZ, the decontamination of transport vehicles handling contaminated soil prior to leaving the EZ, the decontamination of personnel and clothing prior to entering the Support Zone and for the physical segregation of the Support Zone and EZ.

c) Support Zone (SZ) - This area is the portion of the Site defined as the area outside the zone of significant air and soil contamination. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work Site. The function of the Support Zone includes:

1) an entry area for personnel, material and equipment to the CRZ;

2) an exit area for decontaminated personnel, materials and equipment from the EZ;

3) the housing of Site special services; and

4) a storage area for clean safety and work equipment.

7.0 COMMUNICATIONS

Telephone service (cellular or stationary) will be provided to the Site during removal activities. Emergency numbers including police, fire, ambulance, hospital, and appropriate Regulatory agencies will be prominently posted near each phone and attached to the final Health and Safety Plan.

8.0 MEDICAL SURVEILLANCE

In accordance with requirements detailed in 29 CFR 1910.120 and 29 CFR 1910.134, all Site personnel who will come in contact with potentially contaminated materials will have received, within one year prior to starting field activities, medical surveillance by a licensed physician or physician's group.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

Each employer will ensure that its personnel involved in on-Site work will have all necessary medical examinations prior to commencing work which requires respiratory protection or exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to on-Site activity or when accidental exposure to elevated concentrations of contaminants occurs.

9.0 TRAINING

All Site personnel will be required to complete Site training and refresher sessions conducted by the HSO. Site training and refresher sessions are designed to ensure that all personnel are capable of, and familiar with, the use of safety, health, respiratory and protective equipment and with the safety and security procedures required for the Site. The Site training session will be conducted by the HSO (or other qualified professionals in the presence of the Certified Industrial Hygienist) prior to beginning work at the Site.

In accordance with 29 CFR 1910.120, all employees exposed to hazardous substances, health hazards or safety hazards will receive training including a minimum of 40 hours instruction off Site, as required by OSHA, and three days of actual field experience under direct supervision. The Contractor will provide documentation stating that all on-Site personnel have complied with this regulation. Each individual's name will be included on this confirmatory letter. The training program will include at a minimum the following items:

1) personnel responsible for Site health and safety;
2) Site-specific potential hazards;
3) use of personal protective equipment, including proper donning and doffing procedures;
4) work practices by which the employee can minimize risks from these potential hazards;
5) safe use of engineering controls and on-Site equipment;
6) discussion and completion of medical surveillance requirements and recognition of symptoms associated with exposure to hazards;
7) Site control methods (described in Section 20.0);
8) on and off-Site contingency plans;
9) decontamination procedures;
10) Site specific standard operating procedures;
11) delineation between work zones;
12) use of the buddy system (described in Section 16.0);
13) scope of the intended works for the project; and
14) review on-Site communications and appropriate hand signals between personnel working in the EZ and/or CRZ.

The HSO will be responsible for ensuring that personnel not successfully completing the required training prior to beginning work are not permitted to enter the Site to perform work.

The Contractor will implement a hazard communication ("Right-to-Know") program in accordance with 29 CFR 1910.1200.

10.0 PERSONAL PROTECTIVE EQUIPMENT

All on-Site personnel will be equipped with personal protective equipment (PPE) and protective clothing appropriate for the hazardous material being handled and the nature of work being completed. All PPE and protective clothing will be kept clean and well-maintained.

The anticipated PPE and apparel as required for general work and excavation work within the Exclusion Zone will consist of:

1) hardhats;
2) work clothing (full length pants, shirts);
3) steel toed, steel shank chemical resistant work boots; and
4) safety glasses with sideshield.

HSO in conjunction with the Engineer will determine if upgrades to the level of PPE are required based on Site conditions and air monitoring results.

Additional protective equipment usage guidelines to be implemented include:

1) all prescription eyeglasses in use on the Site will be safety glasses. Contact lenses will not be permitted;
2) during periods of respirator usage in contaminated areas, respirator cartridges will be changed daily or upon breakthrough, whichever occurs first;
3) footwear used on Site will be approved safety boots;
4) on-Site personnel unable to pass a respirator fit test will not enter or work in the EZ or CRZ;
5) all on-Site personnel will wear an approved hardhat when present in the EZ if overhead hazards are present;
6) all PPE worn on Site will be decontaminated at the end of each work day. The HSO will be responsible for ensuring individuals decontaminate PPE before reuse; and
7) duct tape will be used to ensure that disposable coveralls and gloves are tightly secured when personnel are working within contaminated zones.

11.0 RESPIRATORY PROTECTION

All on-Site personnel will receive extensive training in the usage and limitations of, and be qualitatively fit tested for, half and/or full-facepiece respirators in accordance with 29 CFR 1910.134. This will include both air purifying and supplied air type respirators.

Appropriate respiratory protection, will be mandatory during all on-Site remedial activities which involve the contact or potential contact with contaminated soil or groundwater. As a minimum, all on-Site personnel will be required to wear half-facepiece air purifying respiratory protection when working in the EZ, which will be modified based on air monitoring readings.

Levels of respiratory protection have been chosen consistent with potential airborne hazards. The selection of appropriate protection is based upon the potential presence of compounds with the lowest recommended threshold limit value.

The following levels of respiratory protection will be required when working in the EZ:

Sustained Photoionization Total Volatile Organic Compound Concentration (ppm)	*Level of Respiratory Protection Required*
< Background to 49	Level D
49 to 500 meter units above background	Level C
>500 meter units above background	Cease operation and move to safe area. Confer with HSO. Re-evaluate work plan. Abandon location or upgrade to Level B and continue.

Sustained Respirable Dust Concentration Above Background	*Level of Respiratory Protection Required*
< 4 mg/m^3	Level D
4 - 10 mg/m^3	Level C
≥ 10 mg/m^3	Level B

All major equipment handling potentially contaminated soils will be equipped with a source of compressed grade D breathing air for air supplied respirators, should they be required.

If other air monitoring data exists and occupational health standards are not being exceeded, then respiratory protection requirements may be relaxed with the approval of the HSO.

The HSO will be responsible for implementing, maintaining and enforcing the respirator program.

On-Site personnel unable to pass a respirator fit test will not be permitted to enter or work in the EZ or CRZ.

12.0 PERSONAL HYGIENE FACILITIES

The HSO will be responsible for ensuring that all personnel performing or supervising remedial work within a hazardous work area, or who may potentially be exposed to hazardous chemical vapors, liquids, or contaminated solids, observe and adhere to the personal hygiene-related provisions of this section.

On-Site personnel found to be disregarding the personal hygiene-related provisions of this plan will be barred from the Site.

The following equipment/facilities will be provided for the personal hygiene of all on-Site personnel:

1) suitable disposable outerwear, gloves, and footwear on a daily or as-needed basis for the use of on-Site personnel;
2) contained storage and disposal for used disposable outerwear;
3) portable toilet facility;
4) lunch area; and
5) a smoking area.

The following regulations for personnel working within the EZ will also be enforced:

1) used disposable outerwear will not be reused, and when removed, will be placed inside disposable containers provided for that purpose;
2) smoking will be prohibited except in a designated smoking area;
3) eating and drinking will be prohibited except in the designated lunch or break area;
4) soiled disposable outerwear will be removed prior to entering the lunch area, and prior to cleansing hands; and
5) on-Site personnel will thoroughly cleanse their hands and other exposed areas before entering the smoking or lunch area.

13.0 EMERGENCY AND FIRST AID EQUIPMENT

The safety equipment listed below will be located and maintained within the EZ in appropriate locations as directed by the Health and Safety Officer.

1) portable emergency eye wash;
2) two 20-pound ABC type dry chemical fire extinguishers; and
3) two self contained breathing apparatus.

One hand-held emergency siren, an industrial sized first aid kit, two 20-pound ABC Fire extinguishers, an eye wash station and two complete sets of Level B protective equipment will be located and maintained in the Support Zone.

14.0 HEAT STRESS MONITORING

14.1 OVERVIEW

Heat induced occupational illnesses, injuries and reduced productivity occur in situations in which the total heat load (environmental plus metabolic) exceeds the body's capacities to maintain normal body functions without excessive strain. Heat stress is the sum of the heat generated in the body plus the heat gained from the environment minus the heat lost from the body to the environment. The body's response to heat stress is called heat strain. The level of heat stress at which excessive heat strain will result depends on the heat tolerance of the individual. Certain predisposing factors may reduce an individual's ability to tolerate heat stress.

Using PPE may put a hazardous waste worker at an increased risk of developing heat stress. Health effects may range from heat rash or heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions such as temperature and relative humidity, protective clothing which limits natural heat loss through perspiration, workload and the individual characteristics of the worker.

It is the responsibility of the project team members to inform the HSO or CIH if any of the predisposing factors listed below apply to them. This enables the HSO to monitor the individual if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a heat related illness or disorder.

14.2 PREDISPOSING FACTORS

Predisposing factors that will increase the individual's susceptibility to heat stress are listed below:

- Lack of Physical Fitness: Such individuals experience more physiological strain including a higher heart rate, a higher body temperature, less efficient sweating and slightly higher oxygen consumption as compared to fit individuals.
- Obesity: Overweight individuals produce more heat per unit surface area than thin individuals and have a lowered ability to dissipate heat.
- Age: Older individuals may have a decreased ability to cope with heat stress.
- Dehydration: Dehydrated individuals will have a decreased ability to cool the body by sweating. Diarrhea can cause dehydration.

- Alcohol, Medications and Drug Use: Alcohol consumption may dehydrate individuals and certain medications/drugs may act as diuretics. Hence, the individual may have a decreased ability to lose heat by sweating.
- Infection, Sunburn, Illness and Certain Chronic Diseases: These factors may interfere with the body's normal mechanisms to lose heat.
- Heart Conditions or Circulatory Problems: Heat stress may place an additional strain on the heart and circulatory system that could harm the individual as well as decrease the individual's physiologic response.
- Low Salt Diet: Could affect the individual's electrolyte balance.
- Pregnancy
- Previous History of Heat Stroke or Heat Exhaustion: May increase the individual's susceptibility to heat stress.
- Heavy Work Load: Will generate metabolic heat thereby increasing the heat stress placed on the individual.
- The Use of PPE Over Light Summer Clothing: This will decrease the ability of an individual to lose heat by sweating as evaporative cooling can no longer occur.
- Lack of Acclimatization: Acclimatization is the gradual introduction of workers into a hot environment to allow their bodies to physiologically adjust to hot working conditions. Acclimatized individuals generally have lower heart rates and lower body temperatures. In addition, they sweat sooner and more profusely and even have more dilute sweat (thereby losing less electrolytes) than non-acclimatized individuals.

14.3 PREVENTION OF HEAT STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing heat stress related disorders. These include fluid and electrolyte replenishment, the provision of shelter from the sun and heat, work schedule adjustment, the use of cooling devices, acclimatization, heat stress monitoring and employee education, as discussed below:

- Fluid and Electrolyte Replenishment: Personnel should drink about 16 ounces of water before starting work and drink water at every break. To encourage water consumption, cool water and disposable cups should be made available. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, personnel should be encouraged to drink more. Replacing body fluids with Gatorade is an option. It is advisable to

have Gatorade on site if the air temperature is 70°F (21°C) or more and the workers are performing tasks with a moderate to heavy work load in chemical resistant clothing.

- Shelter From the Sun and Heat: Air-conditioned (if possible) or shaded areas should be made available for rest periods. Sitting in an air-conditioned truck is an acceptable option.
- Work Schedule Adjustment: Scheduling work for early mornings and/or late afternoons will avoid the hottest parts of the day and reduce the heat stress placed on personnel. Rotation of personnel will help reduce overexertion of workers and adjusting the work-rest schedule will help personnel recover from the effects of heat stress periodically.
- Use of Cooling Devices: The use of cooling devices like field showers, hose-down areas or cooling vests should be considered for project tasks that involve heavy work loads in chemical resistant clothing.
- Acclimatization: Acclimatization is the gradual introduction of workers into a hot environment to allow their body to physiologically adjust to hot working conditions. Acclimatized individuals generally have lower heart rates and lower body temperatures. In addition, they sweat sooner and more profusely and even have more dilute sweat (thereby losing less electrolytes) than non-acclimatized individuals.
- Heat Stress Monitoring: Monitoring hot environments for potential heat stress should be initiated when the ambient air temperature is in excess of 70°F. There are several ways to monitor heat stress: measuring heart rate, oral temperature, loss of body weight and the Wet Bulb Globe Temperature using a Reuter-Stokes or Quest Electronics heat stress monitor. Workers are advised to measure their heart rates as a primary means of heat stress monitoring following the guidelines in Section 14.3.2 and Table 14.1.
- Employee Education: Workers have already been trained to recognize and treat the effects of heat stress during the OSHA required 40-hour training course. Signs, symptoms and treatment of heat stress should be discussed in site safety meetings. The buddy system will help in preventing heat stress once the employees are trained to recognize the signs and symptoms of heat stress.

14.3.1 PREVENTION PRACTICES

It may not be practically feasible to implement all of the above prevention measures. The following has been developed as a field guide for use in actual field situations.

Ambient air temperature is 70°F (21°C) or more:

- Replenish fluids and electrolytes. Drink cool (50°F to 60°F/10°C to 15°C) fluids hourly. The fluids should be caffeine-free and non-alcoholic. Do not wait until you are thirsty. Your normal thirst mechanism is not sufficient to overcome the effects of dehydration. If you feel thirsty, you are already becoming dehydrated.
- Provide shelter from the sun and heat.

Ambient air temperature is 70°F (21°C) or more and chemical-resistant clothing is being used:

- Same as above;
- Adjust work schedules if feasible; and
- Initiate heat stress monitoring and/or the use of cooling devices.

14.3.2 HEAT STRESS MONITORING

Heat stress monitoring may be performed by monitoring the heart rate. Heart rate should be measured at the beginning of the work shift, at regular intervals and at the start of each rest period.

1) If the heart rate is <110 beats per minute (bpm), personnel may continue the current work/rest schedule.

2) If the heart rate is >110 bpm, take a 10 minute break. Monitor heart rate at the end of the rest period. If not <110 bpm, rest until the heart rate is <110 bpm. Reduce the current work time between breaks by approximately 1 hour. If the next scheduled monitoring session shows a heart rate of >110 bpm once again, reduce the work time between breaks by 1 hour.

14.4 HEAT STRESS FIRST AID

14.4.1 HEAT CRAMPS

Cause: Excessive water loss/electrolyte imbalance.

Symptoms	*First-Aid Guidelines*
Muscular pain in arms, legs, abdomen	Administer sips of Gatorade (1/2 glass every 15 minutes)
Faintness, dizziness, exhaustion	Do not massage cramping muscles
Normal temp, cool moist skin	Relax person

14.4.2 HEAT EXHAUSTION

Cause: Large amount of water loss; blood circulation diminishes.

Symptoms	*First-Aid Guidelines*
Moist, clammy, skin, usually pale	Move to a cool place
Dilated pupils	Apply cold, wet compresses to skin
Weak, dizzy, nauseous, headache	Raise feet 8 to 12 inches
Normal or low body temperature	Administer sips of Gatorade (1/2 glass every 15 minutes)
	Get medical attention

14.4.3 HEAT STROKE

Cause: Body overheats; temperature rises; no sweating occurs

Symptoms	*First-Aid Guidelines*
No sweating occurs	Get emergency medical assistance ASAP
Dry, hot skin, usually red	Remove from sunlight
Constricted pupils	Wet down body with cool water or rubbing alcohol
Hot body temperature (105°F to 110°F/40.5°C to 43.5°C)	Elevate head/shoulders
Strong, rapid pulse	Wrap in wet, cold wrapping
Unconsciousness may occur	Once cooled to 102°F (38.9°C), stop cooling measures
Muscular twitching	

15.0 COLD STRESS MONITORING

15.1 OVERVIEW

Fatal exposures to cold have been reported in employees failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F, can be life threatening. A drop in core temperature to 95°F or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind-chill must be considered as it contributes to the effective temperature. The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow and possible skin burns from contact with cold metal.

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the HSO to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

15.2 PREDISPOSING FACTORS

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- Dehydration: The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- Fatigue During Physical Activity: Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- Age: Some older and very young individuals may have an impaired ability to sense cold.

- Alcohol Consumption: Alcohol dilates the blood vessels near the skin surface resulting in excessive body heat loss.
- Sedative Drugs: Sedatives may interfere with the transmission of impulses to the brain, thereby interfering with the body's physiological defense against cold. Some prescription drugs may react the same way.
- Poor Circulation: Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- Heavy Work Load: Heavy work loads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.
- The Use of PPE: PPE usage which traps sweat inside the PPE may increase an individual's susceptibility to cold stress.
- Lack of Acclimatization: Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- History of Cold Injury: Previous injury from cold exposures may result in increased cold sensitivity.

15.3 PREVENTION OF COLD STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules and employee education.

- Acclimatization: Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- Fluid and Electrolyte Replenishment: Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.

- Eating a Well-Balanced Diet: Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high energy foods throughout the day.
- Warm Clothing: It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

The parts of the body most important to keep warm are the feet, hands, head and face. As much as 40 percent of body heat can be lost when the head is exposed.

Recommended clothing includes:

- Inner layers (t-shirts, shorts, socks) should be of a thin, thermal insulating material.
- Wool or thermal trousers. Denim is not a good protective fabric.
- Felt-lined, rubber-bottomed, leather-upper boots with a removable felt insole is preferred. Change socks when wet.
- Wool shirts/sweaters should be worn over inner layer.
- A wool cap is good head protection. Use a liner under a hard hat.
- Mittens are better insulators than gloves.
- Face masks or scarves are good protection against wind.
- Tyvek/poly-coated Tyvek provides good wind protection.
- Wear loose fitting clothing, especially footwear.
- Carry extra clothing in your vehicle.
- Shelters with heaters should be provided for the employees' rest periods if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
- At temperatures of 30°F (-1°C) or lower, cover metal tool handles with thermal insulating material if possible.
- Schedule work during the warmest part of the day if possible, rotate personnel and adjust the work/rest schedule to enable employees to recover from the effects of cold stress.

15.3.1 EMPLOYEE EDUCATION

Employees have already been trained to recognize and treat the effects of cold stress during their OHSA required 40-hour training. Signs, symptoms and treatment of cold stress should be reviewed in project safety meetings where applicable. The buddy system will help in preventing cold stress once the employees are trained to recognize the signs and symptoms of cold stress.

15.3.2 COLD STRESS PREVENTION GUIDELINES

It may not be practically feasible to implement all the above prevention measures. Follow the guidelines given below when the ambient air temperature is -5°F (-20°) or lower:

- Contact the HSO or the CIH to determine if the project team should be on-site in such temperatures;
- Dress warm;
- Replenish fluids and electrolytes at regular intervals;
- Provide shelter from the cold; and
- Adjust work/rest schedules.

15.3.3 ADJUST WORK-REST SCHEDULES

Follow the work/rest schedule in Table 15.1. It is based on the cooling power of air which is a function of wind speed and ambient air temperature.

15.4 FIRST-AID TREATMENT GUIDELINES

The following describes symptoms of different stages in cold stress and the related first-aid treatment guidelines.

15.4.1 FROSTBITE

Stages

Incipient (frost nip)	May be painless. Tips of ears, nose, cheeks, fingers, toes, chin affected. Skin blanched white.
Superficial	Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.
Deep	Tissue beneath skin is solid, waxy, white with purplish tinge. Entire tissue depth is affected.

First-Aid

Incipient	Warm by applying firm pressure - blow warm breath on spot or submerge in warm water (102°F to 110°F) (39°F to 43°C). Do not rub the area.
Superficial	Provide dry coverage, steady warmth; submerge in warm water.
Deep	Hospital care is needed. Do not thaw frostbitten part if needed to walk on. Do not thaw if there is danger of refreezing. Apply dry clothing over frostbite. Submerge in water; do not rub.

15.4.2 GENERAL HYPOTHERMIA

Stages

- Shivering
- Indifference
- Decreased Consciousness
- Unconsciousness
- Death

Symptoms

- Muscle Tension
- Uncontrollable Shivering
- Glassy Stare
- Decreased Muscle Function
- Speech Distortion
- Blue, Puffy Skin
- Slow Pulse
- Shallow Breathing
- Coordination Loss
- Stumbling
- Forgetfulness
- Freezing Extremities
- Dilated Pupils
- Fatigue

Emergency Response

- Keep person dry; replace wet clothing
- Apply external heat to both sides of patient using available heat sources, including other bodies.
- Give warm liquids - not coffee or alcohol - after shivering stops and if conscious.
- Handle gently.
- Transport to medical facility as soon as possible.
- If more than 30 minutes from a medical facility, warm person with other bodies.

16.0 BUDDY SYSTEM

All Site excavation work will be conducted under a buddy system. This system is designed to ensure that no one employee enters the EZ without the support and assistance of a coworker.

The daily safety briefings will be the forum where buddy assignments will be made for the Site. In the event that an odd number of employees are present on the Site, then one team of three "buddies" will be established.

The key responsibilities of a buddy are as follows:

1) monitor your buddy's work practices and physical condition;
2) if your buddy appears to be in distress or has had an accident, assist him in a manner consistent with this Health and Safety Plan; and
3) do not permit your buddy to enter the EZ alone.

17.0 EMERGENCY COMMUNICATIONS

A system of emergency communications will be required to ensure that communications are maintained and emergency procedures are followed in the event of a release or accident.

The emergency communication procedures to be followed during all Site activities are:

1) emergency communications are to be made by hand held sirens, by vehicle horns, or hand/arm signals;
2) one long blast of a siren or one arm continuously waving over a worker's head means to stop work and return to the CRZ; and
3) repeated short blasts of a siren or both arms continuously waving over a worker's head will mean that an emergency condition exists on Site and all employees are to leave the Site immediately and congregate at the Site gate.

18.0 CONTINGENCY AND RESPONSE PLAN

18.1 OFF-SITE CONTINGENCY PLAN

Prior to commencing work involving the excavation and/or handling of potentially contaminated material, an off-Site emergency contingency plan will be developed by the Contractor. Such a plan is required prior to the initiation of excavation. This plan is intended to provide immediate response to a serious Site occurrence such as explosion, fire or migration of significant quantities of toxic or hazardous material from the Site into adjacent public areas.

Coordination meeting will be held with appropriate local authorities to identify the remedial action activities to be performed on Site and to discuss the protocols to be taken in the event of an incident. Contingency plan will be developed to incorporate the following:

1) transport of injured personnel to medical facilities; and
2) priority transportation routes.

18.2 ON-SITE CONTINGENCY PLAN

In the event of injury to on-Site personnel or contact with hazardous materials, the following protocols will be followed:

1) in the event of injury, notify the Health and Safety Officer;
2) contact the closest medical center and describe the injury;
3) decontaminate personnel and administer appropriate emergency first aid; and
4) transport personnel to the defined medical facility along a predefined route (as shown on Figure 18.1).

Fire extinguishers will be maintained in strategic locations within the Site to combat localized fires. Personnel will be trained in fire fighting procedures and will be equipped with self contained air when involved in such operations.

In the event of significant release of potentially toxic or hazardous vapors from any container or excavation, equipment operators will immediately don self contained air respirators during such operations and the source of such vapors will be immediately

backfilled or covered with fill. Alternate plans of contaminant removal will be developed and implemented prior to recommencing work in the area.

Emergency telephone numbers for the area surrounding the Site are listed in Table 18.1.

Figure 18.1 and Table 18.1 will be posted in a prominent place in the SZ.

19.0 AIR MONITORING

19.1 PROTOCOLS

During the progress of remedial activities, air quality will be monitored in and around each active work location. Sampling will be conducted on a regular periodic basis, minimum of hourly, and additionally as required by special or work-related conditions. Air monitoring will be conducted for total VOC vapors, Respirable Dust, and PCBs. Rationale for monitoring these parameters and the calculations used to determine Site perimeter Action Levels for VOCs and respirable dust are provided in Attachment I Action levels for PCBs are provided in Attachment II. Any departures from general background will be reported to the Engineer who will, in conjunction with the Health and Safety Officer, determine when operations should be shut down and restarted.

The Engineer will undertake a perimeter air monitoring program to evaluate potential public exposure to fugitive air emissions resulting from the RA at the Site. The perimeter air monitoring program is in addition to air monitoring being conducted by the selected contractor. Perimeter air monitoring will consist of VOC, fugitive (PM_{10}), and PCB monitoring.

Instruments required for air monitoring will include a organic vapor photoionizer detector (PID), a real-time digital particulate monitor (e.g., Miniram dust monitor or equivalent), and a 24-hour high volume air sampler for PCB monitoring.

The air monitoring equipment will be operated by personnel trained in the use of the specific equipment provided and will be under the control of the Health and Safety Officer. Calibration of air monitoring equipment will be completed on a daily basis in accordance with the manufacturer's specifications.

A wind direction indicator will be installed and maintained by the Contractor at each active work location.

19.2 REPORTING

The results of air monitoring programs will be reported on specific forms and will include the following information:

1) site location/date;
2) work process/operation name;

3) sampler's name;

4) sample/location;

6) results

- total VOC (ppm)
- respirable dust (mg/m^3);
- PCBs ($\mu g/m^3$); and

7) field notes

- chemicals/materials/equipment in use
- personal protective equipment in use
- sampling observations/comments.

In addition, all daily air monitoring activities will be recorded in a hard cover log book which will be maintained on Site at all times by the Health and Safety Officer.

19.3 AIR MONITORING FREQUENCY

Air monitoring will be conducted in the breathing zone of workers in the EZ and at the downwind perimeter of the EZ on an hourly basis or as deemed necessary by the HSO. Background measurements immediately upwind of the EZ will be taken before activities commence in the EZ.

Perimeter air monitoring will be conducted for a minimum of 3 days prior to the initiation of excavation activities to establish baseline (i.e., background) levels. Upon initiation of excavation activities, air monitoring will be conducted on a twice daily basis for VOCs and PM_{10}. This frequency may be decreased, subject to the approval of the U.S. EPA in consultation with the U.S. EPA, if results confirm that RA activities are protective of the public. PCB perimeter air monitoring will be conducted on a 24-hour basis following initiation of excavation activities. PCBs air monitoring shall be determined following four consecutive 24-hour periods of monitoring below the Site action levels.

19.4 WORK ZONE ACTION LEVELS

Respiratory action levels for VOCs and respirable dust for on-Site personnel are discussed in Section 11.0.

Work Zone Action Levels for VOCs and respirable dust have been calculated as described in Attachment I. Action levels for PCB monitoring at the Site boundary have been calculated as described in Attachment II. These action levels have been developed such that emissions of contaminants of concern from the Site are below acceptable criteria, provided the Work Zone Levels do not exceed the set action levels.

Work activities generating s sustained (>15 minutes) respirable dust levels in excess of 2.5 milligrams per cubic meter (mg/m^3) or sustained organic vapor levels greater than 10 part per million (ppm) above background at any location inside of the EZ will immediately require monitoring at three downwind locations at either the Site property boundary or half the distance to the nearest downwind residence, as appropriate, to verify that the sustained Site Perimeter respirable dust action level of 0.1 mg/m^3 and the sustained Site Perimeter organic vapor action level of 1 ppm are not exceeded. The three locations will be based on wind direction at the time of monitoring. The action level for 24-hour PCB air monitoring is 1,200 $\mu g/m^3$. If any of the action levels are exceeded at any of these locations, (i.e., Site property boundary or half the distance to the nearest residence), work will temporarily be halted until alternate work methods or engineering controls are in place to maintain respirable dust and/or organic vapor levels to the above acceptable levels. Exceedance of these action levels will require notification of the U.S. EPA on-Site representative, as required.

20.0 CONTAMINANT MIGRATION CONTROL

To prevent the migration of potentially contaminated material both on Site and off Site, vehicle travel will be restricted from entering the EZ.

All vehicles and equipment used in the EZ will be decontaminated in the CRZ prior to leaving the Site and for any work outside of fenced areas. The HSO will supervise the decontamination of each piece of equipment prior to its removal from the Site.

Personnel engaged in vehicle decontamination will wear protective equipment including disposable clothing and respiratory protection.

Decontamination procedures will be strictly adhered to for all personnel and equipment used in the EZ. The procedures for personnel are as follows:

1) all personnel will remove rubber overshoes at a designated boot station adjacent to the decontamination facility prior to leaving the EZ;
2) all personnel will then enter the CRZ to remove respirators and disposable outer clothing, if it is being worn;
3) disposable clothing will be placed in designated containers;
4) personnel will wash hands and faces before eating, drinking or smoking; and
5) all personnel will change out of work clothes in the decontamination area (CRZ) prior to leaving the Site at the end of the day.

At the completion of the project, rubber boots and potentially contaminated clothing will be disposed of based on characterization determined by soil and groundwater analytical results.

Decontamination procedures for equipment are as follows:

1) all equipment used in remedial activities will be moved from the EZ onto the decontamination pad after remedial activities are completed or the equipment is to be moved off Site. The decontamination pad will be located in the CRZ;
2) the equipment will be cleaned using a high pressure steam cleaner, wire brushes, and an Alconox (or equivalent) detergent wash water;
3) decontamination will be certified in writing by the HSO (certification will be in the form of written declaration); and

4) following certification, the equipment can be removed into the Support Zone and off Site.

