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REMEDIAL DESIGN/REMEDIAL ACTION FIELD SAMPLING PLAN

South Andover Salvage Yards
Andover, Minnesota

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FEBRUARY 1994
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CONESTOGA-ROVERS & ASSOCIATES

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1.0 PROJECT DESCRIPTION

The following presents the Site description, objectives and existing Site conditions.

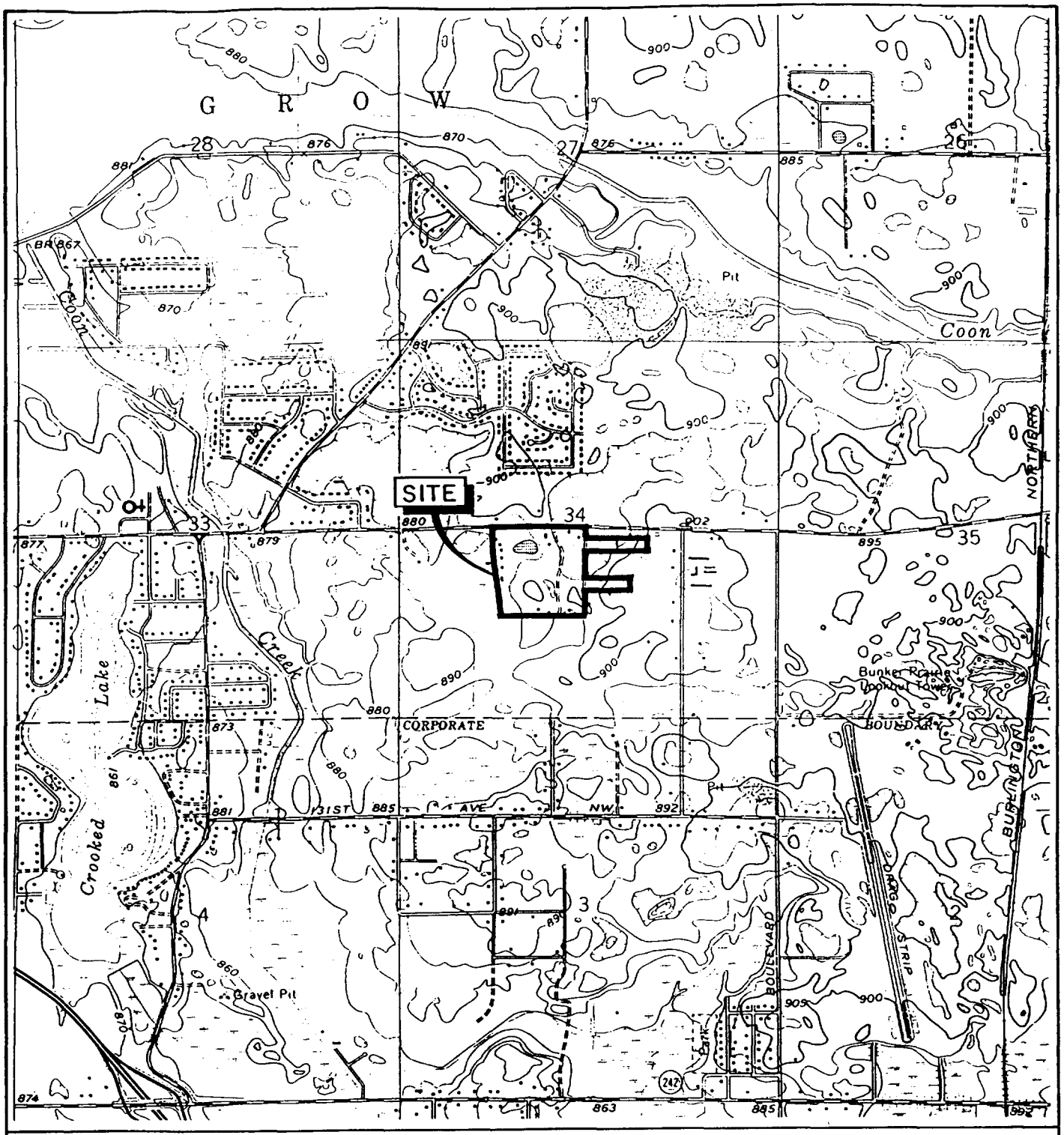
1.1 SITE DESCRIPTION AND OBJECTIVES

South Andover Salvage Yards is a 50 acre site located in Anoka County, Minnesota. Figure 1.1 shows the location of the Site. The Site consists of several privately owned parcels of land that were used, and continue to be used, as scrap and salvage yards.

The United States Environmental Protection Agency (USEPA) and the Minnesota Pollution Control Agency (MPCA) have conducted studies at the Site since 1980, in an effort to identify and characterize contamination. These preliminary studies lead the EPA to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Site in 1988. The RI/FS resulted in the issuance of a Record of Decision (ROD) in March 1988, for remedial action for a groundwater operable unit at the Site. The 1988 ROD called for the construction of a groundwater extraction system.

A second RI/FS focused on the potential soil and surface water contamination at the Site. The second RI/FS was published in July 1991. This report characterized soil contamination in surface soil. A ROD for the second operable unit at the Site was issued in December 1991. The 1991 ROD called for the removal and off-Site disposal of lead/antimony/polychlorinated biphenyl (PCB) contaminated soils and the treatment of polynuclear aromatic hydrocarbon compound (PAH) contaminated soils.