Decontamination equipment includes; high-pressure steam cleaner, Alconox detergent, and wire brushes.

21.0 PARTICULATE EMISSION CONTROL

During removal activities, a dust control program will be implemented and strictly enforced to minimize the generation and potential of off-Site migration of fugitive particulate emissions. Excavations and excavated material will be kept moist while uncovered during Site activities. Treated decontamination wash waters from the wastewater treatment facilities may be used to keep excavated material moist.

All roadways, designated work areas and other possible sources of dust generation will be controlled by application of potable water as required.

22.0 POSTED REGULATIONS

"No Smoking" signs will be posted at the Site entrance and on the perimeter of the EZ in addition to signs which state "Warning, Hazardous Work Area, Do Not Enter Unless Authorized" or similar. In addition, a notice directing visitors to the office will be posted at the Site entrance.

Safety regulations and safety reminders will be posted at conspicuous locations throughout the Site.

23.0 SAFETY MEETINGS

The Health and Safety Officer will conduct a safety meeting with all employees prior to the initiation of Site removal activities, followed by weekly safety meetings which will be mandatory for all Site personnel. Daily safety meetings will be held to brief Site employees on upcoming tasks and associated safety concerns/expectations. The meetings will provide refresher training for existing equipment and protocols, and will examine new Site conditions as they are encountered.

Additional safety meetings will be held on an as required basis.

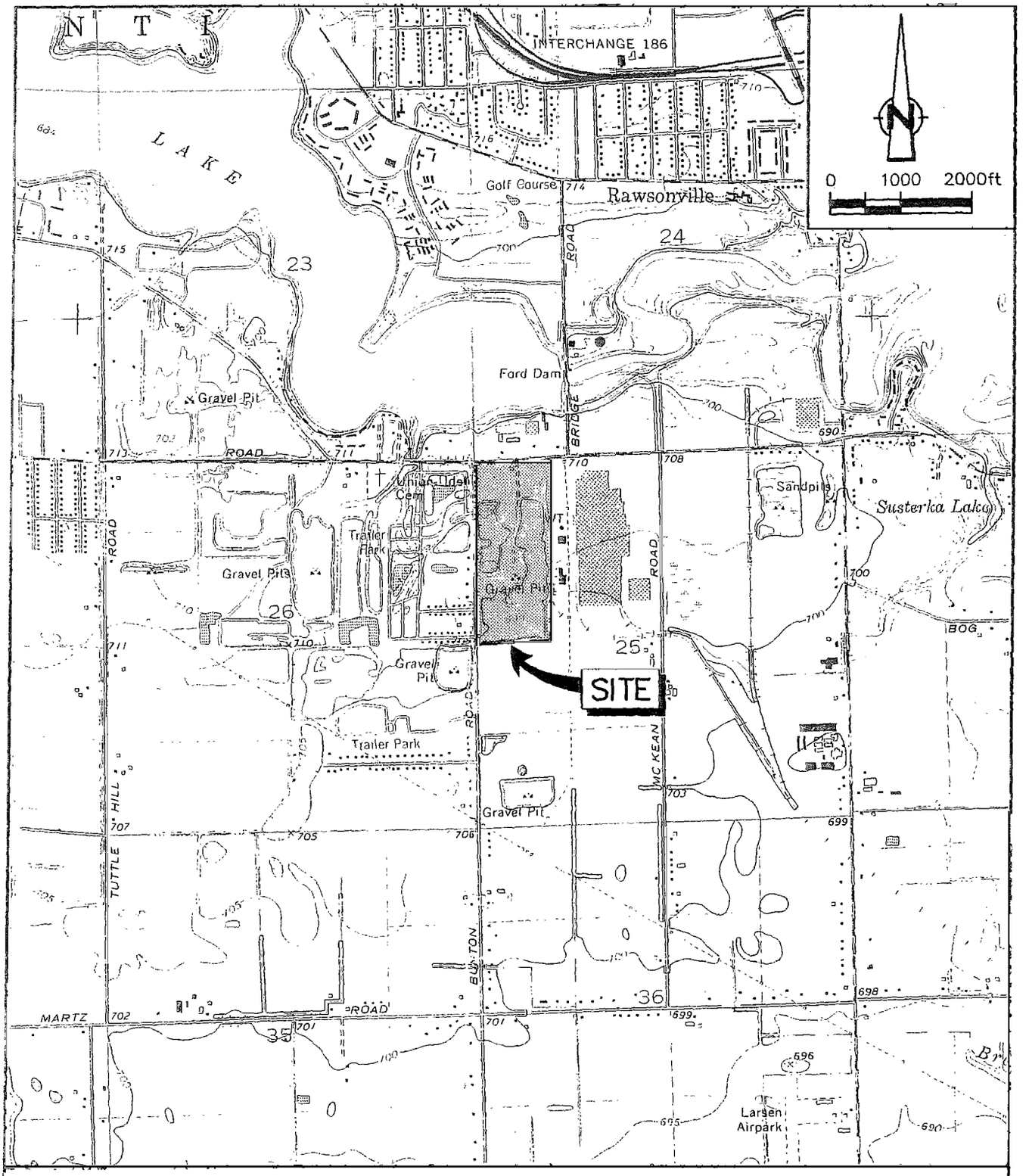
Should any unforeseen or Site peculiar safety related factor, hazard, or condition become evident during the performance of work at this Site, it will be brought to the attention of the Health and Safety Officer as quickly as possible, for resolution. In the interim, prudent action will be taken to establish and maintain safe working conditions and to safeguard employees, the public and the environment.

24.0 SITE SECURITY

The Site will be secured during non-working hours by having the entrance gates locked so as to prevent access onto the Site. Security may include an unarmed guard as deemed necessary.

As part of the Site security, during working hours, the Health and Safety Officer will:

1) limit vehicular access to the Site to authorized vehicles and personnel only;
2) maintain a visitors and Site personnel sign-in/sign-out log, and a log of all security incidents; and
3) provide initial screening of Site visitors



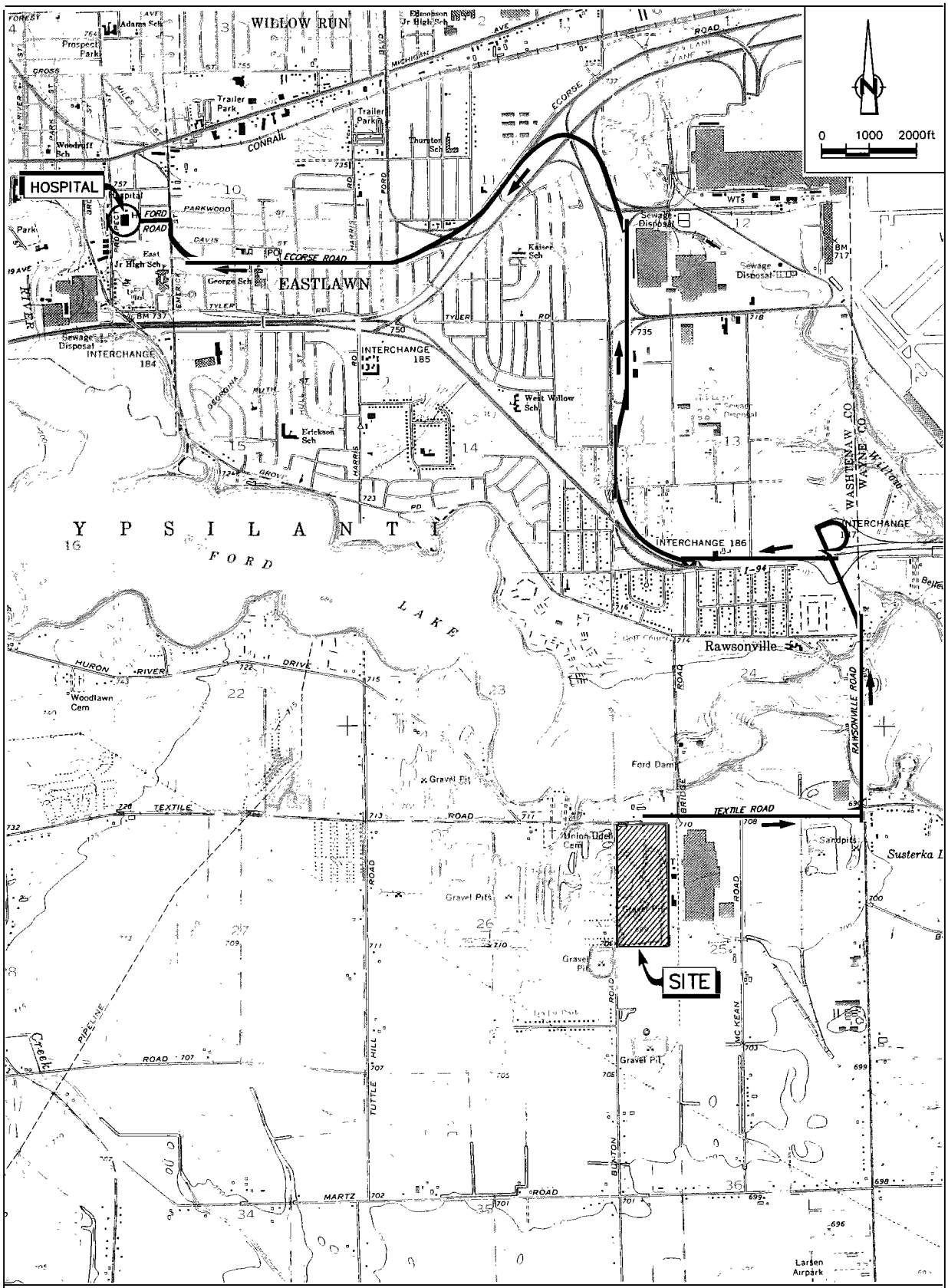
SOURCE: USGS QUADRANGLE MAP,
YPSILANTI EAST, MICHIGAN

CRA

figure 1.1

SITE LOCATION
TEXTILE ROAD SITE
Washtenaw County, Michigan

4770 (17) JUL 8/97(W) REV.0



SOURCE: USGS QUADRANGLE MAP;
YPSILANTI EAST, MICHIGAN

figure 18.1

HOSPITAL ROUTE MAP
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA

4770 (19) JULY 08/97 (W) REV.0

TABLE 3.1

CONTAMINANT PROFILE FOR THE SITE
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Parameter	*# Occurrences/Analyses*	*Range (mg/kg)*
PCB/PEST		
4, 4' DDE	1/17	0.053
4,4' DDT	1/17	0.023
Aroclor-1248	4/151	0.088 - 1.5
Aroclor-1254	42/151	0.038 - 310
Aroclor-1260	10/151	0.044 - 290
VOC		
Acetone	13/17	0.012 - 6.2
Benzene	2/17	0.003 - 0.016J
Bromomethane	1/17	0.50JB
2-Butanone	5/17	0.004 - 0.27
Carbon Disulfide	3/17	0.001 - 0.27
Chlorobenzene	2/17	0.003 - 0.29
1,2-Dichloroethene (total)	1/17	0.1J
Ethylbenzene	5/17	0.002 - 0.46
Methylene chloride	6/17	0.001J - 0.21
4-Methyl-2-pentanone	1/17	0.003J
Tetra chloroethene	1/17	0.047J
1,1,1-Trichloroethane	1/17	0.019J
Toluene	5/17	0.002J - 0.46J
Xylenes (total)	6/17	0.001J - 0.20J
BNAs		
Acenaphthene	3/16	0.003J - 0.22J
Anthracene	2/16	0.024J - 0.21J
Benz(a)anthracene	6/16	0.036 - 3.0
Benz(b)fluoranthene	6/16	0.022J - 1.6J
Benz(g,h,i)perylene	3/16	0.038J - 0.11J
Benz(a)pyrene	3/16	0.055 - 0.65
Bis(2-ethylhexyl)phthatate	8/16	0.026J - 0.26J
Butyl benzyl phthalate	2/16	0.055J - 1.2
Chrysene	6/16	0.019J - 1.9J
Dibenz(a,h)anthracene	1/16	0.11J
Dibenzofuran	2/16	0.05J - 0.12J
Di-n-butyl phthalate	1/16	0.048J
Fluoranthene	4/16	0.02J - 3.3
Fluorene	5/16	0.044J - 1.8J
Hexachlorobenzene	2/16	0.024J - 0.85
Hexachlorobutadiene	1/16	0.190J

TABLE 3.1

CONTAMINANT PROFILE FOR THE SITE
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Parameter	*# Occurrences/Analyses*	*Range (mg/kg)*
BNAs (cont'd)		
Indeno(1,2,3-cd)pyrene	1/16	0.070
2-Methylnaphthalene	9/16	0.012J - 2.1J
Naphthalene	7/16	0.030 - 105J
N-Nitrosodiphenylamine	1/16	0.031J
Phenanthrene	13/16	0.018 - 38J
Pyrene	6/16	0.028 - 2.8
INORGANICS		
Aluminum	16/16	601 - 41600
Antimony	1/16	14 - 24
Arsenic	16/16	3.6J - 65
Barium	10/16	46 - 498
Beryllium	3/16	1.3 - 2.9
Cadmium	3/16	1.3 - 2.9
Calcium	14/16	1370 - 169000
Chromium	14/16	2.3 - 1750
Cobalt	3/16	16 - 70
Copper	16/16	6.2 - 1800
Iron	16/16	3770 - 604000
Lead	16/16	7.7 - 290
Magnesium	13/16	1560 - 16700
Manganese	16/16	148 - 4170
Mercury	2/16	0.19 - 0.28
Nickel	11/16	10 - 443
Potassium	3/16	1260 - 1320
Selenium	1/16	1.9
Silver	1/16	2.6 - 4.8
Vanadium	10/16	12 - 105
Zinc	16/16	12 - 448
Total Cyanide	6/14	0.24 - 14

Notes:

PCBs - Polychlorinated Biphenyls
BNAs - Base, Neutral, Acide Extractables
VOCs - Volatile Organic Compounds

TABLE 3.2

CONTAMINANTS OF CONCERN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Compound	*TLV*	*PEL*	*IDLH*
PCBs			
Polychlorinated Biphenyls	0.5 mg/m^3	0.5 mg/m^3	5 mg/m^3
VOC			
Acetone	750 ppm	1000 ppm	2500 ppm
2-Butanone	200 ppm	200 ppm	3000 ppm
Ethylbenzene	100 ppm	100 ppm	800 ppm
Methylene chloride	50 ppm	500 ppm	2300 ppm
Toluene	50 ppm	200 ppm	500 ppm
Xylenes (total)	100 ppm	100 ppm	900 ppm
BNAs			
Acenaphthene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Anthracene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Benz(a)anthracene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Benz(b)fluoranthene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Benz(g,h,i)perylene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Benz(a)pyrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Bis(2-ethylhexyl)phthatate	5.0 mg/m3	5.0 mg/m3	80 mg/m^3
Butyl benzyl phthalate	NA	NA	NA
Chrysene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Dibenz(a,h)anthracene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Dibenzofuran	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA
Fluoranthene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Fluorene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Hexachlorobenzene	0.025 mg/m^3	NA	NA
Hexachlorobutadiene	0.21 mg/m^3	NA	NA
Indeno(1,2,3-cd)pyrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
2-Methylnaphthalene	NA	NA	NA

TABLE 3.2

CONTAMINANTS OF CONCERN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Compound	*TLV*	*PEL*	*IDLH*
BNAs (cont'd)			
Naphthalene	52 mg/m^3	50 mg/m^3	1330 mg/m^3
N-Nitrosodiphenylamine	NA	NA	NA
Phenanthrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
Pyrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3
INORGANICS			
Aluminum	10 mg/m^3	5 mg/m3	NA
Antimony	0.5 mg/m^3	0.5 mg/m^3	50 mg/m^3
Arsenic	0.01 mg/m^3	0.01 mg/m^3	10 mg/m^3
Barium	0.5 mg/m^3	0.5 mg/m^3	50 mg/m^3
Beryllium	0.002 mg/m^3	0.002 mg/m^3	4 mg/m^3
Cadmium	0.002 mg/m^3	0.1 mg/m^3	9 mg/m^3
Chromium	0.5 mg/m^3	1 mg/m^3	250 mg/m^3
Cobalt	0.02 mg/m^3	0.1 mg/m^3	20 mg/m^3
Copper	1	1 mg/m3	100 mg/m^3
Lead	0.05 mg/m^3	0.05 mg/m^3	100 mg/m^3
Manganese	0.2 mg/m^3	--	500 mg/m^3
Mercury	0.025 mg/m^3	--	10 mg/m^3
Nickel	0.05 mg/m^3	--	--
Selenium	0.2 mg/m^3	0.2 mg/m^3	1 mg/m3
Silver	0.1 mg/m^3	0.01 mg/m^3	10 mg/m^3
Vanadium	0.05 mg/m^3	0.5 mg/m^3	35 mg/m^3
Zinc	10 mg/m^3	5 mg/m^3	500 mg/m^3

TABLE 3.2

CONTAMINANTS OF CONCERN

TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Compound	*TLV*	*PEL*	*IDLH*
SVOCs			
Benzo(a)anthracene			
Benzo(b)fluoranthene			
Benzo(a)pyrene			
Chrysene			
Hexachlorobenzene			

Notes:

TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
IDLH - Immediate Danger to Life and Health
PCBs - Polychlorinated Biphenyls
VOCs - Volatile Organic Compounds
BNAs - Base/Neutral Acid Extractable Compounds

TABLE 3.3

SITE HAZARD ANALYSIS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

	Site Activities	*Hazards*	*Prevention*
1.	Air Monitoring	- Potential for inhalation of Site volatiles and dust-containing contaminated materials	- Wear appropriate PPE
2.	Soil Excavation and Handling	- Potential for skin contact with contaminated materials	- Wear appropriate PPE
		- Slip, trip, and fall hazards	- Ensure good housekeeping
		- Heavy equipment operation	- Ensure visual contact with operator
		- Potential for inhalation exposure to volatiles in contaminated materials and dust-containing contaminated materials	- Wear appropriate PPE
3.	Soil Sampling	- Potential for skin exposure to contaminated soil and inhalation exposure to soil, gas and dust	- Wear appropriate PPE
		- Slip, trip, and fall hazards	- Ensure good housekeeping
4.	Groundwater and Surface Water Sampling	- Potential for skin exposure to contaminated surface water and groundwater	- Wear appropriate PPE
		- Slip, trip, and fall hazards	- Ensure good housekeeping

TABLE 14.1

RECOMMENDED HEART RATE MONITORING FREQUENCY

	70°F - 80°F (21°C - 27°C)	*80°F - 90°F (27°C - 32°C)*	*90°F - 100°F (32°C - 38°C)*	*>100°F (38°C)*
Relative Humidity Less than 80%				
Light Summer Clothing	Every 3 hours	Every 3 hours	Every 2 hours	Every 2 hours
Kleengard or Cotton Coveralls	Every 3 hours	Every 3 hours	Every 2 hours	Every hour
Tyvek, Poly-coated or Saranex Tyvek	Every 2 hours	Every 2 hours	Every hour	Stop work and re-assess
Relative Humidity 80% or Greater				
Light Summer Clothing	Every 3 hours	Every 2 hours	Every 2 hours	Every hour
Kleengard or Cotton Coveralls	Every 2 hours	Every 2 hours	Every hour	Every hour
Tyvek, Poly-coated or Saranex Tyvek	Every 2 hours	Every hour	Every hour	Stop work and re-assess

TABLE 15.1

WORK/REST SCHEDULE FOR AN 8-HOUR WORK SHIFT

Air Temperature with Sunny Sky		*Work/Break Schedule (Minutes)*				
°F	*°C*	*No Wind*	*5 mph Wind*	*10 mph Wind*	*15 mph Wind*	*20 mph Wind*
-05 to -09	-20 to -23	110/10	110/10	75/10	55/10	40/10
-10 to -14	-23 to -26	110/10	75/10	55/10	40/10	30/10
-15 to -19	-26 to -28	75/10	55/10	40/10	30/10	Stop
-20 to -24	-29 to -31	55/10	40/10	30/10	Stop	Stop
-25 to -29	-32 to -34	40/10	30/10	Stop	Stop	Stop
-30 to -34	-35 to -37	30/10	Stop	Stop	Stop	Stop
-35 & Below	-38 & Below	Stop	Stop	Stop	Stop	Stop

Note:

This table addresses the health hazards related to cold weather work. The practicality of working under a work/rest schedule, together with the ability of the necessary equipment to function properly in cold weather, may be more restrictive than the health hazards and also need to be considered.

The cold stress schedule applies to light or sedentary work activities. Light to moderate work activities can be moved down one level, moderate to heavy work activities can be moved down two levels if workers are acclimated, have proper protective clothing and show no signs of cold stress.

0 - 5 mph Wind: Light flag moves.
15 mph Wind: Raises newspaper sheet.
10 mph Wind: Light flag fully extended.
20 mph Wind: Blowing and drifting snow.

TABLE 18.1

EMERGENCY TELEPHONE NUMBERS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Agency	*Contact*	*Telephone Number*
Hospital	Byer Memorial Hospital *	313-484-2345
Ambulance	Huron Valley Ambulance *	313-994-4111
Local Police	Sheriff's Office	313-971-3911
Local Fire	Town of Ypsilanti Fire Dept.	313-483-4224
USEPA	Emergency Response	800-424-8802
ChemTrec	Spill Response	800-424-9300
National Response Center		800-424-8802
Poison Control Center	Children's Hospital	313-745-5711
	St. Joseph Mercy Hospital	313-858-7373

Note:

* - To be confirmed by Contractors.

ATTACHMENT I

CRA
651 Colby Drive
Waterloo, Ontario N2V 1C2
(519) 884-0510 (Colby Office)
(519) 725-3313 (Bathurst Office)

MEMO

TO: Greg Carli/File

REFERENCE NO. 4770

FROM: John Ferguson

DATE: July 19, 1997

C.C.: Gordon Reusing

RE: Air Monitoring Action Levels During Excavation Activities
Textile Road Site - Washtenaw County, Michigan

1.0 INTRODUCTION

The following memo details the calculation of the action levels to be used during the excavation activities at the Textile Road Site (Site). The excavation activities will create a potential for release of volatile organic compounds (VOCs), and suspended particulate. The primary work activities associated with the excavation activities will occur in the north eastern portion of the Site. Air monitoring will be conducted in the exclusion zone to evaluate potential impacts to receptors at the boundary of the Site.

The parameters that will be monitored include VOCs and total suspended particulate (TSP). TSP levels will be monitored to provide a representation of other chemicals of potential concern including semivolatile organics (SVOCs), PCBs, and metals which would potentially be present in airborne particulate.

The State of Michigan has established a list of screening levels (ITSLs, IRSLs and SRSLs) for maximum ground level concentrations of air contaminants. In addition, a National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ exists for particulate matter less than 10 microns (PM10). These air quality criteria were converted to one-hour average concentrations using the one-hour to 8-hour, one-hour to 24-hour and one-hour to annual time averaging conversion factors of 0.7, 0.4 and 0.08, respectively. The time averaging conversion factors were obtained from the USEPA document "Guideline for Predictive Baseline Emissions Estimation Procedures for Superfund Sites".

2.0 TOTAL SUSPENDED PARTICULATE ACTION LEVEL

Analytical data for soil samples collected from the Site were reviewed and the highest concentration of each detected chemical was used to back-calculate a dust concentration which would be equal to the screening level for SVOCs, PCBs, and metals. These results are summarized in Table 1. This evaluation is based on the assumption that the chemicals which will potentially be present in the suspended particulate during excavation activities can be represented by the soil sample data. This is a conservative assumption since the highest detected value is used.

As shown on Table 1, the TSP concentrations that would be required to equal or exceed the screening values for the SVOCs, PCBs, and metals are all well in excess of the NAAQS 1-hour PM10 value of 375 $\mu g/m^3$, except for manganese which has a calculated allowable receptor concentration of 240 $\mu g/m^3$.

SCREEN3, a conservative air dispersion model, recommended by the United States Environmental Protection Agency (USEPA) for screening purposes, was used to calculate the exclusion zone concentrations (action levels) required to achieve the estimated maximum allowable receptor concentrations. SCREEN3 uses Gaussian dispersion equations and worst case meteorological conditions to estimate maximum downwind concentrations due to emissions from a source. The SCREEN3 model will provide more conservative modeling results than a detailed dispersion model such as the Industrial Source Complex (ISC3) model.

The SCREEN3 model utilizes rectangular area sources and only one source may be modeled at a time. The area source was assumed to be a square with a length and width of 200 feet (61 meters). This area represents the potential TSP emissions source at any given time during the excavation program. The SCREEN3 modeling results are attached.

The SCREEN3 modeling estimated the maximum ground level concentration to occur at 43 meters from the center of the area source (at the edge of the area source). A dilution factor was determined by comparing the predicted maximum ground level concentration at the edge of the excavation area source, with the concentration at 183 meters away from the source (the nearest property line). The

ratio of the maximum concentration at 43 meters (1.188 E04 µg/m3) over the concentration at 183 meters (0.094 E04 µg/m3) is 12.6.

Thus, the estimated maximum ground level concentration in the exclusion zone will be diluted by a factor of 12.6 at the closest property line. Therefore, by multiplying the acceptable receptor concentrations by the dilution factor (12.6) the action levels can be calculated. The action levels for all SVOCs , PCBs, and metals detected at the Site are summarized in Table 1. The lowest calculated action level is for manganese at 3.03 mg/m3, as shown in Table 1.

3.0 VOLATILE ORGANIC ACTION LEVEL

The following outlines the air dispersion modeling conducted for potential volatile organic compound (VOC) emissions from the excavation activities. The purpose of the dispersion modeling is to calculate the VOC action level in the exclusion zone such that the concentrations at a downwind receptors do not exceed acceptable screening level concentrations.

The State of Michigan has established the acceptable screening level concentrations of VOCs. The air quality criteria for VOC compounds found on Site are summarized in Table 2. It should be noted that, VOCs with a detection percentage less than 20% were not considered to be of concern.

The area source used for the VOC SCREEN3 modeling was assumed to be a square with a length and width of 20 feet (6.1 meters). This area represents the potential VOC emissions source at any given time during the excavation program. The SCREEN3 modeling results are attached.

The SCREEN3 modeling estimated the maximum ground level concentration to occur at 5 meters from the center of the area source (at the edge of the area source). A dilution factor was determined by comparing the predicted maximum ground level concentration at the edge of the excavation area source, with the concentration at 183 meters away from the source (nearest property line). The ratio of the maximum concentration at 5 meters (5.757 E05 $\mu g/m^3$) over the concentration at 183 meters (0.013 E05 $\mu g/m^3$) is 458.

Thus, the estimated maximum ground level concentration in the exclusion zone will be diluted by a factor of 458 at the closest property line, 183 meters away. Therefore, by multiplying the acceptable residential screening level concentration by the dilution factor (458) action levels can be calculated. The action levels for all VOCs detected at the Site are summarized in Table 2. The lowest calculated action level is 32.4 ppm.

TABLE 1

MAXIMUM ALLOWABLE TOTAL SUSPENDED PARTICULATE CONCENTRATIONS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

	Contaminant Concentration in Soil (mg/kg)	*Screening Levels (ug/m3)*		*Screening Levels* 1-hour (1) *(ug/m3)*	Maximum Allowable *1-Hour PM_{10} Concentration (2)*	
					Receptor *(ug/m3)*	Exclusion Zone *(ug/m3)*
PM-10	1000000	150	NAAQS 24hr	375	3.75E+02	4.73E+03
PCB/PESTICIDES						
4,4' DDE	0.053	NA		NA	NA	NA
4,4' DDT	0.023	0.1	SRSL-1yr	1.25	5.43E+07	6.86E+08
Aroclor-1248	1.5	500	TLV	714	4.76E+08	6.01E+09
Aroclor-1254	310	500	TLV	714	2.30E+06	2.91E+07
Aroclor-1260	290	500	TLV	714	2.46E+06	3.11E+07
BNAs						
Acenaphthene	0.22	210	ITSL 24hr	525	2.39E+09	3.01E+10
Anthracene	0.21	1000	ITSL 24hr	2500	1.19E+10	1.50E+11
Benz(a)anthracene	3	NA		NA	NA	NA
Benz(b)fluoranthene	1.6	NA		NA	NA	NA
Benz(g,h,i)perylene	0.11	12	ITSL 24hr	30	2.73E+08	3.44E+09
Benz(a)pyrene	0.65	0.005	SRSL-1yr	0.0625	9.62E+04	1.21E+06
Bis(2-ethylhexyl)phthalate	0.26	NA		NA	NA	NA
Butyl benzyl phthalate	1.2	700	ITSL 24hr	1750	1.46E+09	1.84E+10
Chrysene	1.9	NA		NA	NA	NA
Dibenz(a,h)anthracene	0.11	NA		NA	NA	NA
Dibenzofuran	0.12	NA		NA	NA	NA
Di-n-butyl phthalate	0.048	5000	TLV	7143	1.49E+11	1.88E+12
Fluoranthene	3.3	140	ITSL 24hr	350	1.06E+08	1.34E+09
Fluorene	1.8	140	ITSL 24hr	350	1.94E+08	2.45E+09
Hexachlorobenzene	0.85	0.02	SRSL-1yr	0.25	2.94E+05	3.71E+06
Hexachlorobutadiene	0.19	210	TLV	300	1.58E+09	1.99E+10
Indeno(1,2,3-cd)pyrene	0.07	NA		NA	NA	NA
2-Methylnaphthalene	2.1	NA		NA	NA	NA
Naphthalene	105	52000	TLV	74286	7.07E+08	8.93E+09
N-Nitrosodiphenylamine	0.031	NA		NA	NA	NA
Phenanthrene	38	NA		NA	NA	NA
Pyrene	2.8	100	ITSL 24hr	250	8.93E+07	1.13E+09
INORGANICS						
Aluminum	41600	10000	TLV	14286	3.43E+05	4.33E+06
Antimony	24	500	TLV	714	2.98E+07	3.76E+08
Arsenic	65	0.02	SRSL-1yr	0.25	3.85E+03	4.85E+04
Barium	498	5	ITSL 8hr	7	1.43E+04	1.81E+05
Beryllium	2.9	0.004	SRSL-1yr	0.05	1.72E+04	2.18E+05
Cadmium	2.9	0.006	SRSL-1yr	0.075	2.59E+04	3.26E+05
Calcium	169000	NA		NA	NA	NA
Chromium	1750	500	TLV	714	4.08E+05	5.15E+06
Cobalt	70	20	TLV	29	4.08E+05	5.15E+06
Copper	1800	2	ITSL 8hr	3	1.59E+03	2.00E+04
Iron	604000	5000	TLV	7143	1.18E+04	1.49E+05
Lead	290	50	TLV	71	2.46E+05	3.11E+06
Magnesium	16700	NA		NA	NA	NA
Manganese	4170	0.4	ITSL 24hr	1	2.40E+02	3.03E+03
Mercury	0.28	0.3	ITSL 24hr	0.75	2.68E+06	3.38E+07
Nickel	443	0.042	SRSL-1yr	0.525	1.19E+03	1.50E+04
Potassium	1320	5000	TLV	7143	5.41E+06	6.83E+07
Selenium	1.9	200	TLV	286	1.50E+08	1.90E+09
Silver	4.8	100	TLV	143	2.98E+07	3.76E+08
Vanadium	105	50	TLV	71	6.80E+05	8.59E+06
Zinc	448	10000	TLV	14286	3.19E+07	4.02E+08
Total Cyanide	14	50	ITSL 1hr	50	3.57E+06	4.51E+07

Notes:
NA Air Criteria Not Available
TLV American Conference of Governmental Industrial Hygienists Threshold Limit Value (8-hour)
(1) Converted to one-hour average concentrations using the one-hour to 8-hour, one-hour to 24-hour and one-hour to annual time averaging conversion factors of 0.7, 0.4 and 0.08, respectively
(2) Maximum allowable TSP concentrations such that air quality criteria for compound is not exceeded.

TABLE 2

ACTION LEVELS FOR SITE SPECIFIC VOCS
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

Volatile Organic Compounds	*Michigan Screening Levels (ug/m3)*	*Screening Level Basis*	*Maximum Allowable 1-hour Receptor Concentration (ug/m3)*	*Exclusion Zone Action Levels*	
				(ug/m3)	*(ppm)*
2-BUTANONE	1000	ITSL - 24hr	2500	1142500	380.8
ACETONE	5900	ITSL - 8hr	8429	3851857	1591.7
ETHYLBENZENE	1000	ITSL - 24hr	2500	1142500	259.1
METHYLENE CHLORIDE	20	SRSL -1yr	250	114250	32.4
TOLUENE	400	ITSL - 24hr	1000	457000	119.3
XYLENES, TOTAL	4400	ITSL - 1hr	4400	2010800	456.0

(1) Converted to one-hour average concentrations using the one-hour to 8-hour, one-hour to 24-hour and one-hour to annual time averaging conversion factors of 0.7, 0.4 and 0.08, respectively

07/17/97
11:10:05

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Textile Road Site - Washtenaw County, Michigan

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.269100E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	60.9600
LENGTH OF SMALLER SIDE (M)	=	60.9600
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.1001E+05	6	1.0	1.0	10000.0	.00	45.
100.	2145.	6	1.0	1.0	10000.0	.00	45.
200.	827.6	6	1.0	1.0	10000.0	.00	45.
300.	447.4	6	1.0	1.0	10000.0	.00	44.
400.	283.4	6	1.0	1.0	10000.0	.00	43.
500.	198.1	6	1.0	1.0	10000.0	.00	38.
600.	148.0	6	1.0	1.0	10000.0	.00	36.
700.	115.8	6	1.0	1.0	10000.0	.00	44.
800.	93.94	6	1.0	1.0	10000.0	.00	1.
900.	78.18	6	1.0	1.0	10000.0	.00	26.
1000.	66.50	6	1.0	1.0	10000.0	.00	40.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

43.	.1188E+05	6	1.0	1.0	10000.0	.00	45.

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
183.	941.0	6	1.0	1.0	10000.0	.00	44.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1188E+05	43.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Textile Road Site - VOC Emissions - Washtenaw County, Michigan

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.269098E-01
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	6.0960
LENGTH OF SMALLER SIDE (M)	=	6.0960
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.4242E+06	6	1.0	1.0	10000.0	.00	45.
100.	3905.	6	1.0	1.0	10000.0	.00	31.
200.	1067.	6	1.0	1.0	10000.0	.00	33.
300.	511.0	6	1.0	1.0	10000.0	.00	1.
400.	307.3	6	1.0	1.0	10000.0	.00	16.
500.	209.2	6	1.0	1.0	10000.0	.00	17.
600.	153.9	6	1.0	1.0	10000.0	.00	44.
700.	119.3	6	1.0	1.0	10000.0	.00	38.
800.	96.09	6	1.0	1.0	10000.0	.00	38.
900.	79.65	6	1.0	1.0	10000.0	.00	44.
1000.	67.51	6	1.0	1.0	10000.0	.00	4.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

5.	.5757E+06	6	1.0	1.0	10000.0	.00	45.

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
183.	1258.	6	1.0	1.0	10000.0	.00	23.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.5757E+06	5.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

ATTACHMENT II

PCB AIR MONITORING ACTION LEVEL
TEXTILE ROAD SITE
WASHTENAW COUNTY, MICHIGAN

A. Action Level Based on ACGIH TLV and OSHA PEL

Agencies such as the American Conference of Governmental Industrial Hygienists (ACGIH) and Occupational Safety and Health Administration (OSHA) have been involved with the safety aspects of work places where individuals may be exposed to varying levels of toxic substances. The ACGIH and OSHA publish and continuously update a list of "Threshold Limit Values" (TLVs) and "Permissible Exposure Limits" (PELs), respectively, for many substances. These TLVs and PELs represent maximum concentrations under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effects.

The TLVs and PELs were determined for a population of workers who are essentially healthy and who fall within a "working age group" of about 17 to 65 years. The AGCIH TLVs *"refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects"* (ACGIH, 1995-1996). The TLV Time-Weighted Average (TWA) is defined as *"the time-weighted average concentration for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed day after day, without adverse effect"* (ACGIH, 1995-1996). Therefore, the TLVs are based on a duration of 8 hours per day, 5 days per week (regular work day).

The ACGIH TLV and the OSHA PEL for chlorodiphenyls containing 42% C1 and 54% C1 are 1,000 $\mu g/m^3$ and 500 $\mu g/m^3$, respectively. Adjusted TLVs or PELs provide alternative ambient air guidelines that are protective. To account for the varying sensitivity or susceptibility (i.e., interhuman variability) to toxic substances, with the elderly and infants in general being more susceptible than the "healthy" worker, a safety factor of 10 is applied to the TLV. For a continuous exposure (that is, an individual exposed continuously in the environment containing the substances), the TLV is also adjusted for a 24-hour day, 7 days per week. Thus, from the above discussion, the TLV or maximum acceptable ground level concentration (MAGLC) beyond the boundary of a continuous emitting source would be:

$$\text{MAGLC} = \frac{TLV}{10} x \frac{8hours}{24hours} x \frac{5days}{7days} = \frac{TLV}{42}$$

Therefore, following the approach described above, an alternate ambient air guideline for PCBs is derived using the lower TLV/PEL value of 500 $\mu g/m^3$. The MAGLC for PCBs beyond the boundary of a continuous emitting source (i.e. the work zone) would be:

$$\text{MAGLC} = \frac{TLV}{10} x \frac{8hours}{24hours} x \frac{5days}{7days} = \frac{TLV}{42}$$

$$MAGLC = \frac{500\ \mu g/m^3}{42} = 11.9\ \mu g/m^3$$

This approach is commonly used (e.g. U.S. EPA Emergency Response branch, Gross Isle, Michigan) and is currently applied by several states (e.g., Ohio). The current Ohio EPA (OEPA) Air Toxics Policy for Maximum Ground Level concentrations (during remediation projects) is the ACGIH TLV divided by 42 (TLV/42).

This approach would generally indicate that a value of 11.9 $\mu g/m^3$ would serve as a protective level at the work zone boundary. Applying the dispersion factor calculated in Attachment I to the HASP (458), would produce a perimeter air level of 5,450 $\mu g/m^3$.

B. Action Level Based on U.S. EPA Risk Based Approach

The U.S. EPA typically selects site action levels for air monitoring based on the Recommended Exposure Level (REL) established by the National Institute for Occupational Safety and Health (NIOSH). The NIOSH value is based on worker studies which indicated that PCB air levels (for a 40 hour work week) should be maintained under 10 $\mu g/m^3$ for long term exposures (Note that the OSHA PEL is 500 $\mu g/m^3$ and the ACGIH TLV is 1,000 $\mu g/m^3$). The NIOSH value is based on the following assumptions:

1. exposure duration is 70 years;
2. all PCBs inhaled are absorbed;
3. the individual spends their entire working time in the PCB work zone;
4. the adult worker has a respiration rate of 2.5 m^3/hour doing moderate work; and
5. the exposure is 8-hours per work day, five days per week, 250 days per year.

Firstly, the NOISH value is based upon worker studies which indicated that PCB air levels should be maintained under 10 $\mu g/m^3$ to provide protection from liver injury over a 40 hour work week exposure. These values are based upon long term exposures.

Secondly, it is assumed that exposure to PCBs in air would occur for the lifetime of the individual (i.e. 70 years). This is an inappropriate assumption for the Site since active operations are expected to occur for only approximately two to four months.

Thirdly, the assumption that the receptor spends their entire working time in the PCB work area (or close proximity), eight hours per work day, five days per week, 250 days per year, for their "entire" lifetime of 70 years, is also inappropriate for the Site. Presently, the closest receptors who are potentially exposed to PCBs in air are those individuals living in the mobile home park located across Bunton Road or individuals using the commercial establishments located to the north of Textile Road and east of the Site. The potential receptors in the vicinity of the Site would have a significantly lower exposure duration (i.e., up to 8 hours per day, 5 days per week, for two to four months in the mobile home park). This indicates a maximum exposure of 1/1000 of that utilized by NIOSH.

Finally, an inhalation rate of 2.5 m^3 per hour doing moderate work is assumed for an adult worker. This is also overly conservative based on the Layton studies presented in the U.S. EPA Exposure Factors Handbook (EFH) (U.S. EPA, 1989). The U.S. EPA EFH document presents inhalation rates for short-term exposures for various age/gender cohorts and five energy expenditure categories (rest, sedentary, light, moderate, and heavy). The results of the Layton studies are as follows:

Gender/Age	*Weight (kg)*	*Rest (m^3/hr)*	*Sedentary (m^3/hr)*	*Light (m^3/hr)*	*Moderate (m^3/hr)*	*Heavy (m^3/hr)*
Male						
18≤30	76	0.43	0.52	0.84	1.74	4.32
30≤60	80	0.42	0.50	0.84	1.68	4.20
60+	75	0.34	0.41	0.66	1.38	3.42
Female						
18≤30	62	0.33	0.40	0.66	1.32	3.30
30≤60	68	0.32	0.39	0.66	1.32	3.24
60+	67	0.30	0.36	0.59	1.20	3.00

Based on the Layton results shown above, the average inhalation rate for female adults (18 to 60 years), engaged in moderate activity, is 1.28 m^3 per hour. For male adults (18 to 60 years), engaged in moderate activity, the average inhalation rate is 1.6 m^3 per hour. Therefore, the average inhalation rate for an individual involved in moderate activity is approximately 1.44 m^3 per hour. This indicates an average inhalation rate which is 0.576 of that utilized to develop the NIOSH standard. The 1.44 m^3/hour inhalation rate is more reasonable for use in this instance.

For those individuals living in the mobile home park, it is assumed that these individuals would be exposed up to eight hours per day, five days per week, for 16 weeks. Based upon these assumptions, the protective PCB inhalation action level is calculated as follows:

(1) Risk Level (4.0E-05) = Absorbed Dose * Inhalation CSF

(2) $$\text{Absorbed Dose} = \frac{\text{Risk (4.0E - 05)}}{\text{Inhalation CSF}}$$

(3) $$\text{Absorbed Dose} = \frac{\text{Risk-Based Air Concentration } (C_{air}) * \text{Intake}_{inhalation})}{\text{Body Weight}}$$

Therefore:

(4) $$\text{Risk-Based Air Concentration } (C_{air}) = \frac{\text{(4.0E - 05 risk/CSF) * Body Weight}}{(\text{Intake}_{inhalation})}$$

where:

$CSF\ (mg/kg\text{-}day)^{-1}$	=	Inhalation CSF (0.4);
$Intake_{inhalation}$	=	Inhalation Rate (m^3/hr)*ET*EF*ED;
ET	=	exposure time (hrs/day);
EF	=	exposure frequency (days/year); and
ED	=	exposure duration (year).

Applying the following scenario assumptions, in equation (4) above, will provide a conservative estimate of the PCB absorbed dose corresponding to the potential inhalation exposure at the nearest receptor downwind from the Site:

i) the inhalation rate is 1.44 m^3 per hour and occurs at the Site perimeter;
ii) the individual is exposed for 8 hours per day;
iii) excavation activies occur for five days per week for 16 weeks (i.e., total of 80 days per year); and
iii) the individual weighs 70 kilograms (kg).

The risk-based air criterion for the nearest receptor is determined by multiplying the risk based air concentration (2.77 $\mu g/m^3$) by the dilution factor calculated in Attachment I to the HASP (458) to get a receptor point risk based air concentration of 1,269 $\mu g/m^3$ (for a $4x10^{-5}$ risk).

C. Action Level Based on Modified MDEQ SRSL Approach

The Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) action level for PCB ambient air monitoring is 0.02 $\mu g/m^3$. This action level corresponds to the Michigan air toxic cancer risk assessment methodology Secondary Risk Screening Level (SRSL) for PCBs of 0.02 $\mu g/m^3$.

The MDEQ-AQD cancer risk assessment screening methodology relies on the Initial Risk Screening Level (IRSL) and SRSL to determine ambient air monitoring levels. The IRSL is used in situations where a single source is present. The allowable carcinogenic risk level for such a case is an upper bound lifetime cancer risk of $1x10^{-6}$ (or 1 in 1,000,000). Where more than one emission source is considered, or where evaluating overall facility emissions, the SRSL applies with an allowable carcinogenic risk level based on an upper bound lifetime cancer risk of $1x10^{-5}$ (or 1 in 100,000). The IRSL and SRSL are based on lifetime (i.e. 70 years) exposure assumptions.

An important issue in developing the action level for the Site is the assumed exposure assumptions. The MDEQ SRSL value is based on a 70-year lifetime exposure duration. However, active activities at the Site are scheduled to be completed within a period of approximately two to four months. Using an exposure duration of four months is conservative as the excavation activities are only conducted during daylight hours. In addition, excavation activities are only occurring on approximately five days per week. Therefore, on a technical (and health protective) basis, the actions levels would be more

reasonable (although conservative), and relevant, if they were based on an adjusted four month worker exposure.

Based on this information, the following calculation provides an evaluation of the MDEQ-AQD's SRSL action level for the Site. The calculations of the action levels using the SRSL values consistent with Part 55 of P.A. 451 of 1994, while adjusting for the actual duration of the project, are presented as follows.

$$\text{ACTION LEVEL} = \frac{\text{SRSL} \times 70 \text{ Years}}{\text{Expected Duration of Project (Years)} \times \text{Days/Week}}$$

$$\text{ACTION LEVEL FOR PCBs} = \frac{0.02 \times 70}{80/365 \times (5/7)} = 8.94\ \mu g/m^3$$

The calculation of the action level incorporating the duration of the project has been utilized at other sites in Michigan by the U.S. EPA and MDEQ. The action level based on the SRSL risk-based air criterion for the Site perimeter ambient air quality monitoring is 8.94 $\mu g/m^3$. Applying the dispersion factor of 458, produces an action level at the nearest receptors (mobile home park) of 4,095 $\mu g/m^3$.

APPENDIX D

PROJECT SPECIFICATIONS

APPENDIX D

PROJECT SPECIFICATIONS

EXCAVATION AND OFF-SITE DISPOSAL

TEXTILE ROAD SITE
YPSILANTI TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

Contract No. 4770 (21)

JULY 1999
REF. NO. 4770 (21)
This report is printed on recycled paper.

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SECTION 01010

SUMMARY OF WORK

1.1 SECTION INCLUDES

A. Scope of work.

B. Location.

C. Access to Site.

D. Description of work.

E. Work not included.

F. OWNER-supplied products.

G. Contract schedule.

H. Drawings.

I. CONTRACTOR use of Site.

1.2 SCOPE OF WORK

A. Works to be performed under this Contract consist of Excavation and Off-Site Disposal or On-Site Consolidation and associated work for Textile Road Site located in Ypsilanti Township, Washtenaw County, Michigan.

1.3 LOCATION

A. Site is located at the southeast corner of Textile Road and Bunton Road in Ypsilanti Township, Washtenaw County, Michigan. OWNER has secured an access agreement with State of Michigan for performance of Works at Site.

1.4 ACCESS TO SITE

A. Access to Site is limited to Textile Road Site as shown on Drawings and for which access agreements have been obtained.

B. Make arrangements with the authorities having jurisdiction for the movement of material and equipment to and from Site over public roadways.

1.5 DESCRIPTION OF WORK

A. Work includes but is not limited to the following:

1. Preparation and submission of submittals to OWNER, ENGINEER, USEPA, and MDEQ.

2. Development, implementation, and maintenance of Site-specific Health and Safety Plan.

3. Verification of existing conditions.

4. Mobilization and startup.

5. Provision, operation, and maintenance, as appropriate, of construction facilities including but not limited to field offices, personnel hygiene/decontamination facility, equipment decontamination facility, soil stockpiling facility, temporary access roads, wastewater treatment facility, wastewater retention basin, wastewater sanitary sewer connections, and temporary parking necessary to perform Works.

6. Provision, operation and maintenance, as appropriate, of temporary controls including but not limited to barriers, temporary fencing, Site security, traffic regulation, cleaning, stormwater control, dewatering, shoring, erosion and sediment control, noise control, dust and particulate control, pollution control and equipment decontamination necessary to perform Works.

7. Survey and layout of soil excavation areas.

8. Implementation of a fugitive air emissions monitoring program.

9. Clearing and grubbing of existing vegetation, as necessary, for excavation of soils.

10. Removal and reinstallation of portions of Site fencing, as necessary, for excavation of soils.

11. Excavation, on-Site stockpiling, and backfilling of non-contaminated soils.

12. Excavation, on-Site stockpiling, and backfilling of non-hazardous, non-TSCA, soils containing contaminant concentrations below Site-specific industrial cleanup levels but above Site-specific residential cleanup levels.

13. Excavation, on-Site stockpiling, transportation, and off-Site disposal of non-hazardous, non-TSCA, contaminated soils containing contaminant concentrations in excess of Site-specific industrial cleanup levels in an off-Site RCRA Subtitle D landfill.

14. Excavation, on-Site stockpiling, transportation, and off-Site disposal of TSCA/RCRA soils in an off-Site TSCA/RCRA Subtitle C approved landfill.

15. Backfilling and grading of excavated areas.

16. Removal, transportation and off-Site disposal of miscellaneous surface debris, including existing drums, existing building, interior fencing, and concrete decontamination pad in an off-Site landfill that meets solid waste landfill requirements under RCRA Subtitle D and Michigan Act 451 Part 115 (Subtitle D landfill).

17. Demobilization of construction facilities and temporary controls from Site on completion of removal action construction activities including final decontamination.

1.6 WORK NOT INCLUDED

A. The following items of work associated with the project do not form part of this Contract:

1. Establishment of initial control elevations and coordinates.

2. Excavation verification sampling and analysis.

3. Survey of final limits of excavation and verification sampling locations.

1.7 OWNER-SUPPLIED PRODUCTS

A. No products will be supplied by OWNER.

1.8 CONTRACT SCHEDULE

A. Perform Works in accordance with the following Contract Schedule:

1. Commence Works at Site within 15 days after the date of Notice to Proceed.

2. Complete Works within 90 days after the date of Notice to Proceed.

1.9 DRAWINGS

A. Drawings issued with and forming part of Contract Documents are listed below:

Drawing No.	*Rev. No.*	*Date of Drawing or Latest Revision*	*Title*
1	0	1999	Site Location
2	0	1999	Site Plan
3	0	1999	Site Preparation Plan
4	0	1999	Project Excavation Areas
5	0	1999	Grading Plan
6	0	1999	Typical Details

B. Perform Works in accordance with such Drawings issued "Approved for Construction" by ENGINEER.

C. Revised "Approved for Construction" Drawings may be issued from time to time by ENGINEER and such Drawings will supersede previous revisions.

D. If revised "Approved for Construction" Drawings are issued which necessitate changes to CONTRACTOR's drawings not yet reviewed, no separate payment will be made for CONTRACTOR's expenses involved in revising such drawings.

1.10 CONTRACTOR USE OF SITE

A. Construction Operations: Limited to areas noted on Drawings. Do not unreasonably encumber Site with plant, equipment, or materials. Do not obstruct vehicle passage, use, or otherwise interfere with properties outside of Site unless otherwise specified.

B. Hours of Operation: Limit on-Site hours of operation to the hours of 7 a.m. to 7 p.m., 6 days per week, unless otherwise restricted by local bylaws, or, unless prior arrangements are made with OWNER or ENGINEER.

C. When unfavorable weather, soil, drainage, or other unsuitable construction conditions exist, continue operations which will not be adversely affected by such conditions. Do not construct or cause to be constructed any portion of Works under conditions which would adversely affect the quality of Works, unless special means or precautions are taken to perform Works in a proper and satisfactory manner.

END OF SECTION

SECTION 01015

GENERAL REQUIREMENTS

1.1 SECTION INCLUDES

A. Mobilization and startup.

B. Superintendence.

C. Specification language.

D. Coordination.

E. Field surveying.

F. Site mobilization meeting.

G. Progress meetings.

H. Examination.

I. Restoration.

J. Hazardous waste.

K. Community relations.

1.2 MOBILIZATION AND STARTUP

A. Do not mobilize to Site without ENGINEER's prior written authorization. Ensure insurance as required by Contract Documents are in full force.

B. Perform planning and scheduling activities as necessary for the performance of Works.

C. Use existing Site access roads to designated work areas during mobilization. Complete improvements to existing Site access roads as necessary.

D. Locate all underground utilities.

E. Prior to commencing work at Site, mobilize material and equipment necessary for the performance of Works.

F. Site construction facilities in areas designated by ENGINEER. Obtain ENGINEER's approval prior to changing locations of construction facilities. No other areas shall be used by CONTRACTOR without ENGINEER's prior approval. Furnish additional land and access thereto not shown or described that may be required by CONTRACTOR for construction facilities or storage of materials with no liability to OWNER or ENGINEER. Relocate construction equipment or other materials or equipment as required for the performance of Works. Proposed additional lands required off-Site in connection with the Works shall be approved by OWNER.

G. Furnish submittals as required and described in these Specifications.

H. Obtain permits required, if any, specifically for Works.

1.3 SUPERINTENDENCE

A. Provide all necessary superintendence during execution of Works. Employ and assign to Works a competent and authorized representative satisfactory to OWNER, herein referred to as Superintendent and who shall be responsible for supervision, inspection, and direction of Works and who shall be empowered to act on behalf of CONTRACTOR in all matters pertaining to the Contract. All instructions given such representative by OWNER or ENGINEER shall be binding as if given to CONTRACTOR. Instructions will be confirmed by ENGINEER in writing upon request. Superintendent shall be constantly on Site during completion of Works and give his/her whole time to the superintendence of the same. Do not remove Superintendent from Works unless (a) OWNER requests removal, (b) Superintendent ceases to be employed by CONTRACTOR, or (c) otherwise agreed by OWNER and CONTRACTOR.

B. Within 7 days after the date of Notice to Proceed, furnish name and qualifications of Superintendent, in writing, to ENGINEER.

1.4 SPECIFICATION LANGUAGE

A. These Project Specifications are written in imperative mood and are in the abbreviated or streamlined form and include incomplete sentences. This imperative language is directed to CONTRACTOR, unless specifically noted otherwise. Omission of words or phrases, such as "the CONTRACTOR shall", "shall be", "a", "the", and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on Drawings.

1.5 COORDINATION

A. Coordinate scheduling, submittals, and work of the various Sections of Project Specifications and other requirements of Contract Documents to assure efficient and orderly sequence of Works.

B. Verify utility requirements and characteristics of operating pumps, generators, and other equipment are compatible with available Site utilities. Coordinate work of various Sections for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of field offices, temporary parking, equipment decontamination facility, personnel hygiene/decontamination facility, soil stockpiling facility and wastewater treatment facility. Utilize Site efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Coordinate completion and cleanup of work of separate Sections in preparation for Preliminary Acceptance of Works.

E. After Preliminary Acceptance of Works, coordinate access to Site with ENGINEER for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

E. After Preliminary Acceptance of Works, coordinate access to Site with ENGINEER for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

F. Provide advance notice of delivery of materials to Site as required in other Sections. Do not deliver material or equipment of any kind to Site until approval in writing has been obtained from ENGINEER.

G. Coordinate delivery of material and equipment to Site with work sequence; schedule deliveries to limit requirement for storage at Site to the practical minimum; limit on-Site storage of materials to areas approved by ENGINEER. Do not store materials or equipment at properties adjacent to Site. Do not use such properties except to extent strictly necessary to complete the remedial activities specified.

1.6 FIELD SURVEYING

A. ENGINEER will establish bench marks and base lines adjacent to Works.

B. Verify locations of bench marks and base lines prior to starting work. Promptly notify ENGINEER of any discrepancies discovered.

C. Notify ENGINEER in writing at least 5 working days in advance of commencing Works at the Site to enable ENGINEER to establish bench marks and base lines.

D. Locate, preserve, and protect bench marks and base lines established by ENGINEER. Promptly report to ENGINEER the loss or destruction of any bench marks or base lines or relocation required because of changes in grades or other reasons. Make good any errors entering into Works through CONTRACTOR failure to notify ENGINEER concerning lack of preservation of such bench marks and base lines. Replace dislocated bench marks and base lines based on original survey control. Make no changes without prior written notice to and approval of ENGINEER.

E. Develop and make additional detailed surveys as are needed for construction, such as bench marks, base lines, slope stakes, batterboards, stakes for establishing the design elevations of excavations and final grades, and other working points, lines, and elevations.

F. ENGINEER may check CONTRACTOR's survey and layout work but this shall not relieve CONTRACTOR of any of CONTRACTOR's responsibilities to carry out Works to the lines and grades as set out in accordance with Drawings and Project Specifications.

G. Provide reasonable and necessary opportunities and facilities for setting points and making measurements during construction.

H. Control datum for survey is that established by OWNER.

I. Verify set-backs and easements, confirm Drawing dimensions and elevations. Maintain complete and accurate log of control and survey work as it progresses.

J. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.7 SITE MOBILIZATION MEETING

A. ENGINEER will schedule and administer a site mobilization meeting at Site within 7 days after the date of Notice to Proceed and prior to CONTRACTOR occupancy of Site.

B. Attendance Required: CONTRACTOR's Health and Safety Officer and CONTRACTOR's Superintendent. The meeting may be attended by USEPA and/or MDEQ.

C. Agenda:

1. Use of Site by OWNER, ENGINEER, MDEQ, USEPA, and CONTRACTOR.

2. OWNER's requirements and Site occupancy.

3. Verification of existing conditions.

4. Dewatering requirements and wastewater collection, treatment and discharge.

5. Construction facilities and temporary controls provided by CONTRACTOR.

6. Temporary utilities provided by CONTRACTOR.

7. Survey and Site layout.

8. Security and housekeeping procedures.

9. Procedures and processing of field decisions, submittals, substitutions, progress payments, Field Orders, Requests for Quotation, Work Change Directives, Change Orders, and Contract closeout procedures.