In June 1992, an amendment to the 1988 ROD was issued, which revised the proposed remedy from groundwater treatment to continued monitoring.



SOURCE: USGS TOPOGRAPHIC MAP
COON RAPIDS, MN QUADRANGLE

N

SCALE: 1" = 2000'

figure 1.1
SITE LOCATION
South Andover Site

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4769-16/03/93-M

The Site has been divided by USEPA into sub-areas that do not relate directly to the present ownership patterns. The USEPA-designated areas are shown in Figure 1.2. The final remedy as described in the RODs contains the following elements:

- excavation and bioremediation of an estimated 2,100 cubic yards of soil in Areas A, C and D contaminated with carcinogenic polynuclear aromatic hydrocarbons (cPAH) exceeding 4 ppm;

- excavation and off-site landfilling of approximately 9,300 cubic yards of soil in Areas A, B and E contaminated with lead exceeding 500 ppm, antimony exceeding 25 ppm, and/or PCB exceeding 2 ppm;

- groundwater monitoring; and

- surface water and sediment monitoring.

In July 1992, the EPA sent special notice letters to 31 potential responsible parties (PRPs) which, in part, requested the PRPs to implement USEPA's remedy. On February 5, 1993, the PRP group, now known as the South Andover Administrative Group (SAAG), entered into a Consent Agreement with the USEPA. As part of this agreement, the SAAG agreed to perform the necessary studies and activities necessary to remediate the South Andover Salvage Yards. In addition the SAAG, at USEPA's request, agreed to remove drums that were identified in the April 1989 MPCA inventory and the September 1992 TAT inventory.

The SAAG has retained Conestoga-Rovers & Associates (CRA) as their consultant for the RD/RA program.