10. Schedules.

11. Procedures for verification sampling by ENGINEER.

12. Procedures for maintaining Record Documents.

13. Health and safety, including CONTRACTOR's Site-specific Health and Safety Plan, fugitive air emissions monitoring program requirements and action levels as well as fugitive air emissions controls.

D. ENGINEER will record minutes and distribute copies to participants and those affected by decisions made.

1.8 PROGRESS MEETINGS

A. ENGINEER will schedule and administer progress meetings throughout the progress of Works.

B. ENGINEER will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

C. Attendance Required: CONTRACTOR's Health and Safety Officer, and CONTRACTOR's Superintendent and when requested by ENGINEER major Subcontractors as appropriate.

D. Agenda:

1. Review minutes of previous meetings.

2. Review work progress.

3. Field observations, problems, and decisions.

4. Identification of problems which impede planned progress.

5. Review submittals schedule and status of submittals.

6. Review dewatering and wastewater treatment and applicable maintenance and operation schedules.

7. Review health and safety concerns and issues including fugitive air emissions monitoring results and fugitive air emission controls.

8. Maintenance of projected progress schedule.

9. Corrective measures to regain projected progress schedule.

10. Planned progress during succeeding work period.

11. Coordination of projected progress.

12. Maintenance of quality and work standards.

13. Effect of proposed changes on progress schedule and coordination.

14. Other business relating to Works.

E. ENGINEER will record minutes and distribute copies to participants and those affected by decisions made. Identify errors in the minutes, if any, to ENGINEER in writing within 3 days.

1.9 EXAMINATION

A. Prior to commencement of Works at Site, inspect Site with ENGINEER to review and establish the condition of surface features including existing structures, facilities, wells, surface water drainage features, trees and other plants, grassed areas, agricultural land, fencing, utilities, roads and survey bench marks and base lines on or adjacent to Site which may be affected by Works. This inventory shall be mutually agreed between ENGINEER and CONTRACTOR and shall not thereafter be subject to dispute. Such inventory as may be amended, from time to time, will be used by ENGINEER to check compliance by CONTRACTOR with the requirements of Contract Documents.

B. Provide ongoing review, inspection, and attendance during performance of Works to properly document conditions. Promptly inform ENGINEER of any existing condition affected by Works

which may require restoration, repair, or replacement. Do not cover up any of Works without prior approval from ENGINEER.

C. Maintain and protect existing features including but not limited to structures, facilities, wells, surface water drainage features, trees and other plants, grassed areas, agricultural lands, fencing, utilities, roads and survey bench marks and base lines from damage which may be affected by Works while work is in progress. Repair or replace any damage resulting from Works to ENGINEER's approval.

D. Verify that existing Site conditions and substratum are acceptable for Works.

E. Examine and verify specific conditions described in individual specification Sections.

F. Verify that utility services are available, of the correct characteristics, and in the correct location.

1.10 RESTORATION

A. As a minimum, restoration shall mean replacement, repairs, or reconstruction to a condition at least as good as or better than the condition prior to commencement of Works.

B. Except where specifically required otherwise by other specification Sections, restore areas of Works and areas affected by the performance of Works to conditions that existed prior to commencement of Works and to match condition of similar adjacent, undisturbed areas.

C. Ensure restored areas match existing grade and surface drainage characteristics, except as otherwise specified, and ensure smooth transition from restored surfaces to existing surfaces.

D. Do not alter original conditions without prior written approval from ENGINEER.

E. Without limiting the generality of the foregoing or other requirements of the Contract Documents, preserve and protect any existing features encountered on Site or off Site during the performance of Works including, but not limited to structures, facilities, wells, surface water drainage features, trees and other plants, grassed areas, agricultural land, fencing, utilities, roads and survey bench marks and base lines.

F. Utilize construction methods and procedures during the performance of Works which keeps disturbance and damage of whatever nature to existing conditions to the practical minimum. Where work necessitates root or branch cutting, do not proceed without ENGINEER's prior approval.

G. Restoration Material: New, except as otherwise specified, not damaged or defective and of the best quality for the purpose intended. Furnish evidence as to type, source, and quality of materials or products provided when requested by ENGINEER or specified in other specification Sections.

H. Should any dispute arise as to the quality or fitness of materials, whether obtained on Site or off Site, whether previously inspected by ENGINEER prior to use or not, the decision to use any material or product in the finished Works will rest solely with ENGINEER.

I. Remove from Site non-contaminated material not approved for reuse.

J. Handle and store products and materials in a manner to prevent damage, adulteration, deterioration, and soiling and in accordance with manufacturer's instructions when applicable.

K. Prior to commencement of restoration work, inform ENGINEER of proposed material, methods, and procedures to repair, replace, or reconstruct any disturbed, damaged, or suspected damage to Works.

L. Perform cutting, fitting, remedial, and coordination of Works to make the several parts of Works fit together.

M. Except as specified otherwise, dismantle and salvage materials for reuse where practicable. Exercise due care when removing material for salvage. Repair or replace materials damaged through improper handling or through loss after removal.

N. Store and protect removed material approved for reuse in approved locations.

1.11 HAZARDOUS WASTE

A. No waste that is considered to be hazardous, or is subject to regulation under any applicable Law or Regulation, shall be treated or disposed of on Site. No such waste shall be stored in violation of any such applicable requirements.

B. Liability and responsibility for any and all hazardous or toxic substances produced by CONTRACTOR during the performance of Works shall be the sole liability and responsibility of CONTRACTOR.

1.12 COMMUNITY RELATIONS

A. When required, and solely at the request of ENGINEER, participate in the community relations program organized and directed by USEPA, MDEQ, and OWNER. The community relations program may require CONTRACTOR to provide a senior representative to attend and speak at community meetings during Works, to provide information for inclusion in meetings, letters and information packages, to provide a knowledgeable representative to participate in Site tours, and to assist in any fashion in the community relations program.

B. Do not communicate with any member of the public, media, government, authorities or any person regarding the Works and processes used in Works without the prior written approval of ENGINEER in each case.

END OF SECTION

SECTION 01111

HEALTH AND SAFETY

1.1 SECTION INCLUDES

A. General requirements.

B. Basis of program.

C. Site characterization.

D. Submittals.

E. Health and safety officer.

F. Personnel health, safety, and hygiene.

G. Fugitive air emissions monitoring.

H. Contingency and emergency response plans.

I. Site health and safety.

1.2 GENERAL REQUIREMENTS

A. Develop written Site-specific Health and Safety Plan prior to commencing any on-Site work and continue to implement, maintain, and enforce the plan until final demobilization from Site. Development, implementation, and maintenance of Site-specific Health and Safety Plan is CONTRACTOR's sole responsibility. CONTRACTOR's Site-specific Health and Safety Plan, as a minimum, shall address the specifications contained herein.

B. The health and safety guidelines contained herein are intended to provide for a safe and minimal risk working environment for on-Site personnel and to minimize the impact of activities involving contact with any contaminated materials on the general public and the surrounding environment.

C. Should CONTRACTOR seek relief from or substitution for any portion or provision of the minimum health and safety guidelines specified herein or the reviewed Site-specific Health and Safety Plan, such relief or substitution shall be requested of ENGINEER in writing, and if accepted by ENGINEER, will be authorized in writing.

D. Responsibility: Be responsible for the safety of persons and property on Site and for the protection of persons and property off Site and the environment to the extent that they may be affected by the Works. Comply with and enforce compliance by CONTRACTOR employees and the employees of Subcontractors, agents, and invitees, with safety requirements of Contract Documents, applicable federal, state, and local statutes, regulations, and ordinances, and with CONTRACTOR's Site-specific Health and Safety Plan. CONTRACTOR acknowledges that safety and environment protection obligations are of paramount importance regarding all of the work to be performed under Contract Documents.

E. Hazard Communication Requirements:

1. Comply with the requirements of OSHA's "Hazard Communication" rule, 29 CFR 1910.1200. CONTRACTOR shall be responsible for obtaining information of any hazardous chemical or harmful physical agent to which CONTRACTOR's personnel and visitors have potential exposure while on the Site.

2. Furnish ENGINEER with MSDS (Material Safety Data Sheet) documentation on any "hazardous" chemicals that CONTRACTOR plans to bring onto Site. In addition, CONTRACTOR shall be responsible for meeting container warning label requirements of the OSHA rule.

F. Work Stoppage: CONTRACTOR shall give precedence to the health and safety of the public and on-Site personnel and the protection of the environment over cost and schedule considerations for all project work. The Health and Safety Officer shall be responsible for decisions regarding when work will be stopped or started for health or safety considerations and shall have the authority to stop or start the work for health or safety considerations. CONTRACTOR shall assign the responsibility and obligation to the Health and Safety Officer to stop or start the work when, in the Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. ENGINEER shall have the right to stop work for health and safety considerations. In the event that work is stopped at the Site for reasons of health and safety, no payment for delay or other costs associated with work stoppage including extensions to the work schedule will be made.

G. Unforeseen Hazards: Should any unforeseen or Site-peculiar safety-related factor, hazard, or condition become evident during the performance of Works at Site, bring such to the attention of ENGINEER verbally and in writing as quickly as possible, for resolution. In the interim, take prudent action to establish and maintain safe working conditions and to safeguard CONTRACTOR employees and employees of Subcontractors, agents and invitees, the public, the OWNER, ENGINEER, and the environment.

H. Work Zone Restrictions: Do not work in the Exclusion Zone or in the Contaminant Reduction Zone (including any areas expected to become an Exclusion Zone or Contaminant Reduction Zone), including work relating to the designation or establishment of an Exclusion Zone or Contaminant Reduction Zone, until CONTRACTOR's Site-specific Health and Safety Plan is reviewed by ENGINEER. Other on-Site work may be conducted after the submittal of the Site-specific Health and Safety Plan to, and prior to, its review by ENGINEER, but conduct any such work only with the prior approval of ENGINEER. Implement the Site-specific Health and Safety Plan, as submitted to ENGINEER, during the conduct of any work performed prior to the review of the Site-specific Health and Safety Plan.

1.3 BASIS OF PROGRAM

A. The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) provide the basis for the health and safety program. The program also reflects the position of the USEPA and NIOSH regarding procedures recommended or required to ensure safe operations at sites containing hazardous or toxic materials.

1.4 SITE CHARACTERIZATION

A. Work at Site will involve contact with contaminated materials. A copy of OWNER's Site-Specific HASP will be provided upon Notice of Award.

1.5 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. CONTRACTOR's Site-Specific Health and Safety Plan:

1. Within 7 days after the date of Notice to Proceed and prior to mobilization to Site, submit a Site-specific Health and Safety Plan. As a minimum, address aspects of worker protection and measures designed to prevent migration of hazardous or contaminated material to the environment, including but not limited to the provisions and guidelines contained herein, and the following specific topics:

    1. Worker medical surveillance.

    2. Worker training and education.

    3. Detailed description of the planned movement of labor, equipment, and materials from and between work areas as work progresses, including measures to be employed to prevent contamination of non-contaminated areas.

    4. Detailed description of the personnel hygiene/decontamination facility to be employed including the methods to be used to collect, store, treat, and ultimately dispose of personnel decontamination wastewaters and solid wastes.

    5. Detailed description of the equipment decontamination facility for vehicles and equipment and the methods to be used to collect, store, treat, and ultimately dispose of washdown decontamination wastewaters and sediments.

    6. Confined space entry program and procedures if CONTRACTOR expects confined space work to be performed.

    7. Personal protective equipment types to be used.

    8. Personnel hygiene and decontamination procedures.

    9. Respirator protection program and procedures.

    10. Emergency and first-aid equipment and supply.

    11. Fugitive air emissions monitoring program.

    12. Fugitive air emissions control.

    13. Monitoring and mitigation of worker heat and cold stress.

    14. On-Site and off-Site Contingency and Emergency Response Plans.

2. ENGINEER will review CONTRACTOR's Site-specific Health and Safety Plan and provide comments to CONTRACTOR within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit the plan to ENGINEER within 3 days after receipt of comments from ENGINEER.

C. Proof of OSHA Training: Within 7 days after the date of Notice to Proceed and prior to mobilization to Site, submit a list of all personnel that will be employed at Site. For each of the listed personnel, provide proof of training as required under OSHA 29 CFR 1910.120. Submit proof of training for any additional personnel, at least 7 days prior to the individual's arrival on Site.

D. Medical Surveillance:

1. Within 7 days after the date of Notice to Proceed and prior to mobilization to Site, submit a report for medical examination conducted within the last 12 months as part of compliance with OSHA medical surveillance requirements for each of CONTRACTOR's personnel that will be employed at Site. As a minimum, submit the following information for each CONTRACTOR personnel:

    1. Name and Social Security Number and date of exam.

    2. Physician's statement that the individual is approved to wear and use the types of respiratory protection proposed for the project and is able to work safely in hazardous environments capable of producing heat stress in the worker.

2. Submit reports on medical examination for any additional personnel at least 7 days prior to the individual's arrival on Site.

3. Submit the name of the physician and evidence of examination of on-Site personnel prior to assigning personnel on-Site work activities in the Exclusion Zone or Contaminant Reduction Zone.

1.6 HEALTH AND SAFETY OFFICER

A. Employ and assign to Works a competent and authorized representative herein referred to as Health and Safety Officer. Health and Safety Officer shall be on Site during the execution of work and report directly to and be under the direction of a Certified Industrial Hygienist provided by CONTRACTOR.

B. Health and Safety Officer Experience and Responsibilities:

1. Have a minimum of 2 years Site-related working experience specific to the activities associated with handling, excavation and transportation of contaminated soils and sediments.

2. Have a basic working knowledge of state and federal occupational safety and health regulations.

3. Have formal education and/or training in occupational safety and health.

4. Be responsible for completing the health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter Site to perform work in the Exclusion Zone or Contaminant Reduction Zone.

5. Be responsible for implementing and daily enforcing and monitoring the Site-specific Health and Safety Plan.

6. Be responsible for ensuring reusable personal protective equipment is decontaminated before being reissued.

7. Be responsible for performing fugitive air emissions monitoring.

8. Ensure that on-Site personnel have obtained the required medical examinations prior to arrival at Site and at the termination of their assignment as required by this Contract Documents.

9. Be responsible for the pre-construction indoctrination of on-Site CONTRACTOR personnel with regard to the Site-specific Health and Safety Plan and other safety requirements to be observed during performance of Works, including:

    1. Potential hazards.

    2. Personal hygiene principles.

    3. Use of personal protective equipment and respiratory protection, including fit testing.

    4. Emergency procedures for dealing with fire and medical situations.

10. Be responsible for incorporating the provisions of both on-Site and off-Site Contingency and Emergency Response Plans in the Site-specific Health and Safety Plan and maintaining a state of readiness to enact the provisions.

11. Be responsible for alerting appropriate on-Site and/or off-Site emergency services and ENGINEER before starting any particularly contaminated or hazardous work.

12. Assist ENGINEER in contacting and advising local authorities of Works to be performed.

13. Have the authority and obligation to stop all, or any part of Works if, in Health and Safety Officer's sole discretion, stoppage of Works is necessary or advisable for considerations of health or safety.

1.7 PERSONNEL HEALTH, SAFETY, AND HYGIENE

A. Medical Surveillance:

1. Conduct medical surveillance of personnel as required by 29 CFR 1910.120 and 29 CFR 1910.134.

2. Retain the services of a licensed occupational physician or physician's group to provide the medical examinations and surveillance required. Furnish pertinent Site characterization

data, a copy of 29 CFR 1910.120, and a description of the intended personal protective equipment to the occupational physician prior to completing medical surveillance. Maintain CONTRACTOR personnel medical approvals at CONTRACTOR's Site office for the duration of Works performed at Site.

3. Medical surveillance protocol shall be the occupational physician's responsibility but shall meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134 for all personnel. This exam may include:

    1. Medical/occupation questionnaire with work history.

    2. Full physical examination.

    3. Screening audiometric test with otoscopic exam for occlusion or perforation.

    4. Visual acuity measurement, including color perception.

    5. Pulmonary function test (Spirometry - FVC and FEV-1.0 second).

    6. Resting EKG.

    7. Chest x-ray.

    8. Blood chemistry profile as deemed appropriate by the attending physician for contaminated and hazardous waste work.

    9. Complete blood count with differential and platelet evaluation, including WBC, RBC, HGB, hematocrit.

    10. Urinalysis with microscopic examination.

    11. Other Site-specific medical monitoring as required by Site-specific conditions.

4. Provide on-Site personnel requiring full medical surveillance with medical surveillance within the 12-month period prior to entering Site, and at any time there is suspected to be excessive exposure to toxic chemicals or physical agents. Remove on-Site personnel who become due for an annual physical examination from the work force immediately until medical requirements are met in accordance with 29 CFR 1910.120 and 29 CFR 1910.134.

5. Maintain medical surveillance records in accordance with 29 CFR 1910.120 and 29 CFR 1910.134.

B. Training:

1. Provide and require that personnel assigned to or entering Site, complete Site-specific training or refresher sessions. Site-specific training and refresher sessions shall ensure that personnel are capable of and familiar with the use of safety, health, respiratory, and protective equipment and with the safety and security procedures required for Site. The training session shall be completed by CONTRACTOR's Health and Safety Officer.

2. As a minimum, include the following items in the training program:

    1. Names and personnel responsible for Site health and safety.

    2. Site-specific potential hazards.

    3. Use of personal protective equipment (PPE), including proper donning and doffing procedures.

    4. Work practices by which the employee can minimize risks from these potential hazards.

    5. Confined space entry procedures (if confined space work is to be performed).

    6. Safe use of engineering controls and on-Site equipment.

    7. Discussion and completion of medical surveillance requirements and recognition of symptoms associated with exposure to hazards.

    8. Site control methods.

    9. On-Site and off-Site Contingency and Emergency Response Plans.

    10. Decontamination procedures.

    11. Site-specific standard operating procedures.

    12. Delineation between work zones.

    13. Use of the buddy system.

    14. Scope of the intended work for the Contract.

    15. Review on-Site communications and appropriate hand signals between personnel working in the Exclusion Zone and/or Contaminant Reduction Zone.

    16. The content of the OSHA standards, including the Appendices.

3. In accordance with 29 CFR 1910.120, provide training to all employees assigned to or entering the Exclusion Zone or Contaminant Reduction Zone including truck drivers transporting contaminated materials and heavy equipment operators including a minimum of 40 hours instruction off Site and 3 days of actual field experience under direct supervision of a trained and experienced supervisor and an 8-hour annual refresher. Provide documentation stating that all on-Site personnel expected to enter potentially contaminated work areas have complied with this regulation. Include each individual's name on this confirmatory letter.

4. Implement a hazard communication ("Right-to-Know") program in accordance with 29 CFR 1910.1200.

C. Levels of Protection:

1. Establish levels of protection for each work area based on planned activity, location of activity, and fugitive air emissions monitoring results. Monitor potential exposures to contaminated or hazardous materials with an organic vapor photoionization detector (PID), a real-time digital particulate monitor (e.g., Miniram Model PDM-3 or equivalent), and for confined space work an oxygen level meter and explosimeter.

2. Furnish minimum Level C personal protective equipment (PPE) in the Exclusion Zone until initial fugitive air emissions monitoring results are available. After the fugitive air emissions monitoring results are available, increase or decrease the level of PPE, but to not less than Modified Level C for Exclusion Zone and Contaminant Reduction Zone activities. The minimum anticipated levels of personal protection based on work activity are as follows:

	Work Activity	*Anticipated Level of Personal Protection*
1.	Site Mobilization	Level D or modified Level C as determined by Health and Safety Officer
2.	Clearing, Grubbing and Removal of on-Site Structure and Fencing	Level D or modified Level C as determined by Health and Safety Officer
3.	Dewatering, Installation and Operation of on-Site Wastewater Treatment Facility	Level D or modified Level C as determined by Health and Safety Officer
4.	Fence and Temporary Access Road Maintenance Activities	Level D or modified Level C as determined by Health and Safety Officer
5.	Field Surveying Activities	Level D or modified Level C as determined by Health and Safety Officer
6.	Excavation, Handling and Loading of Contaminated Soils for off-Site Disposal Drum Handling and Waste Consolidation	Level D or modified Level C as determined by Health and Safety Officer
7.	Fugitive Air Emissions Monitoring	Level D or modified Level C as determined by Health and Safety Officer
8.	Equipment Decontamination Activities	Level D or modified Level C as determined by Health and Safety Officer

9.	Final Grading and Backfilling of Excavated Areas	Level D or modified Level C as determined by Health and Safety Officer
10.	Demobilization	Level D or modified Level C as determined by Health and Safety Officer

D. Personal Protective Equipment:

1. Furnish on-Site CONTRACTOR personnel with appropriate PPE. Ensure that safety equipment and protective clothing is kept clean and well maintained. As a minimum, supply each worker entering or expected to enter the Exclusion Zone or Contaminant Reduction Zone with:

    1. Individually assigned half- or full-facepiece air purifying respirators (NIOSH approved) with appropriate dual organic vapor/high-efficiency particulate filters. Respirators shall be available at all times and donned when required as indicated by fugitive air emissions monitoring.

    2. Chemical-resistant disposable coveralls (tyvek).

    3. Latex and/or cotton inner gloves.

    4. Nitrile outer gloves.

    5. Work boots with steel toe and shank.

    6. Chemical-resistant overboots or booties, butyl rubber or neoprene.

    7. Hard hat.

    8. Safety glasses with sideshields.

    9. Work clothing (full-length pants, long-sleeve shirt).

2. Based on the work activity and the anticipated level of personal protection as specified in Section 01111, Article 1.7 C, furnish on-Site CONTRACTOR personnel with appropriate PPE. Ensure that safety equipment and protective clothing is kept clean and well maintained. As a minimum, supply each worker entering or expected to enter the Exclusion Zone or Contaminant Reduction Zone with protection as specified in Section 01111, Article 1.7 C. The following are the minimum PPE required for each level of protection as applicable:

    1. Level C:

        1. Individually assigned half- or full-facepiece air-purifying respirators (NIOSH-approved), with appropriate dual organic vapor/high-efficiency particulate filters.

        2. Chemical-resistant disposable coveralls (tyvek).

3. Latex and/or cotton inner gloves.

4. Nitrile outer gloves.

5. Work boots with steel toe and shank.

6. Chemical-resistant overboots or booties, butyl rubber or neoprene.

7. Hard hat.

8. Safety glasses with side shields.

9. Work clothing (full-length pants, long-sleeve shirt).

2. Modified Level C:

1. Chemical-resistant disposable coveralls (tyvek).

2. Latex and/or cotton inner gloves.

3. Nitrile outer gloves.

4. Work boots with steel toe and shank.

5. Chemical-resistant overboots or booties, butyl rubber or neoprene.

6. Hard hat.

7. Safety glasses with side shields.

8. Work clothing (full-length pants, long-sleeve shirt).

3. Level D:

1. Work boots with steel toe and shank.

2. Hard hat.

3. Safety glasses with side shields.

4. Work clothing (full-length pants, long-sleeve shirt).

5. Any personal protective equipment necessary for specialized tasks (e.g., welding goggles).

3. Develop protective equipment usage procedures and ensure that procedures are strictly followed by on-Site personnel; include the following procedures as a minimum:

1. Do not permit prescription eyeglasses to be worn that are not safety glasses. Do not permit contact lenses on Site within the Exclusion Zone or Contaminant Reduction Zone.

2. Change respirator cartridges/filters daily during periods of respirator usage or upon breakthrough, whichever occurs first.

3. Do not permit footwear to be worn that is not steel-toed safety boots. Cover footwear by rubber overshoes when entering or working in the Exclusion Zone.

4. Dispose of or decontaminate PPE worn on Site at the end of the work day.

5. Decontaminate reusable PPE before reissuing.

6. Do not permit on-Site personnel who have not passed a respirator fit test to enter Exclusion Zone and/or the Contaminant Reduction Zone. Do not permit personnel to have facial hair that interferes with a proper fit of the respirator.

E. Respiratory Protection:

1. Provide on-Site personnel with extensive training in the usage and limitations of, and qualitative fit testing for, half- and full-facepiece respirators in accordance with 29 CFR 1910.134; include both air-purifying and supplied-air type respirators.

2. Develop, implement, and maintain the respirator program. Incorporate or attach a copy of the respirator program to CONTRACTOR's Site-specific Health and Safety Plan.

3. Monitor, evaluate, and provide respiratory protection for on-Site personnel.

4. Levels of respiratory protection as listed in Section 01111, Article 1.7C have been chosen to be consistent with Site-specific potential airborne hazards associated with the major contaminants identified at Site. The selection of appropriate protection is based upon the potential presence of compounds with the lowest recommended threshold limit value.

5. In the absence of additional fugitive air emissions monitoring information or substance identification, the following minimum levels of respiratory protection will be required:

Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone	*Particulate Level Worker Breathing Zone*	*Action Taken*
<50 ppm	<4 mg/m^3	- Level D
50-500 ppm	4-10 mg/m^3	- Level C
--	≥10mg/m^3	- Level B
>500 ppm	--	- shut down activities, implement engineering controls

6. Immediately notify ENGINEER when level of respiratory protection required increases from modified Level C to Level C.

7. Be responsible for appropriate respiratory protection during work activities. As a minimum, ensure that persons entering the Exclusion Zone or Contaminant Reduction Zone are supplied with and use appropriate respiratory protection.

8. Be responsible for assessing the ability for on-Site personnel to wear respiratory protection. Cardiopulmonary system examination and pulmonary function testing are minimum requirements as specified in Section 01111, Article 1.7A.

9. Do not permit on-Site personnel unable to pass a respirator fit test to enter the Exclusion Zone or Contaminant Reduction Zone. Furnish proof of such fit testing to ENGINEER prior to commencing work.

F. Heat Stress/Cold Stress:

1. Implement a heat stress and/or cold stress monitoring program as applicable; include as a minimum the following specific components:

    1. Training of personnel to recognize and mitigate heat/cold stress situations and symptoms.

    2. Target conditions which will initiate monitoring of personnel.

    3. Monitoring methods.

    4. The means and methods by which CONTRACTOR will mitigate such conditions.

2. Base the heat stress/cold stress program on recommendations by ACGIH, NIOSH, and other recognized authorities.

G. Personnel Hygiene and Personnel Decontamination Procedures:

1. Ensure that on-Site personnel observe and adhere to the personal hygiene-related provisions of this Section.

2. Issue a written notice of violation to on-Site personnel found to be disregarding the personal hygiene-related provisions of the Site-specific Health and Safety Plan or the Project Specifications (including but not limited to the requirements concerning PPE specified in Section 01111, Article 1.7 D respiratory protection specified in Section 01111, Article 1.7 E and personnel hygiene and personnel decontamination procedures specified in Section 01111, Article 1.7 G). The notice may be issued by ENGINEER, the Health and Safety Officer, or any supervisory personnel of CONTRACTOR. Give a copy of the notice to the offending worker, to his immediate supervisor, to CONTRACTOR's Superintendent, and to ENGINEER. Upon issuance of a second written notice of such violation, terminate the worker from employment at Site.

3. Failure of CONTRACTOR's supervisory personnel to implement this warning/termination provision shall be deemed a material breach of the Contract.

4. Provide, as a minimum, the following:

    1. Suitable containers for storage and disposal of used disposable PPE.

    2. Potable water and a suitable sanitation facility.

5. Enforce the following provisions:

    1. Require on-Site personnel to wear appropriate PPE at all times when entering or working in the Exclusion Zone or Contaminant Reduction Zone.

    2. Do not permit used disposable PPE to be reused, and when removed, place PPE inside appropriate containers provided for that purpose.

    3. Prohibit smoking, chewing nicotine products, eating, and drinking, except in a designated lunch or break area.

    4. Require removal of soiled disposable outerwear prior to entering the lunch area, and prior to cleansing hands.

    5. Require on-Site personnel to thoroughly cleanse their hands and other exposed areas before entering the smoking or lunch areas.

    6. Require personnel working in the Exclusion Zone and/or Contaminant Reduction Zone to shower and change to fresh clothing after each working period or shift, prior to leaving Site.

    7. Launder used work clothing daily.

    8. Store wastewater generated from washing and showering in designated wastewater storage tank(s) in accordance with Section 01500.

6. Place discarded disposable outerwear, gloves, and outer footwear in sealable containers. Prior to placement, segregate discarded articles of clothing and secure in plastic bags. Place articles which are soiled, stained, or have been in contact with contaminated materials in separate CONTRACTOR-supplied sealable containers for disposal at an off-Site approved landfill that meets TSCA solid waste landfill requirements. Place remaining clean articles of clothing in CONTRACTOR-supplied general refuse containers.

H. Emergency and First-Aid Equipment:

1. Locate and maintain emergency and first-aid equipment in appropriate locations on Site. Include the following equipment as a minimum:

    1. First-aid kit to accommodate the numbers of on-Site personnel.

    2. Portable emergency eye wash (pressurized).

    3. Two 20-pound ABC type dry chemical fire extinguishers.

    4. Blankets and towels.

    5. Stretcher.

    6. One hand-held emergency siren/air horn.

    7. Two self-contained breathing apparatus units.

2. As a minimum, provide one certified first-aid technician on Site at all times that on-Site work activities are in progress. This person may perform other duties but shall be immediately available to render first aid when needed.

I. Site Communications:

1. Post emergency numbers near Site telephones in accordance with the on-Site and off-Site Contingency and Emergency Response Plans.

2. Ensure that personnel work under the use of a "buddy" system and develop a hand signal system appropriate for Site activities.

3. Provide an employee alarm system to notify employees of on-Site emergency situations or to stop work activities if necessary.

4. Provide selected personnel with two-way radios in accordance with Section 01500.

J. Safety Meetings: Conduct safety meetings, mandatory for on-Site personnel, on a regular weekly basis and additionally as required by special or work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new Site conditions as they are encountered. Hold additional safety meetings on an as-needed basis.

K. Custodian: Employ and provide a custodian who shall be responsible for keeping safety equipment and facilities clean, properly equipped, and maintained. The custodian may perform other duties for CONTRACTOR but the custodian's first priority shall be maintenance of protective equipment and the decontamination area. The custodian shall report directly to the Health and Safety Officer.

1.8 FUGITIVE AIR EMISSIONS MONITORING

A. Fugitive Air Emissions Monitoring Program:

1. During the progress of work activities, monitor air quality in and around the Exclusion Zone and Contaminant Reduction Zone. Conduct monitoring on a regular periodic basis, and additionally as required by special or work-related conditions. Report any departures from general background air quality to ENGINEER who will, in conjunction with the Health and Safety Officer, determine when operations should be modified or shut down and restarted.

2. Provide the required instruments for fugitive air emissions monitoring including, as a minimum, an organic vapor photoionization detector (PID), a real-time digital particulate monitor (e.g., Miniram model PDM-3 or equivalent) and if confined space work is to occur, an oxygen level meter and an explosimeter. Additionally, personnel sampling pumps and dust monitors may be required if Site conditions warrant. Provide sufficient numbers of each instrument to monitor the active work locations and to provide backup equipment in cases of equipment malfunction.

3. Operate fugitive air emissions monitoring equipment with personnel trained in the use of the specific equipment provided and under the control of the Health and Safety Officer.

Monitoring equipment used within the Exclusion Zone and Contaminant Reduction Zone shall be intrinsically safe.

4. Conduct fugitive air emissions monitoring for organic vapors and respirable particulate matter (PM-10) on a routine basis around active work locations. Perform monitoring as a minimum on an hourly basis and additionally as dictated by Site activities.

5. Provide a wind speed indicator at an unobstructed location on Site located above the elevation of the work area with unobstructed view.

6. Fugitive air emissions monitoring for organic vapors and respirable particulate matter (PM-10) shall be conducted in the breathing zone of workers in the Exclusion Zone (EZ) and at the downwind perimeter of the EZ during soil/sediment excavation and handling activities on an hourly basis or as deemed necessary by the Health and Safety Officer. Background measurements immediately upwind of the EZ shall be taken on a regular basis for a minimum of 3 days before activities commence in the EZ. Respiratory action levels for organic vapors and PM-10 for on-Site personnel are specified in Section 01111, Article 1.7 E.

   Work activities generating sustained (>15 minutes) particulate levels in excess of 2.5 milligrams per cubic meter (mg/m^3), or sustained organic vapor levels greater than 10 parts per million (ppm) above background at any location inside of the EZ will immediately require monitoring at downward perimeter of Site and/or half the distance to the nearest downwind residence to verify acceptable levels at these locations.

   At half the distance to the nearest residence the PM-10 action level is 0.1 mg/m^3 and the organic vapor action level is 1 ppm. Exceedances of either action level at the downwind perimeter of Site and/or half the distance to the nearest downwind residence shall be cause to temporarily halt work activities until CONTRACTOR implements alternate work methods or engineering controls are in place to maintain PM-10 and/or organic vapor levels below their respective action levels.

   Organic vapor levels greater than 1 ppm above background at half the distance to the nearest downwind residence shall be cause to immediately cease work activities until alternate work methods or engineering controls are in place to maintain organic vapor levels below 1 ppm above background at this location.

   Air monitoring will be conducted by the ENGINEER at downwind perimeter of Site and/or half the distance to the nearest residence for organic vapor, PM-10, and PCBs. The action levels for organic vapor and PM-10 for air monitoring conducted by ENGINEER are the same as the action levels for air monitoring conducted by CONTRACTOR. The action level for PCB air monitoring by the ENGINEER is 1,200 $\mu g/m^3$. Exceedances of the action levels at the downwind perimeter of Site and/or half the distance to the nearest downwind residence shall be cause to temporarily halt work activities until CONTRACTOR implements alternate work methods or engineering controls are in place to maintain organic vapor, PM-10, and/or PCB levels below their respective action levels.

7. Should the organic vapor level in any active work location exceed 500 ppm for any single reading or should the explosimeter indicate in excess of 10 percent of the Lower Explosive Limit (LEL) on any single reading, or reduced oxygen concentrations less than 19.5 percent oxygen, or if toxic gases and particulates are present in concentrations which present Immediate Danger to Life and Health (IDLH) or in excess of the protection factor afforded by the air purifying respirator (whichever is lower), then that work location shall be shut

down and personnel evacuated upwind. Work shall not resume at that location until authorized by the Health and Safety Officer.

8. All air monitoring equipment shall be calibrated on a daily basis in accordance with the manufacturer's guidelines. Calibrations shall be recorded in Site daily log book.

B. Fugitive Air Emissions Monitoring Reporting:

1. Report the results of fugitive air emissions monitoring programs to ENGINEER daily on specific forms and include the following information as applicable:

1. Site location/date.

2. Work process/operation name.

3. Temperature, wind speed, and wind direction.

4. Area sampling location diagram.

5. Field notes including the following:

1. Description of operations and complaints/symptoms.

2. Chemicals/materials/equipment in use.

3. Engineering/administration controls in effect.

4. Personal protective equipment in use.

5. Sampling observations/comments.

2. In addition, record daily fugitive air emissions monitoring activities in a hard cover log book; maintain log book on Site at all times.

1.9 CONTINGENCY AND EMERGENCY RESPONSE PLANS

A. General: Prior to mobilization to Site prepare both on-Site and off-Site Contingency and Emergency Response Plans to ensure the safety of on-Site and off-Site personnel. Incorporate the on-Site and off-Site Contingency and Emergency Response Plans into CONTRACTOR's Site-specific Health and Safety Plan. Contingency and Emergency Response Plans shall present project personnel responsibilities during medical emergencies, fire, or explosion emergencies and emergencies involving spills or leaks. All appropriate response agencies and their phone numbers shall appear in the plans. An appropriate figure with directions to the nearest medical facility shall also be included.

B. On-Site Contingency and Emergency Response Plan: Address the standard operating procedures to be implemented during emergency situations. Include and address the following emergency situations and responses as a minimum:

1. In the event of injury to on-Site personnel or contact with hazardous materials requiring immediate medical attention, implement the following protocol:

1. Notify the Health and Safety Officer and ENGINEER.

2. Phone the hospital previously identified to be closest to Site and describe injury.

3. Decontaminate personnel and administer appropriate first aid.

4. Transport personnel to the specified hospital along the most direct route which shall be predefined prior to commencing Site work.

2. In the event that barrels or canisters are encountered during Works, immediately cease work and notify Health and Safety Officer and ENGINEER; determine appropriate modifications to the Site-specific Health and Safety Plan in conjunction with ENGINEER and Health and Safety Officer. CONTRACTOR shall continue the Works in another area as directed by the ENGINEER.

3. In the event that excessive gases or vapors are detected during Works, take the following actions:

   1. Evacuate workers to an area upwind from the affected area.

   2. Identify the contaminant and monitor contaminant concentrations to determine the type of respiratory protection and/or engineering controls required before workers re-enter the area.

4. In the event of a fire during Works, quickly use earthmoving equipment to backfill the area and smother the fire if possible and if the presence of noxious gases prohibits this, employ proper evacuation procedures.

5. In the highly unlikely event of a major leak of toxic gas, such as might occur if a compressed gas cylinder were encountered and ruptured during Works, evacuate on-Site personnel to a safe distance, and notify the Police and Fire Department and local hospital if deemed necessary by ENGINEER or the Health and Safety Officer. Police and Fire Department Officials will assume responsibility for coordinating with ENGINEER and the Health and Safety Officer for the proper emergency response strategy upon arrival.

C. Off-Site Contingency and Emergency Response Plan:

1. Prior to commencing work involving the handling of hazardous materials, develop an off-Site Contingency and Emergency Response Plan. This plan is intended to provide immediate response to a serious Site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site which could affect or endanger the public or adjacent public or private areas.

2. ENGINEER will be responsible for coordination of meetings with local officials, issuing minutes of meeting and distribution of the off-Site Contingency and Emergency Response Plan.

3. Attend a coordination meeting to be held with appropriate authorities including Fire, Hospital, State Police, State Department of Transportation, the County Health Department, and the Community Emergency Coordinator; meeting will identify the off-Site Emergency Response Coordinator through whom all information and coordination will occur in the

event of an incident. Develop plans and procedures, or adopt existing plans and procedures, for:

1. Evacuation of Site-adjacent areas.

2. Fire-fighting procedures.

3. Transport of injured personnel to medical facilities.

4. Priority transportation routes.

5. Coordination and/or modification of highway operations.

4. Develop techniques and recommended procedures for immediate first-aid emergency response with local medical facilities.

1.10 SITE HEALTH AND SAFETY

A. Work Areas: Clearly lay out and identify work areas in the field and limit equipment, operations and personnel in the areas as defined below. Establish work areas as temporary or permanent, depending on the work activity and the sequence in which it is performed. These areas are:

1. The Exclusion Zone: Includes areas where contaminated soils, debris, and other materials are being, or may be contacted, disturbed, or handled and areas where contaminated equipment or personnel travel. Establish temporary Exclusion Zones around remote work areas beyond the limits of the Site fence; clearly delineate temporary Exclusion Zones in the field by temporary snow fencing and/or barricades and warning signs provided by CONTRACTOR.

2. The Contaminant Reduction Zone: Occurs at the interface of the Exclusion Zone and Clean Zone and provides for the decontamination of equipment and vehicles prior to entering the Clean Zone from the Exclusion Zone, the decontamination of personnel and clothing prior to entering the Clean Zone from the Exclusion Zone, and for the physical segregation of the Clean and Exclusion Zones.

3. The Clean Zone: Defined as a clearly delineated area outside the Exclusion Zone and Contaminant Reduction Zone, which functions include:

    1. An entry area for personnel, material, and equipment to the Contaminant Reduction Zone.

    2. An exit area for decontaminated personnel, material, and equipment from the Contaminant Reduction Zone.

    3. A storage area for clean safety and work equipment.

B. Temporary Fencing:

1. Erect temporary fencing on Site to delineate work areas in accordance with the Site-specific Health and Safety Plan.

2. Construct temporary fencing of standard snow fence or construction fence supported by posts with warning signs.

3. Coordinate the erection of temporary fencing with the work specified under other Sections of the Project Specifications. Prior to or during mobilization erect fencing to enclose the Exclusion Zone.

4. Reuse existing temporary fencing; decontaminate temporary fencing prior to reuse at another location.

C. Contaminant Migration Control:

1. Take appropriate measures to prevent contaminant tracking on and off Site. Decontaminate vehicles, equipment, and personnel leaving areas of potential contamination, as determined by the Health and Safety Officer, prior to entry into Clean Zones. Locate decontamination facilities and sequence work activities to prevent contaminant tracking.

2. Personnel engaged in vehicle decontamination shall wear protective equipment including suitable disposable clothing, respiratory protection, and face shields.

D. Confined Space Entry Program:

1. Responsibility: The Health and Safety Officer shall be responsible to ensure that minimum precautions as specified herein have been taken to assure safe entry of confined spaces, as stated in 29 CFR 1910.146.

2. Procedure:

1. Time Period Covered by Permits:

1. Do not allow Site personnel to enter confined space without a written confined space work permit.

2. Issue the confined space work permit with validity for a single shift only. On jobs requiring more than a single shift to bring to completion, issue a new permit at the start of each shift.

2. Variances:

1. Inability to Follow Procedure: Should any circumstances be found where these rules cannot be met, rules to insure adequate safety for entering these specific confined spaces shall be written out by the Health and Safety Officer, for approval in accordance with the Site-specific Health and Safety Plan. Detail any special conditions associated with this variance and attach to the confined space work permit.

3. Availability of Permit: Maintain properly completed permits readily available at Site. Keep permit on file indefinitely after the completion of the shift for which they were issued.

4. Preparation of Equipment For Safety:

    1. Power: De-energized, locked, and tagged.

    2. Remove hazardous contents from the confined space. Conduct tests for hazardous materials, flammable vapor and oxygen content on a continuous basis while anyone is in the confined space. If the tests do not meet the requirements of items 5.1 and 5.2, require the workers to leave the confined space.

5. Testing of Atmospheres Within Confined Spaces:

    1. Oxygen Content: Above 19.5 percent and below 23.5 percent before entry will be allowed.

    2. Flammable Vapors: Require personnel to leave confined spaces if the concentration of explosive gases exceeds 10 percent of the lower explosive limit (LEL). If hot work is to be conducted in the space, then explosive gases cannot exceed 0 percent (LEL).

6. Ingress and Egress: Maintain a safe means of ingress and egress, such as a portable ladder, in place at all times when personnel are occupying a confined space.

7. Protective Clothing: Modified Level C protection shall be worn as a minimum by personnel entering confined spaces where the confined space has been made vapor free, meaning the vapor concentration is below the Threshold Limit Value (TLV) of the vapor being monitored, the total organic vapor readings are less than 10 ppm, the LEL is zero and the oxygen content is between 19.5 and 23.5 percent, and continuous air monitoring with a photoionization detector, oxygen meter, and explosimeter is maintained. If all these conditions are not met, Level B protection shall be worn. The Site-specific Health and Safety Plan shall include a full confined space entry program.

8. Life Lines: Provide each authorized entrant with a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level or above the entrant's head. Wristlets may only be used if it can be demonstrated that the use of wristlets is the safest and most effective alternative. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space such that rescue can begin immediately if required.

9. Illumination:

    1. Temporary Lighting In the Confined Space: Explosion-proof design with heavy-duty cords and fittings and insulations maintained in good condition.

    2. Portable battery powered Lighting: Operated at a maximum of 12 volts; kept at-the-ready outside of the confined space access opening to be used as illumination in the event of failure of the principle system; capable of providing illumination for a period of at least 1 hour.

10. Safety Monitors:

    1. A person designated as a safety monitor shall be trained in first aid and CPR and stationed at the access opening of any confined space while it is occupied. He/she shall have continuous visual or verbal contact with occupants. One of his/her major responsibilities shall be to summon additional help in emergency situations.

    2. In addition to the safety monitor, provide another person located within 100 feet of the confined space opening. This individual may do work other than that related to the confined space entry but such work shall not prevent his/her responding to a call for aid.

11. Equipment Immediately Available to the Safety Monitor: Locate the following emergency items at the access opening of the confined space or not more than 15 feet from such opening:

    1. Respiratory equipment for Level B protection.

    2. Life lines, as described in item 8. above.

    3. A battery powered portable light, as described in item 9. above.

    4. A portable type air-horn, capable of being heard 100 feet away over background noises.

END OF SECTION

SECTION 01300

SUBMITTALS

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Progress schedules.

C. Project organization chart.

D. Quality control logs.

E. Submittals for progress meetings.

F. Site layout plan.

G. Record Documents.

H. Summary of major project submittals.

1.2 SUBMITTAL PROCEDURES

A. Unless directed otherwise, transmit submittals to ENGINEER at the address set forth in the Special Conditions.

B. Unless otherwise specified, drawings and other technical information specified to be submitted by CONTRACTOR to ENGINEER shall be submitted in 5 copies. Copies shall be legible and shall clearly show all information contained on the original.

C. Before transmitting each submittal, determine and verify the following:

1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.

2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of Works.

3. All information relative to CONTRACTOR's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction, and safety precautions and progress incident thereto.

D. Identify Contract, CONTRACTOR, Subcontractor, or Supplier; pertinent drawing and detail number, and specification Section number, as appropriate.

E. Review and coordinate each submittal with other submittals and with the requirements of Works and Contract Documents. Coordinate submission of related items.

F. Apply CONTRACTOR's approval stamp prior to initial submission to ENGINEER, signed and dated, certifying that CONTRACTOR has satisfied CONTRACTOR's obligations under Contract Documents including but not limited to review and approval, verification of products required, field dimensions, adjacent construction work, and coordination of information, with respect to CONTRACTOR's review and approval of that submittal. Unstamped or unsigned submittals will be returned by ENGINEER without action.

G. Except as specified otherwise, for each submittal for review, allow 15 days excluding delivery time to and from CONTRACTOR. Where submittals and the schedule of any work upon which such approval is dependent and subject to review times of the USEPA and MDEQ, schedule submittals to expedite the Contract and in accordance with specified scheduling.

H. At time of each submission, give ENGINEER specific written notice of such variations, if any, that the submittal may have from the requirements of Contract Documents, such notice to be in written communication separate from the submittal; and, in addition, cause a specific notation to be made on each submittal submitted for ENGINEER's review of each such revision.

I. Identify product or system limitations which may be detrimental to successful performance of the completed Works.

J. ENGINEER will review submissions in accordance with the schedule established for each submittal. ENGINEER's review will be only to determine if the items covered by the submittals will, after installation or incorporation in Works, conform to the information given in Contract Documents and be compatible with the design concept of the completed Works as a functioning whole as indicated by Contract Documents. ENGINEER's review will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by Contract Documents), or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate approval of the assembly in which the item functions. Make corrections to each submittal required by ENGINEER, and return the required number of corrected copies of each submittal and submit as required new submittals required by such correction. Direct ENGINEER's specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

K. Promptly revise and resubmit; identify all changes made since previous submission and changes other than those requested by ENGINEER.

L. Promptly distribute copies of reviewed submittals to Subcontractors, Suppliers, and other concerned parties as appropriate. Instruct parties to promptly report any inability to comply with provisions.

M. Submittals received directly from Subcontractors, Suppliers, vendors, or other CONTRACTOR Representatives will be returned by ENGINEER without action.

N. Adjustments made on CONTRACTOR's drawings by ENGINEER are not intended to change the Contract Price. If adjustments affect the Contract Price, state such in writing, as specified elsewhere in the Contract, to ENGINEER prior to proceeding with Works.

O. ENGINEER's review of CONTRACTOR's submittals shall not relieve CONTRACTOR from responsibility for any variation from the requirements of Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of

submission as required in Article 1.2 H of this Section; nor will any review by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of Article 1.2 C of this Section.

P. Where a submittal is required by Contract Documents, any related Works performed prior to ENGINEER's review of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

1.3 PROGRESS SCHEDULES

A. Submit initial detailed progress schedule within 7 days after the date of Notice to Proceed and prior to commencing work at Site. The schedule shall identify on a weekly basis: the size of the work force, anticipated man hours by trade, the type of equipment, the equipment hours for each type of equipment and demobilization. Actual progress of each activity of the Works shall be compared with progress indicated on CONTRACTOR's construction progress schedule no less than once every week by CONTRACTOR and such comparison shall be submitted to ENGINEER for review.

B. Revise and resubmit as required.

C. Submit revised schedules with each Payment Certificate, identifying changes since previous version.

D. If CONTRACTOR believes it necessary or advantageous to change sequence of activities shown on CONTRACTOR's construction progress schedule, submit proposed revisions to ENGINEER for approval. No change shall be made in the order in which work activities are being performed until ENGINEER's written approval for the revised schedule has been obtained. The schedule will be acceptable to ENGINEER as providing an orderly progression of Works to completion within any specified dates identified in Section 01010, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling, or progress of Works nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefore.

E. Submit a horizontal bar chart with separate line for each major section of Works or operation item of work identified in the individual specification Sections, identifying first work day of each week.

F. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities in accordance with the Contract Schedule issued by ENGINEER and identified in Section 01010. Show coordination of interrelated work activities and items. Indicate the early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of Works at each submission.

H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.4 PROJECT ORGANIZATION

A. Within 7 days after the date of Notice to Proceed and prior to mobilization to Site submit to ENGINEER a project organization chart identifying major positions and names of persons

assigned to these positions, including the on-Site Superintendent and Health and Safety Officer and the off-Site project manager.

1.5 QUALITY CONTROL LOGS

A. Record daily quality control activities on a "Daily Quality Control Report". All Site activities, Site inspections, submittals made by material suppliers and field testing of materials shall be recorded along with any unacceptable Site occurrences on a daily basis.

B. The Daily Quality Control Report shall be signed and reviewed by CONTRACTOR and ENGINEER at the completion of each work day.

1.6 SUBMITTALS FOR PROGRESS MEETINGS

A. At least 24 hours prior to scheduled progress meetings submit, as applicable, the following:

1. Updated job progress schedules detailing all activities. Include review of progress with respect to previously established milestones and schedules, major problems and action taken, injury reports, equipment breakdown, material removal.

2. Copies of transport manifests, trip tickets, and disposal receipts for contaminated materials removed from the work area.

3. Weekly copies of Site entry and work area logbooks with information on worker and visitor access.

4. Weekly results of wastewater treatment system effluent monitoring.

5. Weekly results of fugitive air emissions monitoring data.

6. Any other information required by ENGINEER or relevant to the agenda for the upcoming progress meeting.

1.7 SITE LAYOUT PLAN

A. Within 7 days after the date of Notice to Proceed and prior to mobilization to Site, submit Site layout drawings, showing existing conditions and facilities and construction facilities and temporary controls to be provided by CONTRACTOR including but not limited to the following:

1. Existing structures, facilities, wells, surface water drainage features, trees and other plants, grassed areas, agricultural lands, fencing, utilities, roads and survey bench marks and base lines.

2. Temporary access roads.

3. Field offices.

4. Equipment decontamination facility and personnel hygiene/decontamination facility.

5. Temporary parking.

6. The means of ingress and egress and temporary traffic control facilities.

7. Soil stockpiling facility.

8. Weigh scale facility.

9. Exclusion Zone, Contaminant Reduction Zone, Clean Zone, and other zones specified in CONTRACTOR's Site-specific Health and Safety Plan.

10. Silt fences and/or straw bales.

11. Wastewater treatment facility and wastewater retention basin.

12. Any other data deemed pertinent by CONTRACTOR or required by ENGINEER.

1.8 RECORD DOCUMENTS

A. Maintain on Site, 1 set of the following Record Documents; record actual revisions to Works:

1. Drawings.

2. Specifications.

3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by OWNER.

C. Store Record Documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Documents: Legibly mark each item as applicable to record actual construction including:

1. Measured areal and vertical limits of excavations referenced to established bench marks and base lines.

2. Field changes of dimension and detail.

3. Details not on original Drawings.

F. Remove ENGINEER title block from Record Documents generated by CONTRACTOR.

G. Submit documents to ENGINEER prior to Preliminary Acceptance of Works.

1.9 SUMMARY OF MAJOR PROJECT SUBMITTALS

A. In addition to the submittals specified in this Section, submit the following submittals to ENGINEER for review:

Name of Submittal	*Cross-Reference*
Site-specific Health and Safety Plan	Section 01111
Wastewater Management Plan	Section 01500
Soil Excavation and Handling Plan	Section 02220
Transportation and Disposal Plan	Section 02759

END OF SECTION

SECTION 01400

QUALITY CONTROL

1.1 SECTION INCLUDES

A. Quality assurance - control of installation.

B. References.

C. Inspecting and testing laboratory services.

1.2 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over services, Site conditions, and workmanship, to produce Works of specified quality.

B. Comply with specified standards as minimum quality for Works except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform work by persons qualified to produce workmanship of specified quality. Use persons licensed to perform Works where required by these Specifications or Laws and Regulations.

D. Materials furnished and finished or intermediate stages of Works shall be sampled, tested, and inspected as specified in the individual specifications Sections and as required by reference standards.

E. Performance of tests or observations by ENGINEER or OWNER are for the sole benefit of ENGINEER and OWNER and are not intended to replace CONTRACTOR's quality control program. CONTRACTOR is solely responsible for establishing and implementing a quality control program to ensure that Works are in accordance with Contract Documents.

F. It is CONTRACTOR's responsibility to notify ENGINEER when CONTRACTOR believes Works (or intermediate stages or parts of Works) are of specified quality and to permit ENGINEER or OWNER to perform independent tests or analyses.

G. Testing by ENGINEER or failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate OWNER for final acceptance.

1.3 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Notice of Award, except where a specific date is established by code or by individual specification Section.

C. The contractual relationship, duties, and responsibilities of the parties in Contract and those of ENGINEER shall not be altered from Contract Documents by mention or inference otherwise in any reference document.

D. Publications referred to in these Specifications form part of the Specifications to the extent specified in individual specification Sections.

1.4 INSPECTING AND TESTING LABORATORY SERVICES

A. The OWNER may engage the services of an independent inspecting and testing firm to perform inspections, tests, or approvals required by Contract Documents except as otherwise specifically provided in Contract Documents.

B. Employment of independent inspecting and testing firm and services performed by such firm in no way relieves CONTRACTOR of obligation to perform Works in accordance with requirements of Contract Documents.

C. The independent firm engaged by OWNER will perform inspections, tests, and other services specified in individual specification Sections and as required by ENGINEER or OWNER.

D. Inspecting, testing, and source quality control may occur on or off Site.

E. Reports will be submitted by the independent firm to ENGINEER, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Copies will be furnished to CONTRACTOR on request.

F. Furnish to laboratory at designated location, adequate samples of materials proposed to be used which require testing.

G. Cooperate with personnel of independent inspecting and testing firm, and provide safe access to Works.

H. Provide incidental labor and facilities:

1. To provide access to Works to be tested.

2. To obtain and handle samples at Site or at source of products to be tested.

3. To facilitate tests and inspections.

4. To provide storage of test samples.

I. Notify ENGINEER and independent firm 72 hours prior to expected time for operations requiring inspecting and testing services.

J. Make arrangements with independent firm and pay for additional samples and tests required for CONTRACTOR's use.

K. Retesting required because of non-conformance to specified requirements will be performed by the same independent firm on instructions by ENGINEER. Costs for retesting and reinspection

shall be payable by CONTRACTOR to OWNER on demand or OWNER may deduct cost of inspecting or testing charges from monies which are due or may become due CONTRACTOR.

L. If defects or deficiencies are revealed during testing or inspecting, correct such defects and deficiencies.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, heat, telephone service, facsimile service, photocopier, Site communication and water service.

B. Construction Facilities: Temporary facilities including field offices, equipment decontamination facility, personnel hygiene/decontamination facility, emergency first-aid facility, temporary sanitary facilities, soil stockpiling facility, wastewater treatment facility, potable water tanks, temporary access roads and parking.

C. Temporary Controls: Stormwater control, dewatering, erosion and sediment control, noise control, fugitive air emissions control, pollution control, barriers, temporary fencing, security, traffic regulation, progress cleaning and waste removal.

1.2 TEMPORARY ELECTRICITY

A. Provide, maintain, and pay for temporary power service required from local utility source.

B. Electric power is potentially available near the Site entrance. CONTRACTOR shall make all arrangements with the authority having jurisdiction.

C. Route utility line along alignments approved by ENGINEER. Take all necessary precautions to prevent service interruptions due to accidental breakage of utility lines.

D. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power, miscellaneous lighting, heating, wastewater treatment system and all other electrical equipment and facilities needing electricity.

1.3 TEMPORARY HEAT

A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations and to protect Works and material against damage by dampness, cold, and freezing, and to facilitate completion of Works.

B. Provide attendance, fuel, equipment, and material required for temporary heating.

1.4 TELEPHONE SERVICE

A. Except as specified otherwise, provide, maintain, and pay for separate telephone service and equipment including 1 telephone unit and 1 answering machine to each of CONTRACTOR's field office and to ENGINEER's field office at time of mobilization to Site.

B. ENGINEER will pay for own long distance charges only.

1.5 FACSIMILE SERVICE

A. Except as specified otherwise, provide, maintain, and pay for separate facsimile service and a dedicated telephone line to each of CONTRACTOR's field office and to ENGINEER's field office at time of mobilization to Site.

B. ENGINEER will pay for own long distance charges only.

C. Fax Machine: Xerox 7024 or equivalent capable of sending and receiving separate 8 1/2 x 11-inch and 8 1/2 x 14-inch sheets of plain paper.

D. ENGINEER will be responsible for supply of paper for fax machine in ENGINEER's field office.

1.6 PHOTOCOPIER

A. Provide, maintain, and pay for a photocopier for ENGINEER's field office for ENGINEER's exclusive use.

B. Photocopier: Xerox 5028 capable of making photocopies onto 8 1/2 x 11-inch, 8 1/2 x 14-inch, and 11 x 17-inch sheets of plain paper.

C. ENGINEER will be responsible for supply of photocopy paper for photocopier in ENGINEER's field office.

1.7 SITE COMMUNICATIONS

A. Furnish and maintain, for the exclusive use of ENGINEER, a minimum of 3 two-way portable radios for Site communications, capable of clearly transmitting and receiving communications over a 1-mile radius.