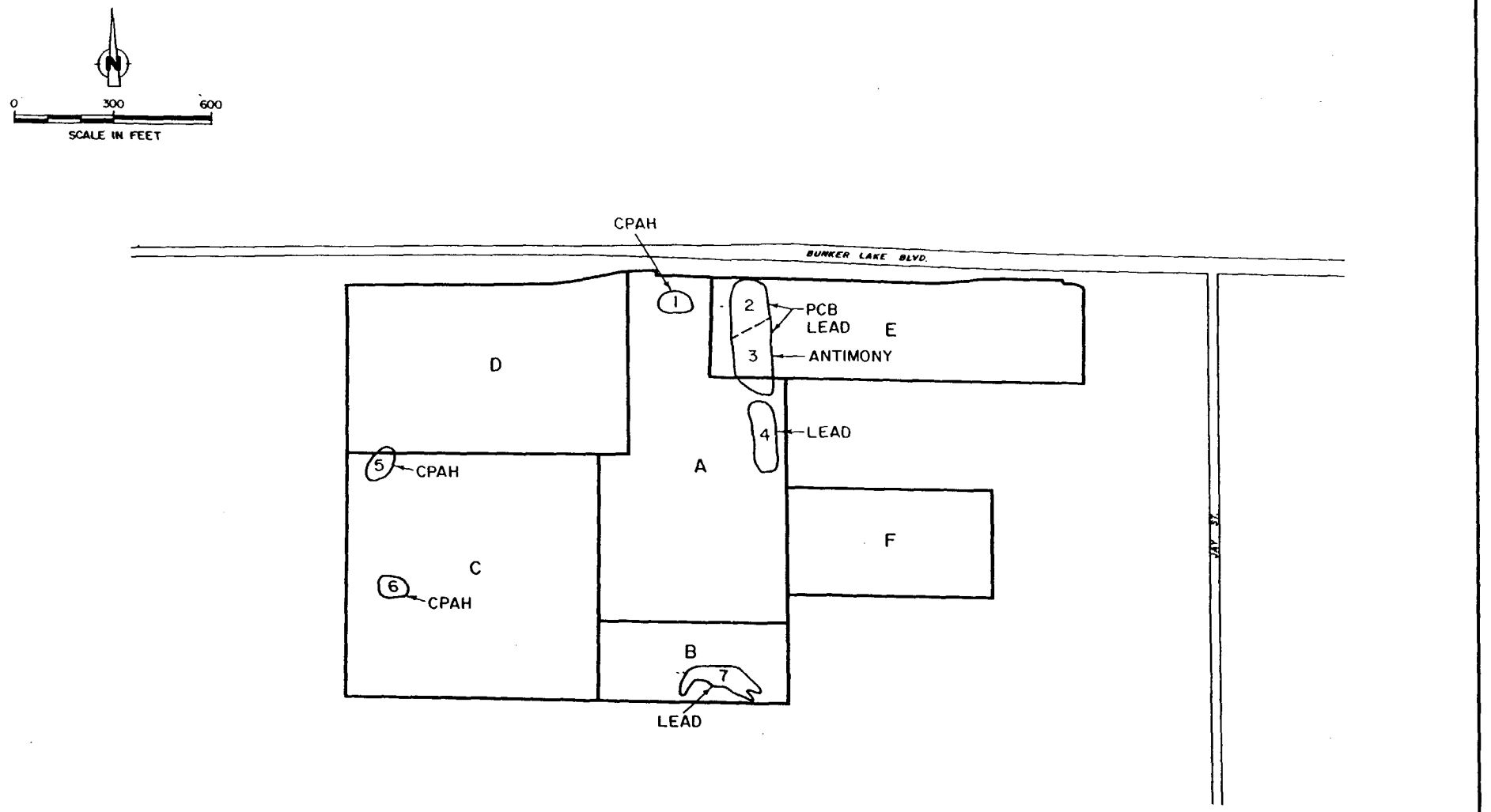


figure 1.2
SITE PLAN
South Andover Site

CRA

4769-16/03/93-M

2.0 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale for sample locations is described in detail in the Work Plan. The sampling, included under provisions of the Field Sampling Plan, will include the pre- and post-excavation soil sampling and the drum sampling activities required by the removal activities. Where ever possible, the post-excavation samples will be taken in the same location as the pre-excavation soil samples. These locations, labeled Additional Soil Sampling Locations, are shown in Figures 2.1 through 2.3.

Routine wetland and monitoring well sampling, as required by the CD and SOW, will also be conducted according to this plan. The location of these sampling points are shown in Figure 2.4.