B. Radio Frequencies: Same as those set for the radios used by CONTRACTOR.

C. Equip key CONTRACTOR personnel with two-way portable radios. Furnish portable radios as a minimum to the following CONTRACTOR personnel:

1. Superintendent.

2. Health and Safety Officer.

3. Each crew foreman.

1.8 TEMPORARY WATER SERVICE

A. Provide, maintain, and pay for suitable quality water service required for construction operations.

B. Exercise measures to conserve water.

C. Provide, maintain, and pay for suitable bottled drinking water service for each field office.

1.9 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling, and ventilating equipment to maintain ambient temperature of 68 to 72 degrees F, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for meetings, with table and chairs to accommodate 6 persons.

C. Provide separate office trailer, minimum floor area: 400 square feet for use of ENGINEER, equipped and furnished with 1 lockable legal size filing cabinet, 2 office desks, 6 office chairs and 1 plan/reference table. The office shall be lockable. ENGINEER will be provided with lock and keys.

D. Locate office trailers in locations shown on Drawings or as directed by ENGINEER.

E. Clean all office trailers on a weekly basis.

1.10 EQUIPMENT DECONTAMINATION FACILITY

A. Prior to commencing work involving equipment contact or vehicle contact with potentially contaminated materials, construct an equipment decontamination facility which at a minimum shall be in accordance with the details shown on Drawings and which when completed will accommodate the largest piece of on-Site equipment. Alternatively, the existing concrete decon pad may be used if deemed adequate by CONTRACTOR. Such pad shall be furnished to CONTRACTOR on an as-is-where-is basis. CONTRACTOR shall be fully and completely responsible for making improvements to existing pad as necessary.

B. Submit equipment decontamination facility design for review prior to commencing construction. Releases from equipment decontamination facility shall be the sole responsibility of CONTRACTOR. If CONTRACTOR requires additional measures regarding construction of equipment decontamination facility, such measures shall be implemented as determined necessary by CONTRACTOR.

C. Provide and maintain equipment decontamination facility including sufficient tarpaulins which are capable of covering the equipment decontamination facility during periods of heavy precipitation.

D. Provide, operate, and maintain suitable portable, high-pressure, low-volume decontamination wash unit equipped with self-contained water storage tank and pressurizing system.

E. Wash Unit: Capable of heating and maintaining wash waters to 180 degrees F and providing a nozzle pressure of 150 psi.

F. At a minimum, perform the following steps during equipment decontamination:

1. Mechanically remove packed dirt, grit, and debris by scraping and brushing without the use of steam or high-pressure water to reduce the amount of water needed and to reduce the amount of contaminated rinsate generated.

2. Use high-pressure, low-volume, hot water or steam supplemented by Alconox as appropriate and as approved by ENGINEER.

3. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages.

4. Scrub surfaces with long handle scrub brushes and a cleaning agent.

5. Rinse off and collect cleaning agent.

6. Air dry equipment in the Clean Zone before removing from Site or travel on clean areas.

7. Perform an assessment to determine the effectiveness of the decontamination as directed by ENGINEER.

G. Maintain an inspection record on Site which includes:

1. Equipment descriptions with identification numbers or license plates.

2. Time and date entering the decontamination facility.

3. Time and date exiting the decontamination facility.

4. Name of the inspector with comment stating that decontamination was performed and completed.

H. Each piece of equipment may be inspected by ENGINEER after decontamination and prior to removal from Site and/or travel on clean areas. ENGINEER will have right to require additional decontamination to be completed if deemed necessary.

I. Take appropriate measures necessary to minimize the drift of mist and spray during decontamination including the provision of wind screens.

J. Collect decontamination wastewaters and sediments which accumulate on the equipment decontamination pad.

K. Transfer and treat decontamination wastewater through CONTRACTOR's on-Site wastewater treatment facility.

L. Transfer sediments to transportation vehicles for disposal at OWNER's approved off-Site disposal facility.

M. Furnish and equip properly trained personnel engaged in equipment decontamination with protective equipment.

N. At all times have on hand sufficient pumping equipment, of adequate pumping capacity and associated machinery and piping in good working condition for ordinary emergencies, including power outage, and have available competent workers for the operation of the pumping equipment. Maintain piping and connections in good condition and leak-free. Contain, collect, and clean up spills or releases which occur at Site at no additional cost to OWNER.

1.11 PERSONNEL HYGIENE/DECONTAMINATION FACILITY

A. Provide, operate, and maintain a Personnel Hygiene/Decontamination Facility which complies with the requirements of 29 CFR 1910.141 and contains, as a minimum, the following:

1. A room where personal safety equipment and protective clothing can be stored.

2. A room where personnel can eat or drink.

3. Boot washing facility and boot rack for washed boots to drain.

4. Containers for storage of spent disposable personnel safety and protective equipment.

B. Perform initial personnel decontamination prior to entering the personnel hygiene/decontamination facility on the decontamination corridor established at each work area. Provide a boot wash, glove wash, refuse containers, and other items required for the initial decontamination of personnel.

C. Store wastewater from decontamination of personnel separately from wastewaters generated from toilet facilities. Provide off-Site disposal of sanitary wastewaters.

D. Collect, transfer and treat personnel decontamination wastewater through CONTRACTOR's on-Site wastewater treatment facility or provide proper off-Site transportation and disposal as specified.

E. Provide sufficient sanitary facilities for workers in accordance with governing regulations and ordinances or portable toilets, as specified in Section 01500, Article 1.13.

F. Post notices and take such precautions as required by local health authorities. Maintain the Personnel Hygiene/Decontamination Facility and premises in a clean and sanitary condition.

1.12 EMERGENCY FIRST-AID

A. Provide, operate, and maintain an Emergency First-Aid Facility which complies with the requirements of 29 CFR 1910.141 and contains, as a minimum, the equipment specified in Section 01111, Article 1.7 H. Locate the Emergency First-Aid Facility within the Personnel Hygiene/Decontamination Facility.

1.13 TEMPORARY SANITARY FACILITIES

A. Provide and maintain temporary sanitary facilities and enclosures in accordance with OSHA. Provide a minimum of 2 portable sanitary toilets. In lieu of portable sanitary toilets, the CONTRACTOR may provide toilets housed within the Personnel Hygiene/Decontamination Facility which are connected to separate waste collection tanks.

B. Remove and dispose of sanitary wastes off Site on a periodic basis as required and in accordance with applicable Laws and Regulations.

1.14 SOIL STOCKPILING FACILITY FOR POTENTIALLY HAZARDOUS TSCA SOILS

A. Prior to commencing work involving excavation of contaminated soils, construct a temporary soil stockpiling facility in accordance with the details shown on Drawings to accommodate a minimum of 500 cubic yards of soils.

B. Submit temporary soil stockpiling facility design for review prior to commencing construction.

C. Provide and maintain temporary soil stockpiling facility including sufficient tarpaulins which are capable of covering the stockpiled soils. Releases from temporary soil stockpiling facility shall be sole responsibility of CONTRACTOR. If CONTRACTOR requires additional measures regarding construction of soil stockpiling facility, such measures shall be implemented as determined necessary by CONTRACTOR.

D. Provide, operate and maintain all necessary equipment, pumps and piping required to collect and transfer any stormwater accumulated within the temporary soil stockpiling facility to the wastewater storage tank.

E. Collect, transfer and treat stormwater through the on-Site wastewater treatment facility or provide off-Site transportation and disposal as specified.

F. Provide, operate and maintain all necessary equipment to transfer stockpiled soils to appropriate haulage units for transportation to OWNER, USEPA, and MDEQ-approved off-Site disposal facility.

1.15 WASTEWATER TREATMENT MANAGEMENT

A. Submit to ENGINEER within 7 days after the date of the Notice to Proceed, a Wastewater Management Plan. This plan shall, at CONTRACTOR's option, identify provisions for either on-Site treatment or off-Site treatment at a commercial treatment facility.

B. Off-Site Treatment

1. Plans for off-Site treatment shall provide for the temporary storage of wastewater generated from dewater from decontamination of personnel and equipment, existing surface water within on-Site areas requiring excavation, and any surface water/precipitation which accumulates within the equipment decontamination facility and the temporary soil stockpiling facility.

2. Wastewater storage tanks shall be sized to accommodate a volume sufficient to manage all wastewater and ensure dewatering of excavations.

3. CONTRACTOR shall provide all labor and equipment to operate the wastewater storage facilities in accordance with the Wastewater Management Plan.

4. Accumulated wastewater shall be sampled and profiled in accordance with provisions of Section 02759, Article 3.2.

5. All off-Site transportation and disposal shall comply with Section 02759.

C. On-Site Treatment:

1. Permitting: CONTRACTOR shall obtain and provide permitting for the operation and discharge of the temporary wastewater treatment facility in accordance with NPDES requirements and/or Act 245, Parts 4, 9, 21, and 22 groundwater discharge criteria.

2 Design and Operating Criteria:

1. Design wastewater treatment facility capable of treating wastewater generated from dewatering of excavations, wastewater from decontamination of personnel and equipment, existing surface water within on-Site areas requiring excavation, and any surface water/precipitation which accumulates within the equipment decontamination facility and the temporary soil stockpiling facility.

2. The wastewater treatment facility shall be sized for a flow rate corresponding to the estimated daily treatment requirements.

3. Wastewater treatment facility shall be designed to remove the physical and chemical characteristics needed to meet effluent permit limitations.

4. Design and construct wastewater treatment facility to operate as a parallel system as shown on Drawings.

5. Ensure sufficient pressure gauges, valves, and all other miscellaneous monitoring and control systems are in place to ensure efficient operation and maintenance.

6. Design construct and operate to ensure that discharges from the wastewater treatment facility are in compliance with effluent limits established by either NPDES permit and/or Act 245.

3 Installation:

1. Provide all labor, materials, and equipment and do all work necessary or required for the setup and construction of the wastewater treatment facility and associated equipment at Site.

2. Prepare designated area for the wastewater treatment facility.

3. Install component systems in accordance with installation procedures and drawings developed by CONTRACTOR.

4. Following installation of the complete system, implement an initial operation test in accordance with the procedures developed by CONTRACTOR and submitted to ENGINEER for review.

5. Install piping in accordance with manufacturer's instructions; test for leakage using potable water prior to commencing treatment operations.

4 Operation:

1. During treatment of wastewater, collect discrete grab samples for wastewater parameter analysis on a weekly basis. Collect discrete grab samples from sampling

ports located between each set of carbon units connected in series. Collect and analyze samples in accordance with the protocols specified in the Wastewater Management Plan. Submit the results of the weekly grab samples to ENGINEER, within 4 days of sample collection.

2. On the basis of the analytical results obtained by CONTRACTOR, make system modifications required for the effluent to satisfy the effluent criteria in accordance with permit requirements.

3. Operate the wastewater treatment facility by experienced, qualified personnel in accordance with the manufacturer's instructions and procedures submitted by CONTRACTOR and reviewed by ENGINEER.

1.16 POTABLE WATER STORAGE TANKS

A. Provide and maintain potable water storage tank(s) with a minimum live capacity of 5,000 gallons on Site and all pipes, hoses, and fittings to adapt to the water supply and to transfer water to work locations.

B. Provide an operating flow control valve in-line near work locations to reduce unnecessary wastage of potable water.

C. Do not use wastewater storage tanks to store or haul potable water.

D. Potable water tanks shall be clean and contaminant free inside and outside.

1.17 TEMPORARY ACCESS ROADS

A. Construct and maintain temporary access roads from public thoroughfares to serve construction area at a width and load bearing capacity to provide unimpeded traffic for construction purposes as CONTRACTOR requires for performance of Works.

B. Provide unimpeded access for emergency vehicles at all times. Maintain sufficient width and turning space.

C. Provide means of removing mud from vehicle wheels before entering public roads.

D. Existing on-Site access roads may be used for construction traffic.

E. Obtain ENGINEER's prior approval for location and extent of temporary access roads.

F. ENGINEER may collect soil samples for chemical analyses from the traveling surfaces of constructed and existing access roads and other clean areas both prior to, during, and upon completion of removal and haul activities. Excavate and dispose of material contaminated by CONTRACTOR's activities in appropriate permitted off-Site disposal facility approved by OWNER, USEPA, and MDEQ.

1.18 PARKING

A. Provide temporary gravel surface parking areas to accommodate construction personnel.

B. Locate parking areas as indicated on Drawings outside the Exclusion Zone and Contaminant Reduction Zone as approved by ENGINEER.

C. Do not allow heavy vehicles or construction equipment in parking areas.

1.19 STORMWATER CONTROL

A. Prevent surface water runoff from leaving excavation areas, the equipment decontamination facility, the temporary soil stockpile facility, and other work areas with potentially contaminated materials. Ensure that surface water runoff does not occur from a potentially contaminated area to a clean, remediated or excavated area. Surface water runoff that comes in contact with potentially contaminated material, will be considered a contaminated wastewater that CONTRACTOR shall treat in accordance with CONTRACTOR's Wastewater Management Plan as specified in Article 1.16 of Section 01500.

B. Use berms, ditches, sandbags, or other methods approved by ENGINEER to prevent surface water from coming into contact with potentially contaminated material.

C. Direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.

D. Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, the equipment decontamination facility, the temporary soil stockpile facility, and other work areas free from water.

E. Prevent precipitation from infiltrating or from directly running off stockpiled contaminated materials. Cover stockpiled contaminated materials with an impermeable liner during periods of work stoppage including at the end of each working day and as directed by ENGINEER.

F. Contain water from stockpiled contaminated materials and transfer the collected water to the wastewater storage tank(s) separate from the wastewater from the Personnel Hygiene/Decontamination Facility.

1.20 DEWATERING

A. Groundwater that enters the excavation areas and comes in contact with potentially contaminated material will be considered a contaminated wastewater, CONTRACTOR shall treat such water and disposal shall comply with Section 02759.

B. Maintain a dry excavation, up to and including an engineered dewater system subject to approval by ENGINEER.

C. Employ construction methods, plant, procedures, and precautions that will ensure excavations, are stable, free from disturbance, and dry.

D. Construction Methods: Includes sheeting and shoring; berming; groundwater control systems; well points; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and any other measures necessary to enable the whole of Works to be carried out in the dry.

E. Provide sufficient and appropriate labor, plant, and equipment necessary to keep Works free of water including standby equipment necessary to ensure continuous operation of dewatering system.

F. Maintain the flow of water in all water courses passing through Site. This may include diverting the flow around the area to be excavated. In the event that any emergency or situation should arise which requires interruption of normal operation of any existing drains, CONTRACTOR shall direct and restore normal operation as soon as possible even though permission for such planned shutdown was obtained.

G. Take precautions necessary to prevent uplift of any structure, culvert or pipeline and protect excavations from flooding and damage due to surface runoff.

1.21 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

B. Minimize amount of soil exposed at one time. Stabilize disturbed soils as quickly as practical. Strip vegetation, regrade, or otherwise develop in such a way as to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as directed by ENGINEER.

C. Provide and maintain temporary measures which may include, but are not limited to, silt fences, straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and any other construction technique required to prevent erosion and migration of silt, mud, sediment, and other debris off of Site or to other areas of Site where damage might result or that might otherwise be required by Laws and Regulations. Make sediment control measures available at all times during construction. Place silt fences and/or straw bales in ditches to prevent sediments from escaping from the ditch termination.

D Plan construction procedures to avoid damage to work or equipment encroachment onto water bodies or drainage ditch banks. In the event of damage, promptly take action to mitigate the effects of such damage. Restore the affected bank or water body to its existing condition.

E. Installation:

1. Construct temporary erosion control items in reasonable close conformity with the typical sections and elevation controls shown on Drawings. Actual alignment and/or location of the various items as directed by ENGINEER.

2. Do not construct straw bale barriers and silt fence in flowing streams or in swales where there is the possibility of a washout.

3. Check erosion and sediment control measures weekly and after each rainfall. During prolonged rainfall, check daily.

4. Straw bales and/or silt fence may be removed at the beginning of the work day, but must be replaced at the end of the work day.

5. Whenever sedimentation is caused by stripping vegetation, grading, or other development, remove sediment from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.

6. Prior to or during construction, ENGINEER may require the installation or construction of improvements to prevent or correct temporary erosion and/or sediment control conditions on Site. Improvements may include berms, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes guardrails, temporary roads, and other measures appropriate to the specific condition. All temporary improvements shall remain in place and in operation until otherwise directed by ENGINEER.

7. Pay close attention to the repair of damaged bales, end runs, and undercutting beneath bales.

8. Unless otherwise specified on Drawings, or directed by ENGINEER, remove all erosion and/or sediment controls upon completion of Works. Spread non-contaminated accumulated sediments to form a suitable surface for seeding or dispose of, and shape the area to permit natural drainage; all to the satisfaction of ENGINEER. Removed materials become the property of CONTRACTOR.

F. Backfill and/or regrade work areas by selective placements to avoid erosive surface silts or clays.

G. Do not disturb existing embankments or embankment protection.

H. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

I. Unless specified otherwise, provide erosion and sediment control in accordance with State of Michigan regulations.

J. If soil and debris from Site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in ENGINEER's determination it is undesirable, remove such accumulation and dispose of off Site and restore the area to its original and functional condition.

1.22 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise from machinery, motors, pumps and noise produced by construction operations.

B. If machinery, motors, pumps, and other similar equipment must be operated beyond normal working hours, keep the noise below a level acceptable to ENGINEER by housing the equipment as necessary.

C. Equip vehicles and equipment with efficient muffling devices. Provide and use devices that will minimize noise levels in the construction area. Adhere to local noise bylaws.

D. Sustained sound levels from Site activities shall not exceed 75 dB above background levels, at the nearest residence from the work area.

1.23 FUGITIVE AIR EMISSIONS CONTROL

A. Provide and maintain fugitive air emissions control measures such as a water misting system as required to prevent the generation of fugitive air emissions.

B. ENGINEER may stop work at any time when CONTRACTOR's control of fugitive air emissions is inadequate for the wind conditions present at Site, or when the fugitive air emissions monitoring indicates that the release of fugitive air emissions from Site equals or exceeds the specified levels.

C. Implement fugitive air emissions control measures immediately as necessary during construction and in accordance with State of Michigan regulations Rule 373 and the action levels specified in Section 01111.

D. Use potable water for fugitive air emissions control.

E. Do not use chemical means for dust and particulate control without ENGINEER's prior written approval.

F. As a minimum, use appropriate covers on trucks hauling fine or dusty material and use watertight vehicles to haul wet materials.

G. Control dust so as not to be a nuisance to adjacent property owners or occupants.

H. In the event that CONTRACTOR's dust control is not sufficient for controlling dusts from Site, work shall be discontinued and a meeting shall be held between ENGINEER and CONTRACTOR to discuss the procedures that CONTRACTOR proposes to resolve the problem. Make all necessary changes to operations prior to resuming any excavation, handling, processing, or any other work that may cause a release of dusts.

1.24 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

B. Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on Site.

C. Promptly report spills and releases potentially causing damage to the environment to:

1. Authority having jurisdiction or an interest in the spill or release including any conservation authority, water supply authorities, drainage authority, road authority, fire department, etc.

2. The owner of the pollutant, if known.

3. The person having control over the pollutant, if known.

4. ENGINEER.

D. Contact the manufacturer of the pollutant if known and ascertain the hazards involved, precautions required, and best measures to be used in any cleanup or mitigating action.

E. Take immediate action using available resources to contain and mitigate the effects on the environment and persons from any spill or release.

F. Implement control measures for volatile organic compounds (VOCs) as necessary during construction and in accordance with the action levels specified in Section 01111.

1.25 BARRIERS

A. Provide and maintain barriers to prevent unauthorized entry to construction and excavation areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Ensure that open excavations are flagged and barricaded daily as required for safety and as a minimum prior to leaving Site at the end of each work day.

C. Provide protection for plant life designated to remain. Restore disturbed vegetation to original condition.

1.26 TEMPORARY FENCING

A. Construction: Standard snow fence.

B. Provide temporary snow fencing around construction Site to delineate work areas as specified in Section 01111.

C. Enforce and require that workers observe and respect the limits marked with temporary fencing.

1.27 SECURITY

A. Provide security and facilities to protect Works and Site from unauthorized entry, vandalism, or theft.

B. Maintain security program throughout construction period until demobilization from Site.

C. Restrict access of persons and vehicles into Site when there are no on-Site activities.

D. Allow entrance only to authorized persons with proper identification.

E. Maintain log of workers and visitors and make available to ENGINEER on request. Include date, name, address, company employed by, company/person visited, time in and time out for each

person, and record of deliveries and security incidents. Visitors shall be required to have written proof of successfully completed 40-hour and/or 8-hour OSHA courses and proof of the OSHA medical documentation requirements in accordance with the Site-specific Health and Safety Plan prior to gaining access to Exclusion Zones or Contaminant Reduction Zones.

F. Control entrance of persons and vehicles related to CONTRACTOR's operations.

G. Do not allow cameras on Site or photographs taken except by prior written approval of OWNER or ENGINEER.

H. If unauthorized personnel are observed on Site, notify ENGINEER and, if so directed by ENGINEER, call upon the appropriate law enforcement officials for proper legal actions.

I. Do not permit visitors to enter Exclusion Zones and Contaminant Reduction Zones without the express permission of Health and Safety Officer and ENGINEER; require visitors to complete training in accordance with the Site-Specific Health and Safety Plan prior to gaining access to Exclusion Zones and Contaminant Reduction Zones.

J. Check that the perimeter fencing and temporary fencing/barriers are secure and intact on a daily basis; if deterioration of fencing is observed, bring the situation to the attention of ENGINEER and correct deterioration promptly.

K. Keep access gate to Site closed except for passage of authorized personnel and vehicles.

1.28 TRAFFIC REGULATION

A. Control vehicular parking to prevent interference with public traffic and access by emergency vehicles.

B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

D. Consult with authority having jurisdiction, establish thoroughfares to be used for haul routes and Site access.

E. Confine construction traffic to designated haul routes.

1.29 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, trash, and rubbish. Maintain Site in a clean and orderly condition throughout the Contract.

B. Pickup garbage, litter, debris, and other materials attributable to Works or the activities of CONTRACTOR's employees, Subcontractors, and Suppliers that accumulates on property in the vicinity of Site.

C. Collect waste materials, debris, and rubbish from Site and dispose of off Site at minimum weekly.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Final decontamination.

D. Final removal.

E. Off-Site disposal.

1.2 CLOSEOUT PROCEDURES

A. Submit written notice to ENGINEER that the entire Works or an agreed portion thereof is complete and ready for ENGINEER's inspection prior to Preliminary Acceptance of Works.

B. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for ENGINEER's review.

1.3 FINAL CLEANING

A. Clean Site.

B. Remove surplus materials from Site.

C. Dispose of non-contaminated litter and rubbish at a sanitary landfill approved by ENGINEER.

D. Removal of miscellaneous surface debris including drums, existing buildings, construction materials and abandoned trailers and contents. Includes removal of interior fencing and former decontamination pad indicated on Drawing 4.

1.4 FINAL DECONTAMINATION

A. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to removal from Site.

B. Perform decontamination as specified in Section 01500 to the satisfaction of ENGINEER. ENGINEER will have right to direct CONTRACTOR to perform additional decontamination if required.

1.5 FINAL REMOVAL

A. Temporary utilities, equipment and materials, construction facilities, and temporary controls:

1. Remove temporary utilities, equipment and materials, construction facilities, temporary controls from Site.

2. Clean and repair damage caused by installation, use, or removal of temporary controls.

B. Sanitary Wastewater: Transfer tank contents to sanitary liquid waste transportable tankers as necessary. Perform transfer of liquids in a manner that will minimize the potential for air emissions, spills, and Site contamination. Following emptying of the sanitary wastewater tank, decontaminate the tank interior with a steam or high-pressure water wash supplemented by detergent (Alconox). Dispose of rinse water generated as part of this cleaning as wastewater.

C. Decontamination Wastewater: Utilize on-Site wastewater treatment facility to treat stored decontamination wastewater or dispose of off Site in accordance with Section 02759. Empty wastewater storage tank and decontaminate tank interior with a steam or high pressure washer.

D. Drum Contents: Consolidate waste from drums for disposal in bulk. Drums containing soils will be emptied and stockpiled in Soil Stockpiling Facility for sampling, characterization and disposal. Wastewater will be processed through on-Site treatment system or disposed of off Site in accordance with Section 02759.

1.6 OFF-SITE DISPOSAL

A. Dispose of, at an appropriate RCRA Subtitle D off-Site facility as identified by CONTRACTOR and approved by OWNER, MDEQ, and USEPA, the following materials:

1. Debris including non-contaminated litter and rubbish.

2. Tyvek and disposable PPE worn during demobilization and Site closure.

3. Construction facilities and temporary control materials.

4. Building and construction debris, decontaminated drums and fencing materials.

B. Dispose of all materials in accordance with Section 02759.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING, AND GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clearing and grubbing.

B. Removal of miscellaneous surface debris.

C. Excavating contaminated soils.

D. Backfilling non-contaminated soils.

E. Backfilling of soils contaminated below commercial cleanup levels.

F. Grading excavation areas.

1.2 REFERENCES

A. Section 01400 - Quality Control: Requirement for References.

1.3 DEFINITIONS

A. Clearing: Felling, trimming, and cutting of trees and other vegetation designated for removal, including downed timber occurring in the areas to be cleared into manageable lengths and staging on or off Site at a location approved by ENGINEER. Chip all shrubs, branches, brush and vegetation and place wood chips at an on-Site location approved by ENGINEER.

B. Grubbing: Removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.

C. Excavation: Removal of all materials of whatever nature encountered, whether wet, frozen, or otherwise, including dense tills, hardpan, frozen materials, cemented materials, concrete and asphalt pavement, boulders or rock fragments, and weathered rock which can be removed by ripping or excavating with heavy-duty mechanical construction equipment without drilling and blasting.

D. Excavation Limits: Areal excavation limits shown on Drawings to the specified depth or as directed by ENGINEER and does not include areas shown as being on hold pending further sampling and analysis by ENGINEER.

E. Additional Excavation: Excavation beyond the initial excavation limits either areally or in depth, as directed by ENGINEER following sampling and analysis.

F. Contaminated Soil: Soil containing constituents at concentrations greater than Site-specific cleanup levels.

1. Commercial Contaminated Soils: Soil containing constituents at concentrations greater than Site-specific residential cleanup levels but less than Site-specific industrial cleanup levels.

2. Commercial Contaminated Soils: Soil containing constituents at concentrations greater than Site-specific commercial cleanup levels.

G. Non-Contaminated Soil: Soil containing constituents at concentrations less than Site-specific cleanup levels.

1.4 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. Soil Excavation and Handling Plan: Prior to mobilization to Site, submit a detailed Soil Excavation and Handling Plan demonstrating compliance with specified requirements and to permit ENGINEER to schedule testing and measurement activities. Include written procedures, schedules, and drawings as applicable and, as a minimum, address each of the following items:

1. Methods and procedures which will be used to perform soils excavation in areas both on and off Site.

2. Sequencing and scheduling of excavation, stockpiling and backfilling in excavation areas on Site to optimize the disposal of excavated material, including allowances for time required for sampling and analysis by ENGINEER.

3. Location and sequencing of construction of equipment decontamination facility.

4. Sequencing and layout of temporary access roads to and from excavation areas.

5. Methods and procedures which will be implemented to prevent contaminant tracking and cross-contamination.

6. Methods and procedures which will be used to perform additional excavation in open excavations.

7. Sequencing and scheduling of stockpiling operations.

8. Anticipated crew sizes, manhours, types of equipment, and equipment hours on a weekly basis.

9. Construction facilities and temporary controls specified in Section 01500.

10. Fugitive air emissions control measures to be employed during excavation.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01500 - Construction Facilities and Temporary Controls: Requirements for temporary controls.

B. Modify excavation activities to include groundwater collection, treatment, and discharge if groundwater is encountered.

C. Protect open excavations against damage due to surface runoff and runon. Take necessary precautions to prevent erosion of excavated or disturbed surfaces.

D. Suspend backfilling operations whenever climatic conditions, as determined by ENGINEER, are unsatisfactory for placing fill to the requirements of this Section.

E. After occurrence of heavy rains, do not operate equipment on approved excavations until the material has dried sufficiently to prevent occurrence of excessive rutting.

F. Where excavations have been softened or eroded, remove soft and yielding material or otherwise objectionable or damaged areas and replace with non-contaminated soil as specified by ENGINEER.

G. Decontaminate equipment involved in excavation activities which may have come in contact with potentially contaminated material before being removed from Site or being relocated to clean areas of Site.

H Do not obstruct flow of surface drainage or natural watercourses.

1.6 SEQUENCING AND SCHEDULING

A. Section 01015 - General Requirements: Requirements for coordination.

B. Sequence and schedule excavation activities with work of other Sections.

C. Do not commence excavation operations until the Site-specific Health and Safety Plan has been reviewed by ENGINEER and implemented, and the Equipment Decontamination Facility, Personnel Hygiene/Decontamination Facility and the Wastewater Treatment Facility are constructed and operational.

D. Excavate areas shown on Drawings in an approved sequence. Submit proposed sequencing changes to ENGINEER in writing. Such changes, if approved, will be authorized by ENGINEER in writing.

E. Coordinate and sequence excavation operations to provide for temporary stockpiling and testing of excavated materials. Keep the time during which excavations remain open to the practicable minimum.

F. Do not allow or cause any of work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

G. Unless otherwise specified, advise ENGINEER minimum of 48 hours in advance of excavation operations to enable ENGINEER to take pre-excavation cross-sections.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01015 - General Requirements: Verification of existing conditions before starting work.

B. Excavation Areas: ENGINEER will provide bench mark and base line. Layout the boundaries of contaminated soil excavation as shown on Drawings, to be defined. Revisions to the boundaries of contaminated soil excavation will be determined in the field by ENGINEER, based on visual observations and the analytical results of soil samples collected from the base and sidewalls of the excavations.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities from damage. Confirm locations of buried utilities and structures by careful test excavations or other suitable means.

C. Notify utility companies of Works and confirm utility locations.

D. Construct temporary access roads as necessary.

3.3 CLEARING AND GRUBBING

A. Clear and grub areas required for access to excavation areas necessary for execution of Works.

3.4 EXCAVATING CONTAMINATED SOILS

A. Excavate soils to depths and dimensions as indicated on Drawings and as directed by ENGINEER. Collect and dispose groundwater if encountered.

B. Stockpile non-contaminated overburden soil, as determined by ENGINEER, adjacent to the excavation on Site for later use as backfill material.

C. Stockpile Residential Contaminated Soils, as determined by ENGINEER, at the Soil Stockpile Facility prior to sampling and later use as backfill material.

D. Stockpile Commercial Contaminated materials at the Soil Stockpile Facility prior to sampling, analysis, loading and off-Site disposal.

E. When possible load miscellaneous surface debris and contaminated excavated soils directly into off-Site transportation vehicles.

F. Minimize contamination of the exterior of the transportation vehicles and the loading area. Measures to minimize contamination shall include draping the sides of the transportation vehicles with polyethylene sheeting. After loading, remove the polyethylene sheeting from the sides of the transportation vehicle and place within the transportation vehicle. Cleanup spillage to the satisfaction of ENGINEER.

G. Perform excavation in such a manner that only the excavation bucket and boom contacts contaminated materials.

H. Keep limits of excavation undisturbed and free of loose, soft, or organic matter.

I. Maintain excavation depth tolerances. Unless directed by ENGINEER, excavation in excess of the specified limits shall be considered over-excavation.

J. As determined necessary by CONTRACTOR or as directed by ENGINEER, drain soils, within the excavated area prior to loading for off-Site disposal. Ensure that soils do not exhibit free liquid prior to loading for off-Site disposal.

K. Upon completion of each excavation area as shown on Drawings, ENGINEER will collect verification samples from the areal limits of the excavation as required. Allow ENGINEER 2 working days to collect and have analyzed verification samples from the excavation prior to performing any additional work within the excavation area.

L. If additional excavation is required, excavate to the revised areal limits directed by ENGINEER. Allow 2 working days for ENGINEER to collect and have analyzed additional verification samples from the revised areal excavation limits.

M. Keep excavations open until directed to be backfilled or graded by ENGINEER pending receipt and review of analytical results of samples collected from the excavated surfaces. Following receipt of analytical results, ENGINEER may direct CONTRACTOR to horizontally extend the limits of the excavation, excavate an additional depth of soil, or commence backfilling or grading. For the duration of an open excavation pending analytical results, maintain the excavation free from water and adequately mark the open excavation with flagging and barricades to restrict access until the excavation is properly backfilled and/or graded.

N. Schedule excavation activities in such a manner that access is available to any excavation area for additional excavation as directed by ENGINEER. In returning to an area for additional excavation, comply with the previously specified access road restrictions. Make due allowance in scheduling excavation activities for the time required for sample collection and analysis and for analytical results to be forwarded to ENGINEER. Allow for a laboratory turnaround time of 2 working days (not including weekends or holidays) commencing on the day following sample collection.

O. Decontaminate excavation equipment periodically and as directed by ENGINEER. Decontaminate equipment when visibly contaminated or when moving from a significantly contaminated area to one of lesser contamination for excavation work. Decontaminate equipment prior to performing additional excavation in an excavation previously left open pending sampling and analysis by ENGINEER. ENGINEER will direct additional decontamination when required in the opinion of ENGINEER.

3.5 OVER-EXCAVATING

A. Should unauthorized excavation be carried below the lines and grades indicated on Drawings and in excess of the specified limits and tolerance because of CONTRACTOR's operations including errors, methods of construction, or to suit his convenience, correct unauthorized excavation as follows:

1. Fill under unauthorized over-excavation areas by extending the indicated bottom elevation of the base of the material specified to be placed to the unauthorized excavation bottom without altering the required top elevation and compact as specified unless otherwise directed by ENGINEER.

B. Additional excavation to remove weakened or disturbed soil caused by CONTRACTOR's error, unsuitable construction methods or procedures, or to suit CONTRACTOR's convenience and subsequent additional backfill and compaction to correct deficiencies shall be at no additional cost to the OWNER.

3.6 PROTECTING NON-CONTAMINATED SOIL FROM CONTAMINATION

A. Prevent contamination of adjacent non-contaminated soil.

B. Stockpile contaminated soils for testing at the Soil Stockpile Facility. Non-contaminated stockpiled soils will be considered native fill for the purpose of backfilling and Site grading.

C. Decontaminate excavation equipment after handling contaminated materials and prior to handling non-contaminated overburden. ENGINEER will direct additional decontamination as necessary in the opinion of ENGINEER.

3.7 TEMPORARY STOCKPILING OF CONTAMINATED SOILS

A. Stockpile excavated soils at temporary Soil Stockpiling Facility.

B. Segregate contaminated soils into Residential Contaminated soil and Commercial Contaminated soil. Further segregate Commercial Contaminated soil into soils requiring disposal at a RCRA Subtitle D landfill or at RCRA Subtitle C/TSCA landfill in stockpiles not to exceed 500 cu yd.

C. Allow ENGINEER 2 working days to obtain and have analyzed samples to characterize stockpiled soils.

D. Direct surface water away from soil stockpiling facility to prevent erosion or deterioration of materials.

E. Maintain temporary stockpile slopes not steeper than 1.5 horizontal to 1 vertical.

F. Maintain area surrounding soil stockpiling facility in neat and tidy condition.

G. Cover stockpiled material with approved polyethylene sheeting of minimum 6-mil thickness to withstand adverse weather, wind, and other detrimental forces. Provide total protection of stockpiled material from rain and other adverse weather effects.

H. Dispose of or backfill contaminated stockpiled material as directed by ENGINEER in accordance with Section 02759.

3.8 BACKFILLING

A. Backfill specific on-Site soil excavation areas located in consolidation area to contours and elevations as shown on Drawings with stockpiled residential contaminated soils, as directed by ENGINEER.

B. Backfill specific on-Site soil excavation and fill areas to contours and elevations as shown on Drawings with stockpiled non-contaminated soils and soils from borrow area designated on Drawings or as directed by ENGINEER.

C. Place and compact backfill material in equal continuous layers not exceeding 12 inches compacted depth. Compact each layer of backfill using on-Site heavy construction equipment, as directed by ENGINEER. Apply potable water as necessary during compaction.

D. Place and compact an additional 6 inches of stockpiled non-contaminated soils or soils from borrow area designated on Drawings over consolidation area designated on Drawings or as directed by ENGINEER.

E. Employ a placement method that does not disturb or damage other work.

F. Do not cause excavations to be backfilled until ENGINEER has approved excavation as complete and completed field measurements for payment purposes, and sampling and testing for analytical purposes.

G. Decontaminate equipment which has handled contaminated or potentially contaminated material at the equipment decontamination area prior to being used for backfilling operations.

3.9 GRADING

A. Grade specific soil excavation areas, as directed by ENGINEER, to contours and elevations as shown on Drawings.

3.10 TOLERANCES

A. Excavation Tolerances: Within 6 inches greater or less than specified depth but not uniformly greater or less.

B. Top Surface of Backfilling: Plus or minus 6 inches from required elevations.

3.11 FIELD QUALITY CONTROL

A. Section 01400 - Quality Control: Field inspection and testing.

3.12 CLEANING

A. Clean and reinstate work areas and areas affected by equipment outside areas specified to be excavated, backfilled or graded, to specified restoration condition.

END OF SECTION

SECTION 02759

TRANSPORTATION AND OFF-SITE DISPOSAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Supply, operation, and maintenance of transport vehicles/containers.

B. Preparing transport vehicles/containers for off-Site transportation.

C. Weighing transport vehicles/containers.

D. Decontaminating vehicles/containers prior to leaving Site.

E. Transporting the following materials from Site to approved off-Site disposal facilities:

1. Soils containing PCB concentrations in the range of 26 to less than 50 ppm.

2. Soils containing PCB concentrations greater than or equal to 50 ppm.

3. Wastewater generated and managed for off-Site disposal.

F. Preparation of shipping and manifesting documents including waste profiles, manifests, and bills of lading.

G. Maintaining transportation records as required by regulatory agencies.

H. Acceptance testing.

1.2 REFERENCES

A. Section 01400 - Quality Control: Requirements for references.

B. United States Federal Government - Code of Federal Regulations (CFR):

1. 40 CFR 261 - Identification and Listing of Hazardous Waste.

2. 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste.

3. 40 CFR 263 - Standards Applicable to Transporters of Hazardous Waste.

4. 40 CFR 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal.

5. 40 CFR 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal.

6. 40 CFR 761 - Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.

7. 49 CFR 171 - General Information, Regulations, and Definitions.

8. 49 CFR 172 - Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.

9. 49 CFR 173 - Shippers - General Requirements for Shipments and Packaging.

10. 49 CFR 174 - Carriage by Rail.

11. 49 CFR 176 - Carriage by Vessel.

12. 49 CFR 177 - Carriage by Highway.

1.3 DEFINITIONS

A. RCRA Characteristic Wastes: Materials as defined in 40 CFR 261 Subpart C.

B. PCB Wastes: Materials as defined in 40 CFR 761.

C. Non-hazardous Materials: Materials not regulated by 40 CFR 261 and 40 CFR 761.

1.4 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. Transportation and Disposal Plan: Submit for review and approval a plan for transportation and disposal of materials 30 days prior to transportation and disposal of materials from Site. Include relevant transporter and disposal facility identifications and status, methods of transportation and disposal, contingency plans for spills during transportation, and schedule for transportation and disposal. Identify facility-specific requirements for waste profiling sampling and analyses to determine acceptance for disposal.

C. Letters of Commitment:

1. Include a copy of the letter of commitment from each proposed disposal facility prior to shipping material to the facility. State in each letter:

1. That disposal facility is in compliance with its current and valid permits.

2. That disposal facility can and will accept the materials, contingent upon acceptance of waste profile, proposed for disposal at the facility.

3. Disposal facility restrictions which may cause rejection of transported materials.

4. Additional sampling and analysis of materials which are required prior to delivery to disposal facility.

5. Restrictions on delivery schedules.

2. Each facility shall disclose information concerning existing corrective action programs which may impact the ability of the disposal facility to accept materials from Site.

D. Agency Approvals: Letters of approval from USEPA and applicable State of Michigan agencies which approve the disposal of materials from Site at each proposed disposal facility 14 days prior to off-Site transportation of materials.

E. Operating Licenses and Permits:

1. Include copies of valid operating licenses and permits for each proposed disposal facility 7 days prior to commencing transportation of materials from Site.

2. Include copies of valid operating licenses and permits from each transporter for each proposed transport vehicle/container 15 days prior to entry to Site.

F. Transportation Routes: Submit detailed plans showing transportation routes or alternate routes which will be used to transport materials to each disposal facility 15 days prior to commencing transportation of materials from Site. Comply with applicable federal, state, and local regulations.

G. Shipping and Disposal Documents:

1. Include blank sample forms of proposed shipping and disposal documents at least 14 days prior to use.

2. Include complete copies of waste profiles.

3. Include completed copies of shipping and disposal documents including manifests and/or bills of lading on standard approved forms, including a copy of each form signed by the transporter prior to leaving Site and a copy of each form signed by the disposal facility accepting the shipment. Use shipping and disposal documents of consignment state where so required.

4. Include completed certificates of disposal/destruction/treatment/recycle as applicable and issued by the facility following acceptance and final disposition of the shipment.

H. Supplemental Indemnifications: For each disposal facility which provides a supplemental indemnification (e.g., Superfund Indemnification), obtain such indemnification for the benefit of OWNER. Submit to ENGINEER.

I. Weigh Scales:

1. Include calibration certificates for off-Site weigh scales.

2. Include copies of weigh scale tickets for off-Site weigh scales on approved forms signed by an authorized weigh scale operator including the following information:

1. Location, date, and time of weighing.

2. Measured weights.

3. Vehicle and container identification.

4. Shipment identification number.

J. Analytical Test Results: Include analytical results of acceptance testing for material removed from Site whether performed by or on behalf of CONTRACTOR.

1.5 QUALITY ASSURANCE

A. Perform waste profiling analyses of materials, scheduled for off-Site disposal as required by and to the satisfaction of the operators of the off-Site disposal facilities and federal, state, and local regulations, prior to transport from Site.

B. Sample and analyze materials scheduled for transportation and off-Site disposal to verify that the type and concentration level of contaminants present lie within acceptable ranges established by the approved waste stream description for each of the off-Site disposal facilities. Determine the sampling and analysis requirements with the disposal facility. Sampling and analysis protocols shall be CONTRACTOR's responsibility. Performance or non-performance of sampling and analysis of materials will not relieve CONTRACTOR of the responsibility of ensuring that transported materials will be accepted by the disposal facility. CONTRACTOR is responsible for determining the regulatory classification of materials scheduled for disposal. ENGINEER may perform confirmatory sampling and/or analysis at his discretion.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01500 - Construction Facilities and Temporary Controls: Requirements for temporary controls.

B. Do not spill, leak, or otherwise release materials from transport vehicles and containers during loading and unloading operations or while in transit from Site to the disposal facility.

C. Clean up any and all spills or leaks in transit.

PART 2 PRODUCTS

2.1 POLYETHYLENE SHEETING

A. Continuous sheeting, minimum 0.006 inch (6 mil) thick, fabricated from a single ply of construction grade polyethylene plastic.

2.2 CONTAINERS, PACKING MATERIAL, AND LABELS

A. Comply with DOT, federal, state, and local regulations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01015 - General Requirements: Verification of existing conditions before starting work.

B. Notify ENGINEER sufficiently in advance of intention to commence activities at Site that require attendance by ENGINEER as provided hereinafter.

C. Activities requiring attendance by ENGINEER include:

1. Placement of polyethylene sheeting in transport vehicles/containers.

2. Final securement of loaded materials prior to transport from Site.

3. Decontamination of transport vehicles/containers prior to leaving Site.

D. Do not cover up loaded material prior to ENGINEER's inspection.

3.2 WASTE PROFILING

A. Conduct additional waste profile sampling and analysis as required by disposal facility.

B. ENGINEER may perform confirmatory sampling and/or analysis. Such sampling and/or analysis or failure to perform such sampling and/or analysis by ENGINEER shall not release or reduce CONTRACTOR's obligation to perform Works in accordance with the requirements of Contract Documents. Do not remove materials from Site which have been sampled by ENGINEER and are awaiting analytical results. ENGINEER will receive analytical results within 2 days of ENGINEER's sample collection. ENGINEER will provide copies of ENGINEER's analytical results to CONTRACTOR upon request.

C. Submit to ENGINEER completed waste profile for each waste stream. Waste profile will be signed by OWNER or an authorized agent of OWNER except for materials brought on Site by CONTRACTOR.

D. Submit signed waste profiles to disposal facilities.

E. Return to Site any transported material delivered to a disposal facility which is rejected by the disposal facility.

3.3 SEGREGATION OF MATERIALS

A. Do not segregate materials for disposal until waste profiles are approved by each disposal facility.

B. Segregate and prepare materials for transportation and disposal in accordance with the delivery acceptance requirements of the transporter and disposal facility and governing regulations.

3.4 PREPARATION AND SECUREMENT OF TRANSPORT VEHICLES/CONTAINERS

A. Comply with applicable federal, state, and local regulations concerning shipping materials.

B. Visibly display number for each transport vehicle/container.

C. Clean the receiving box of the transport vehicle/container of loose debris or foreign material. Line the receiving box or container with minimum 1 layer of 6-mil polyethylene sheeting continuous along the bottom and sides for vehicles or containers transporting soils containing PCB concentrations greater than or equal to 50 ppm. Place the sheeting on the floor, run up the sides, and drape over the sideboards. Neatly push the polyethylene sheeting into corners to prevent tearing during loading and transport.

D. Secure materials in transport vehicles/containers in accordance with regulations governing transportation of these materials.

E. Load materials into transport vehicles or containers in a manner which will not damage the properly placed polyethylene sheeting. Limit the freefall of bulk materials being loaded. Place cushioning materials under and around each container for shipments of drummed/containerized materials.

F. Replace damaged sheeting which is incapable of providing containment.

G. Following loading, fold the tub liner over the loaded materials and place an overliner of polyethylene sheeting over the materials prior to securing with an approved tarpaulin in a manner to prevent loss of materials or fugitive dust emissions.

H. ENGINEER will waive the box or container lining requirements where CONTRACTOR can demonstrate, to the satisfaction of ENGINEER, that all of the following conditions are met:

1. The receiving box or container is of leakproof construction and capable of maintaining a leakproof condition.

2. The cover to be placed over the receiving box or container is impermeable and will totally enclose the materials within.

3. The cover to be placed over the receiving box or container will prevent fugitive dust emissions.

4. The receiving box or container is constructed of materials which can be decontaminated.

3.5 DECONTAMINATION

A. Decontaminate transport vehicles and containers at on-Site equipment decontamination pad after loading and prior to leaving Site. Remove material on the tires and axles of trucks and material on the vehicle resulting from loading operations.

3.6 DOCUMENTATION FOR THE TRANSPORTATION OF MATERIALS

A. Document the transport and disposal of RCRA hazardous/TSCA regulated soil waste and wastewater to off-Site facilities on appropriate state and/or federal manifests as required. Prepare, maintain, and furnish ENGINEER with copies of manifests and/or other records for each shipment of materials from Site. Maintain manifests from the time the materials leave Site to the time of release to the disposal facilities. Manifests for the transportation and disposal of materials will be signed by OWNER or an authorized agent of OWNER, except for materials brought on Site by CONTRACTOR.

B. Document the transport and disposal of non-hazardous materials to off-Site disposal facilities on appropriate state and/or federal manifests or bills of lading. Prepare, maintain, and furnish ENGINEER with copies of manifests and/or bills of lading, for each shipment of materials from Site. Maintain manifests or bills of lading from the time the materials leave Site to the time of release to the disposal facilities. Manifests or bills of lading for the transportation and disposal of non-hazardous material will be signed by OWNER or an authorized agent of OWNER, except for materials brought on Site by CONTRACTOR.

3.7 NOTIFICATION

A. Notify applicable federal, state, and local representatives, or authorities having jurisdiction over the route and mode of transport, in advance of commencing transportation.

3.8 PRE-TRANSPORT WEIGHING

A Weigh transport vehicles with and without loaded materials at Site. Perform weighing operations in such a manner that the net weight of loaded materials can be determined to the satisfaction of ENGINEER.

B. Verbally report to ENGINEER the net weight for completion of manifests/bills of lading and obtain verbal approval from ENGINEER prior to commencing transport to the disposal facility. Transport vehicle operators may be instructed by ENGINEER to return to Site following weighing if loads are determined to be excessively light or heavy.

C. Submit written weigh scale receipts to ENGINEER within 24 hours of weighing; ensure weigh scale receipts agree with the verbally reported quantity and manifest/bill of lading quantities.

3.9 TRANSPORTATION

A. Transport material removed from Site directly to the disposal facility approved by ENGINEER. Do not change either the route or mode of transport after commencing off-Site operations without ENGINEER's prior written approval.

B. Comply with applicable requirements of regulatory publications including, but not limited to 49 CFR 171, 49 CFR 172, 49 CFR 173, 49 CFR 174, 49 CFR 176, and 49 CFR 177.

C. Divert any transport vehicle to a commercial independent certified weigh facility as required and directed by ENGINEER.

D. Mark and placard shipments in accordance with DOT, 40 CFR 262, 40 CFR 279, and 40 CFR 761, as applicable.

E. Employ transport vehicle operators trained in conformance with federal, state, and local regulations for hazardous materials haulers.

F. Regardless of regulatory waste classification, materials shall be transported using vehicles licensed to transport hazardous wastes.

3.10 DISPOSAL

A. Make arrangements with disposal facilities for the receipt and acceptance of materials removed from Site.

B. Ensure that materials removed from Site are properly prepared and will be accepted by the disposal facility. Dispose of materials in disposal facilities approved by OWNER, USEPA, and MDEQ, which are in compliance with applicable regulations and permitted to receive materials from Site.

C. Weigh transport vehicles/containers at approved off-Site disposal facility weigh scales both before and after discharging their contents.

D. Such measurements will be used by ENGINEER to verify proper delivery of materials which have been removed from Site and for payment purposes. Transportation to an off-Site facility will be suspended in the event of discrepancy between the net weight as recorded by the on-Site weigh scale and the disposal facility scale.

E. Return to Site any transported material delivered to a facility which is rejected by the facility.

3.11 DISPOSITION OF MATERIALS

A. Select and submit proposals to ENGINEER for the appropriate disposition of all determined wastestreams to be removed from Site in accordance with applicable regulations for each waste stream. CONTRACTOR shall be responsible for disposition of materials to approved off-Site facilities including TSCA landfills and RCRA Subtitle C/D landfills.

B. Do not load materials for transport for disposal without ENGINEER's approval. Do not cover or otherwise obstruct access to materials to be sampled and analyzed by ENGINEER to confirm their appropriate disposition. ENGINEER will provide the analytical results of such sampling and analysis to CONTRACTOR upon request.

3.12 OFF-SITE WASTEWATER TREATMENT FACILITY

A. Dispose of wastewaters not meeting the discharge criteria specified by treatment system permit or if off-Site wastewater management option is selected, at an industrial wastewater treatment facility approved by OWNER.

B. The treatment facility shall have RCRA and/or TSCA permit or RCRA interim status to treat RCRA wastes if wastewater is RCRA/TSCA regulated.

C. The facility shall be inspected and passed by the appropriate federal, state, and local representatives responsible for RCRA and/or TSCA program within 6 months prior to receipt of wastewater under this Contract, as applicable.

D. The facility shall not have any significant regulatory violations or other environmental conditions that could affect its satisfactory operation or its ability to accept wastes from Site during the performance of this Contract. Such regulatory violations include violations under RCRA and/or TSCA or other federal, state, and local regulations.

3.13 TSCA/RCRA SUBTITLE C LANDFILL

A. Dispose of TSCA/RCRA Subtitle C materials at a RCRA Subtitle C/TSCA chemical waste landfill approved by ENGINEER.

B. If on-Site wastewater management option is selected dispose of filter media from CONTRACTOR's wastewater treatment system following closure of the on-Site treatment system, at RCRA Subtitle C/TSCA landfill approved by ENGINEER.

C. The off-Site facility shall be inspected by the appropriate federal, state, and local representatives responsible for RCRA/TSCA program within 6 months prior to receipt of material under this Contract.

D. The facility shall not have any significant regulatory violations or other environmental conditions that could affect its satisfactory operation or its ability to accept materials from Site during performance of this Contract. Such regulatory violations shall include violations under RCRA/TSCA, or other federal, state, and local regulations.

E. Determine the location of materials placed within the landfill and document with respect to permanent horizontal and vertical control points.

F. Submit copies of all appropriate state and /or federal manifests as required in Section 02759, Article 3.6 A.

3.14 RCRA SUBTITLE D LANDFILL

A. Dispose of non-hazardous materials at RCRA Subtitle D landfill approved by OWNER.

B. The facility shall be permitted to receive solid wastes, other than hazardous wastes, by USEPA, MDEQ, and/or all other authorities having jurisdiction.

C. Prepare a report for each shipment of waste materials to the sanitary landfill. Submit report to ENGINEER no later than the next working day following each day's shipment. The report shall contain as a minimum:

1. The total weight of wastes shipped.

2. A description of wastes shipped with bills of loading in accordance with Paragraph 3.6 B.

3. A receipt signed by the landfill operator showing the weight of waste material received in each shipment, the date and time of day each load is discharged, and a brief description of the waste materials.

END OF SECTION

SECTION 02921

SEEDING AND SOIL SUPPLEMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of subgrade.

B. Placing topsoil.

C. Seeding, mulching, and fertilizing.

D. Maintenance.

1.2 REFERENCES

A. Section 01400 - Quality Requirements: Requirements for references.

B. American Society of Agronomy (ASA): Monograph 9 - Mehlich 3.

C. American Society for Testing and Materials (ASTM):

1. D244 - Standard Test Methods for Emulsified Asphalts.

2. D2974 - Standard Test Method for Moisture, Ash and Organic Matter of Peat and Other Organic Soils.

3. D4972 - Standard Test Method for pH of Soils.

D. United States Environmental Protection Agency (USEPA): SW-846 - Test Method for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition.

1.3 DEFINITIONS

A. Weeds: Include, but are not limited to, Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Noxious Weeds: Harmful, undesirable, hard to control:

1. Restricted: May be sold in the trade but are limited to very small amounts as undesirable contaminants.

2. Prohibited: Prohibited from sale.

1.4 SUBMITTALS

A. Section 01300 - Administrative Requirements: Requirements for progress submittals.

B. Seed Certificates: At least 14 days prior to seeding submit certificates from seed vendors for each seed mixture required, stating botanical and common name, percentage by weight and percentages of purity, germination, and weed seed for each species.

C. Fertilizer Certificate: At least 14 days prior to placing fertilizer, submit certificate confirming conformance with specification.

D. Test Results: Submit test results of imported topsoil. Indicate, by test results, information necessary to determine suitability, including, but not limited to, organic content, pH, phosphorus, potassium, calcium, and magnesium; and laboratory or supplier recommendation for fertilizer application rate for specified seed mixture.

1.5 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Requirements for closeout submittals.

B. Maintenance Data: Include maintenance instructions, cutting method, and maximum grass height; and types, application frequency, and recommended coverage of fertilizer.

1.6 QUALITY ASSURANCE

A. Perform work of this Section in accordance with Natural Resource Conservation Service.

B. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.7 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in original sealed containers. Seed in damaged packaging will be rejected. Label containers showing:

1. Analysis of seed mixture.

2. Percentage of pure seed.

3. Percentage of weeds.

4. Year of production.

5. Net weight.

6. Date when tagged and location.

7. Percentage germination.

8. Name and address of distributor.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

C. Deliver mulch in moisture-proof containers showing manufacturer, content, and net weight (air dry).

D. Store materials in accordance with manufacturer's instructions and in a manner to prevent damage or deterioration.

E. Remove from Site seed which has become wet, moldy, or otherwise damaged in transit or storage.

F. Store seed in weatherproof enclosures.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01500 - Temporary Facilities and Controls: Requirements for temporary controls.

B. Do not apply materials over snow, ice, frozen ground, or standing water.

C. Do not apply seed slurry when wind conditions are such that material would be carried beyond designated area or that materials would not be uniformly applied or when wind velocity exceeds 5 miles per hour.

1.10 SEQUENCING AND SCHEDULING

A. Section 01300 - Administrative Requirements: Requirements for coordination.

B. Schedule topsoil placing to permit seeding operations under optimum conditions during normal planting seasons.

C. Coordinate planting with specified maintenance periods to provide maintenance until acceptance by ENGINEER.

D. Seed areas within 10 days of completion of topsoiling.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Mixture of the following:

1. Kentucky Blue Grass: 5 to 10 percent by dry weight.

2. Creeping Red Fescue Grass: 20 to 30 percent by dry weight.

3. Narlea Perennial Rye: 20 to 30 percent by dry weight.

4. Tall Fescue Grass: Remainder to obtain 100 percent by dry weight.

B. Grass Seed: Fresh, clean, new-crop seed harvested previous year complying with the tolerance for purity and germination established by Official Seed Analysis of North America; minimum germination of 75 percent and minimum purity of 97 percent; obtained from an approved seed house.

C. Weed Seed Content: Not over 0.25 percent and free of noxious weeds.

2.2 TOPSOIL

A. Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained Site; free of subsoil, clay or impurities, plants, weeds, and roots; pH value minimum of 5.4 and maximum of 7,organic content minimum of 5 percent and maximum of 20 percent.

2.3 MULCHING MATERIAL

A. Free of weeds and other foreign materials, free of growth or germination inhibiting ingredients; manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material will become uniformly suspended to form a homogeneous slurry; dyed a suitable color to facilitate inspection of the placement of the material. When applied, capable of forming an absorptive mat, which will allow moisture to percolate into the underlying soil.

2.4 FERTILIZER

A. Granular form, dry, free flowing, and free from lumps.

B. Recommended for grass, with 50 percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in analysis specified in Paragraph1.4 D.

2.5 WATER

A. Clean, fresh, and free of any contaminants and substances or matter which could inhibit germination and vigorous growth of grass.

2.6 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Requirements for source testing and analysis of mix formulation for hydroseeding.

B. Analyze topsoil for organic content, pH, potassium, phosphorus, calcium, and magnesium.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01700 - Execution Requirements: Verification of existing conditions before starting work.

B. Verify that prepared soil base is ready to receive work of this Section.

3.2 PREPARATION - SUBGRADE

A. Prepare subgrade to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated soil.

C. Scarify subgrade to a depth of 3 inches where topsoil shall be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

D. Remove surface debris, roots, vegetation, lumps, and stones in excess of 1 inch.

E. Obtain ENGINEER's approval of topsoil grade and depth before starting seeding.

3.3 PLACING TOPSOIL

A. Spread topsoil to a minimum settled depth of 6 to 8 inches over area to be seeded. Rake until smooth.

B. Place topsoil during dry weather and on dry, unfrozen subgrade.

C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.

D. Grade topsoil to eliminate rough, low, or soft areas, and to ensure positive drainage.

E. Install edging at periphery of seeded areas in straight lines to consistent depth.

F. Coordinate with installation of underground sprinkler system piping and watering heads.

3.4 FERTILIZING

A. Apply fertilizer prior to seeding in accordance with laboratory recommendations based on soil analysis by CONTRACTOR and approved by ENGINEER.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING

A. Apply seed at a rate of 150 pounds per acre evenly in 2 intersecting directions. Rake in lightly.

B. Apply seed by broadcasting. Rake in lightly.

C. Do not seed areas in excess of that which can be mulched on same day.

D. Do not sow immediately following rain or when ground is too dry.

E. Apply seed when winds do not exceed 5 miles per hour using equipment suitable for area involved.

F. Measure quantities of material by weight or weight-calibrated volume measurement.

3.6 MULCHING

A. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

B. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.7 OVERLAP

A. Seeding and mulching, temporary cover, and seeding and erosion control blanket shall overlap adjoining vegetation by 12 inches.

3.8 MAINTENANCE

A. Start maintenance immediately after area seeded.

B. Maintain vegetative cover for not less than the period stated below and longer, as required to establish an acceptable stand, as determined by ENGINEER:

1. Not less than 60 days after last area seeded.

2. If planted in fall and not given full 60 days of maintenance, or if not considered accepted by ENGINEER, at completion of 60 days continue maintenance the following spring until acceptable vegetative cover is established.

C. Maintain vegetative cover by watering, fertilizing, weeding, mowing, trimming, overseeding, and other operations such as rolling, regrading, and replanting as required to establish a smooth, acceptable grassed surface, free of eroded or bare areas.

D. Cutting Height: Mow grassed areas as soon as there is enough top growth to cut with mower set at the specified height for the principal species planted. Repeat mowing as required to maintain specified height. Do not remove more than 1/3 of grass height. Do not mow when grass is wet. Time initial and subsequent mowings as required to maintain the following grass height:

1. Mow grass at 4 to 5-inch height. Do not mow lower than 4 inches.

3.9 CLEANING

A. Section 01700 - Execution Requirements: Requirements for cleaning installed work.

B. Clean up immediately, soil, mulch, broken sod, or other debris spilled onto pavement and dispose of deleterious materials.

C. Take precautions and prevent contamination by seeding slurry of structures, signs, guardrails, fences, utilities, or other surfaces not specified to be landscaped.

D. Where contamination occurs, remove seeding slurry to satisfaction of, and by means approved by ENGINEER.

3.10 PROTECTION OF FINISHED WORK

A. Section 01700 - Execution Requirements: Requirements for protecting installed work.

B. Protect landscaped areas from damage.

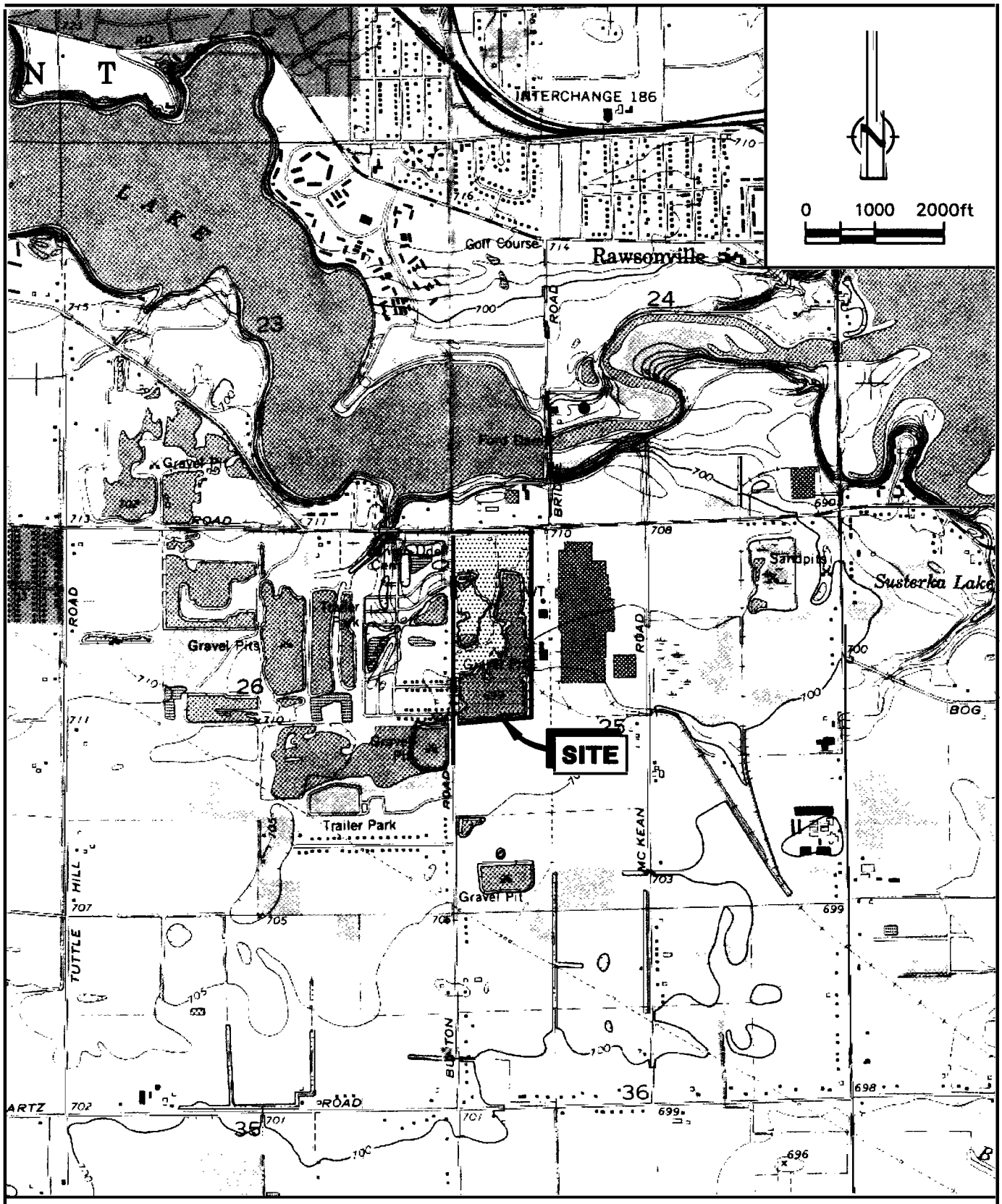
END OF SECTION

ATTACHMENT A

PROJECT DRAWINGS

ATTACHMENT B

ADMINISTRATION ORDER
(NOT PRESENTLY ISSUED)



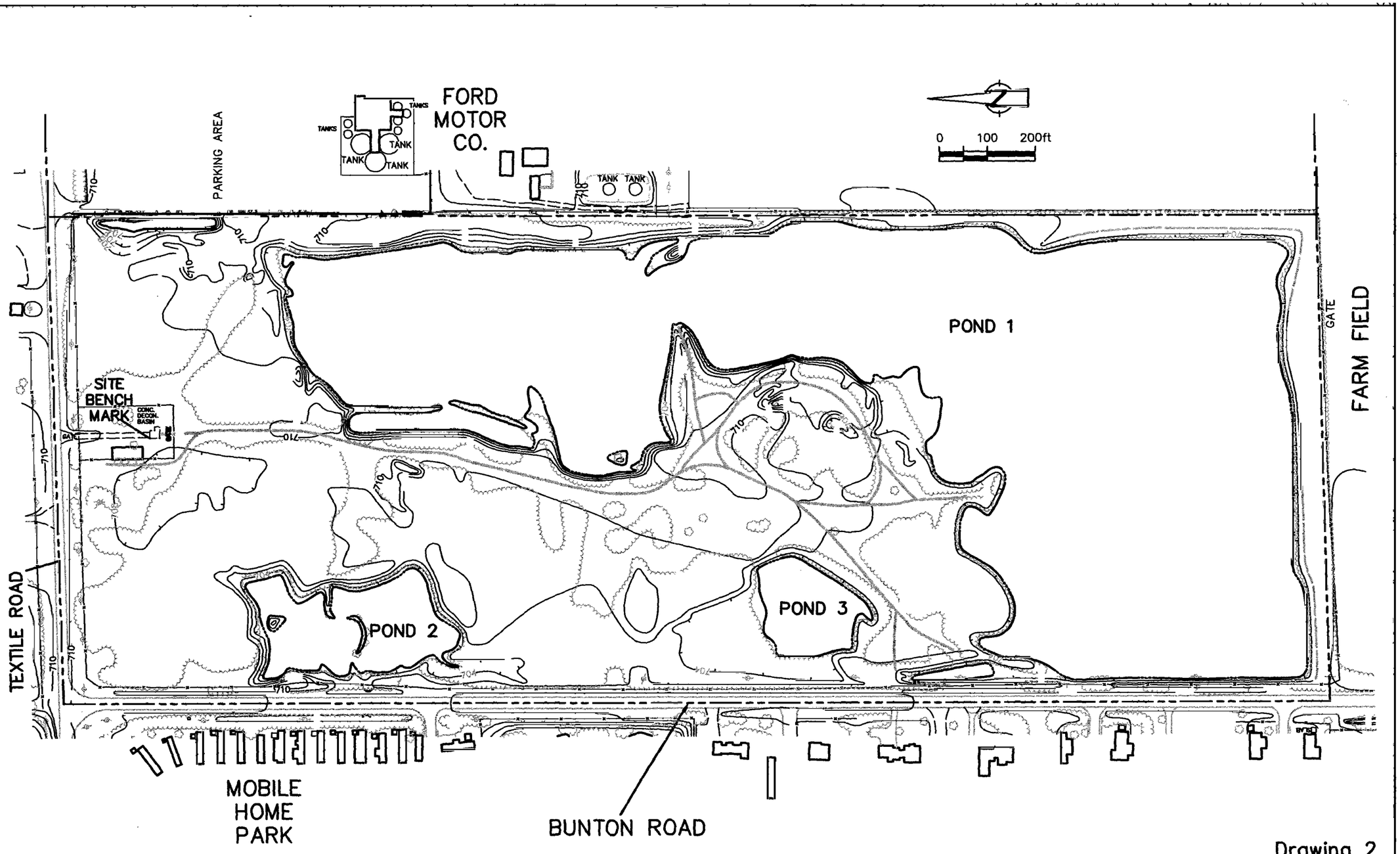
SOURCE: USGS QUADRANGLE MAP,
YPSILANTI EAST, MICHIGAN

CRA

Drawing 1

SITE LOCATION
TEXTILE ROAD SITE
Washtenaw County, Michigan

04770-60(021)GN-WA007 JUL 30/1999

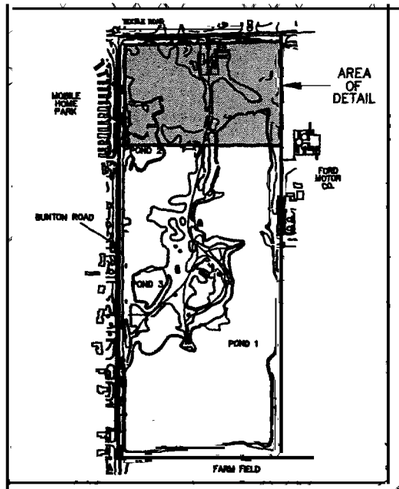


Drawing 2

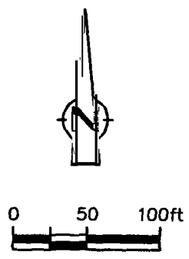
SITE PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

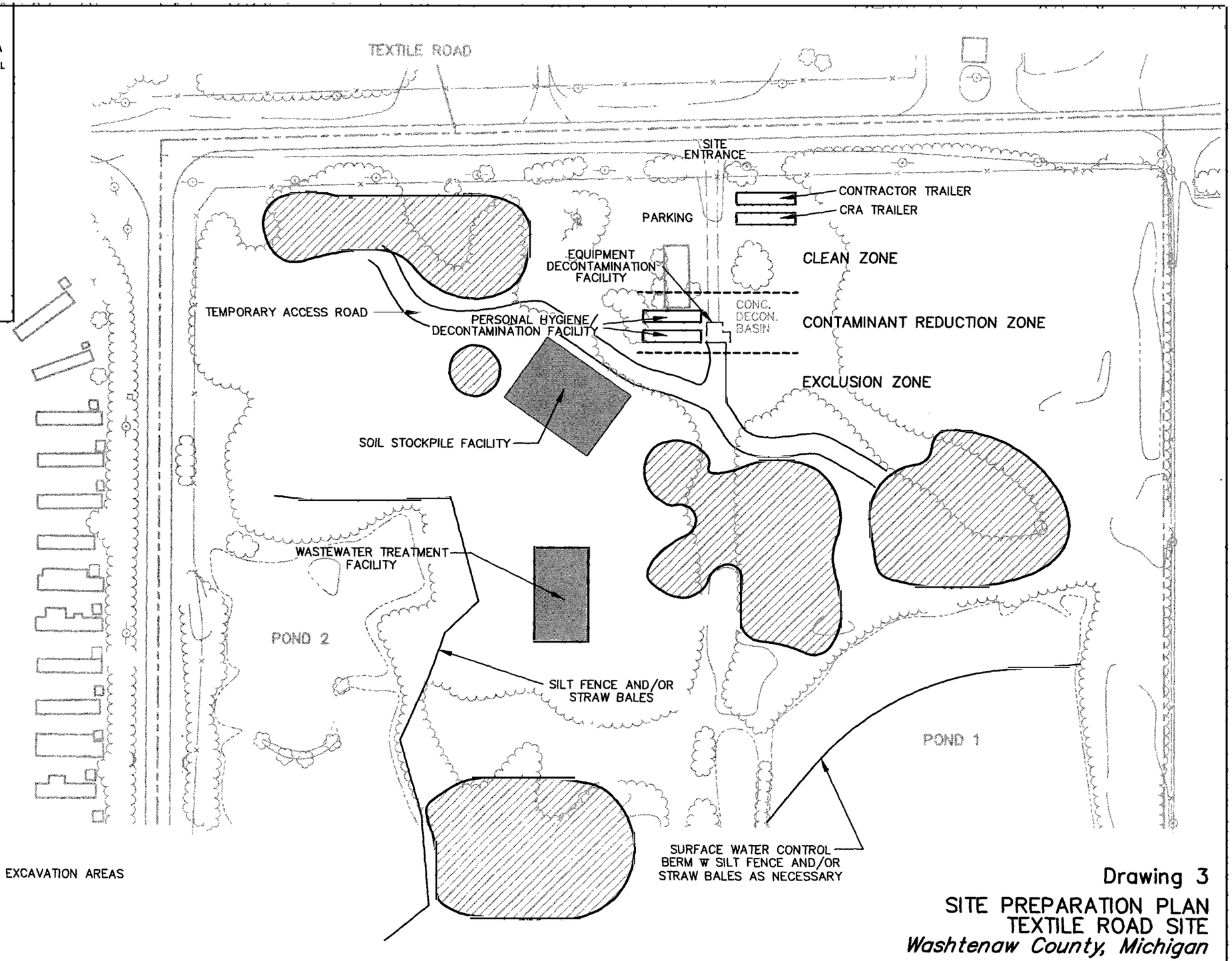
CRA

04770-60(021)GN-WA001 JUL 30/1999



KEY MAP





LEGEND

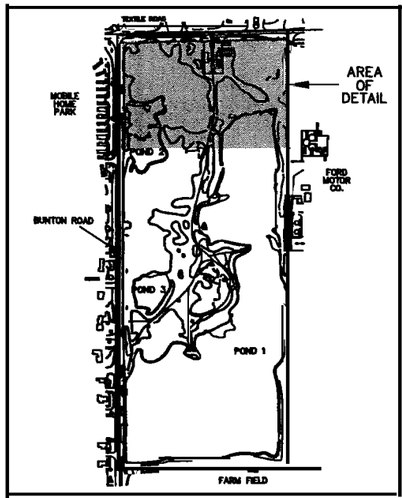
ESTIMATED EXCAVATION AREAS

CRA

04770-60(021)GN-WA002 JUL 30/1999

Drawing 3

SITE PREPARATION PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan



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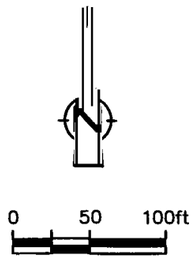


0 50 100ft

TEXTILE ROAD

SITE ENTRANCE

PARKING

CONC. DECON. BASIN

COVER AREA

EXCAVATION AREA 1

EXCAVATION AREA 2

EXCAVATION AREA 3

EXCAVATION AREA 4

EXCAVATION AREA 5

POND 1

POND 2

LEGEND

ESTIMATED EXCAVATION AREAS

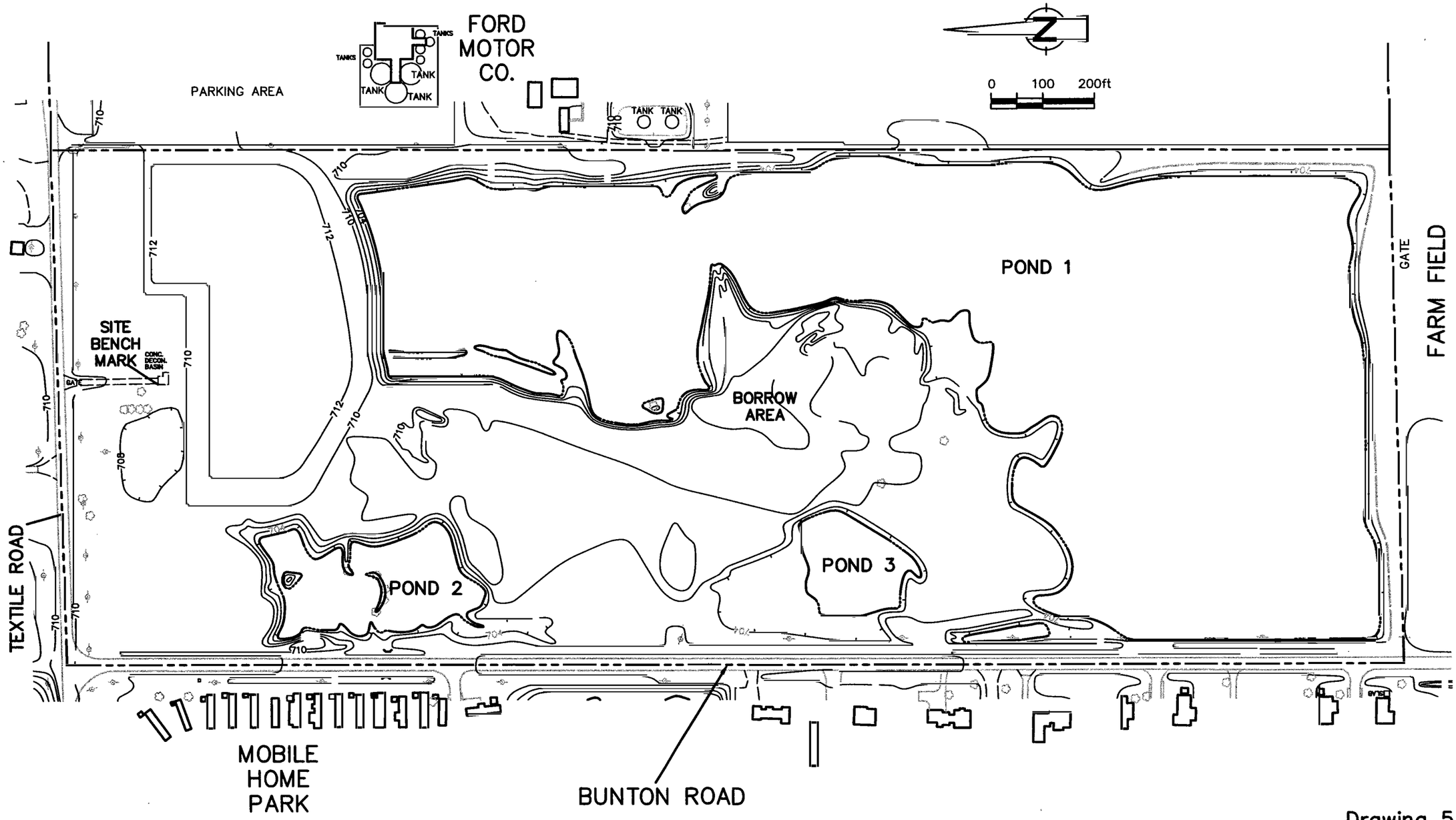
TO BE REMOVED

CRA

04770-60(021)GN-WA003 JUL 30/1999

Drawing 4

PROJECT EXCAVATION AREAS
TEXTILE ROAD SITE
Washtenaw County, Michigan



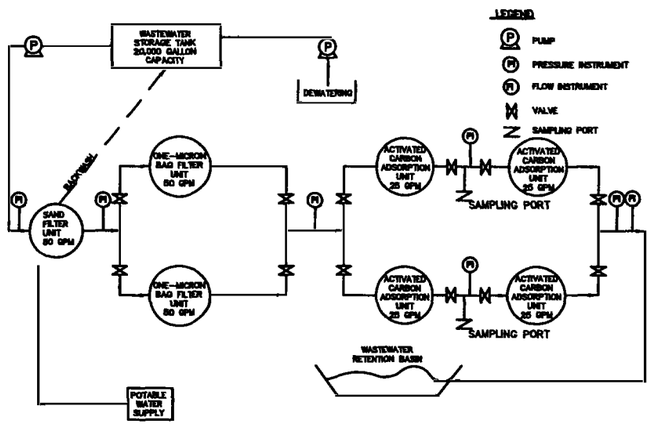
Drawing 5

GRADING PLAN
TEXTILE ROAD SITE
Washtenaw County, Michigan

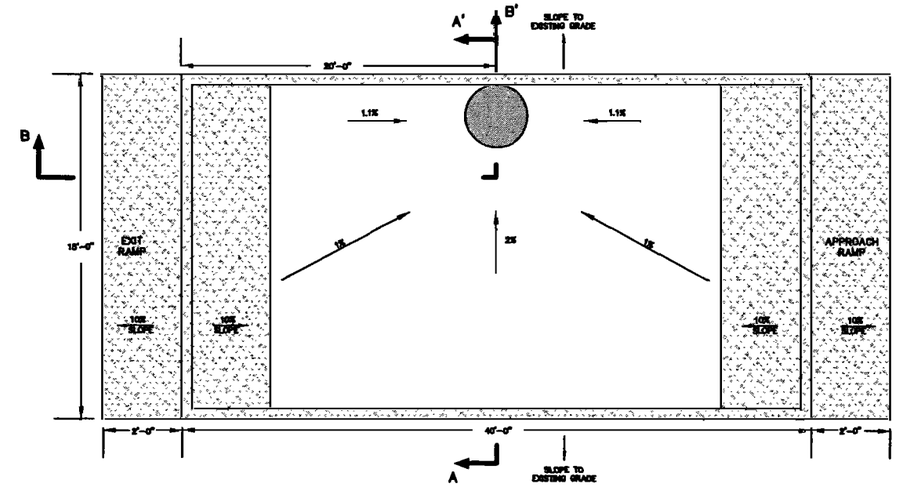
CRA

04770-60(021)GN-WA006 JUL 30/1999

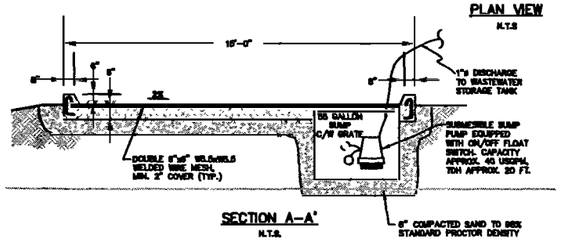
TYPICAL WASTEWATER TREATMENT FACILITY SCHEMATIC



TYPICAL EQUIPMENT DECONTAMINATION FACILITY



PLAN VIEW
N.T.S



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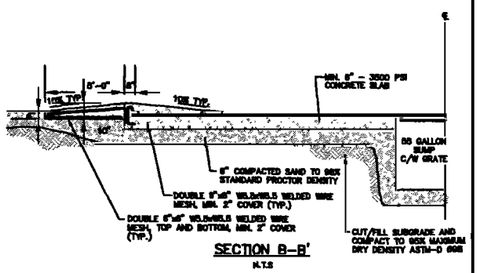
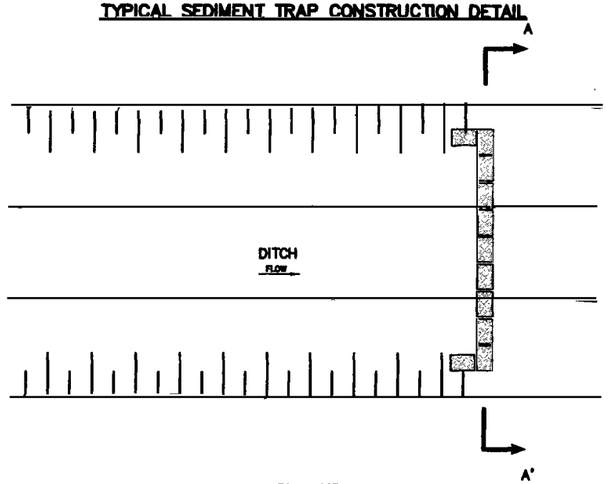
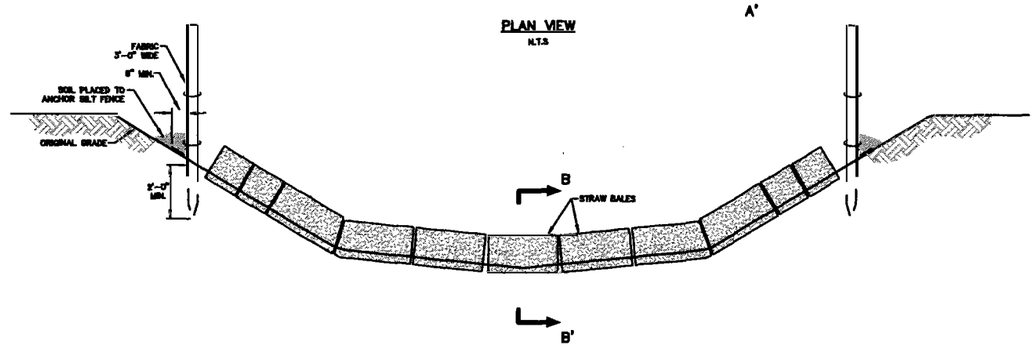


SECTION B–B'
N.T.S

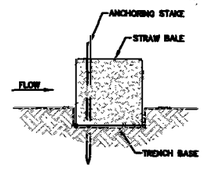
TYPICAL SEDIMENT TRAP CONSTRUCTION DETAIL



PLAN VIEW
N.T.S



SECTION A–A'
N.T.S.



SECTION B–B'
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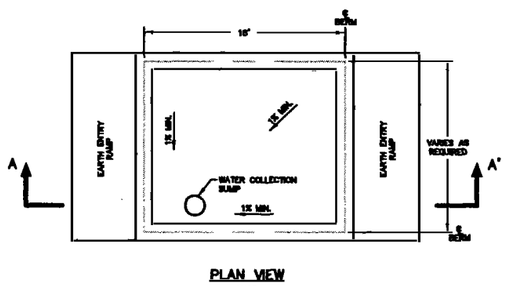
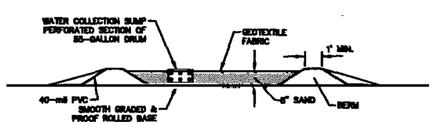
TYPICAL TEMPORARY SOIL STOCKPILING FACILITY



PLAN VIEW
N.T.S



SECTION A–A'
N.T.S.

Drawing 6

TYPICAL DETAILS
TEXTILE ROAD SITE
Washtenaw County, Michigan

CRA