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

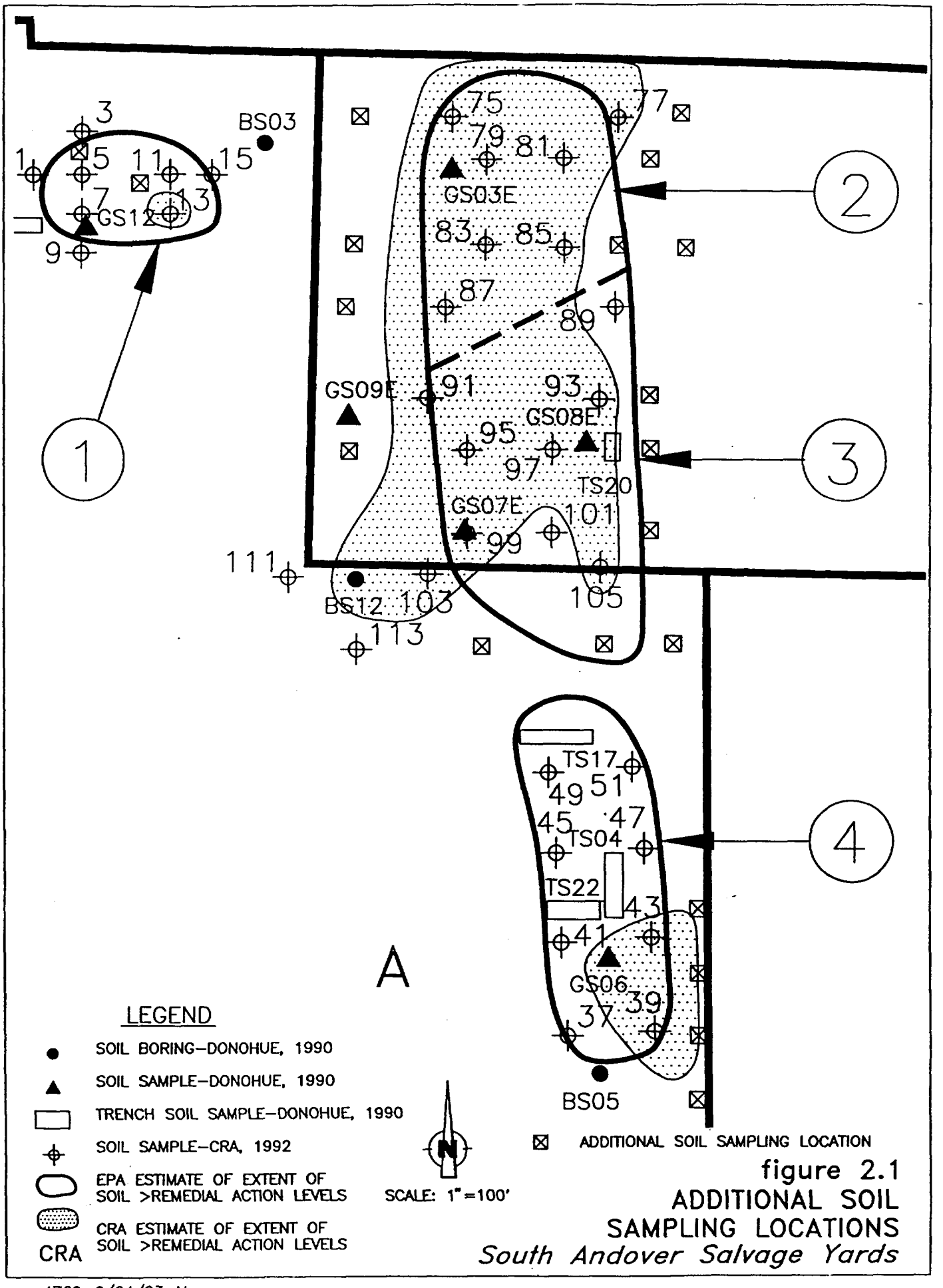
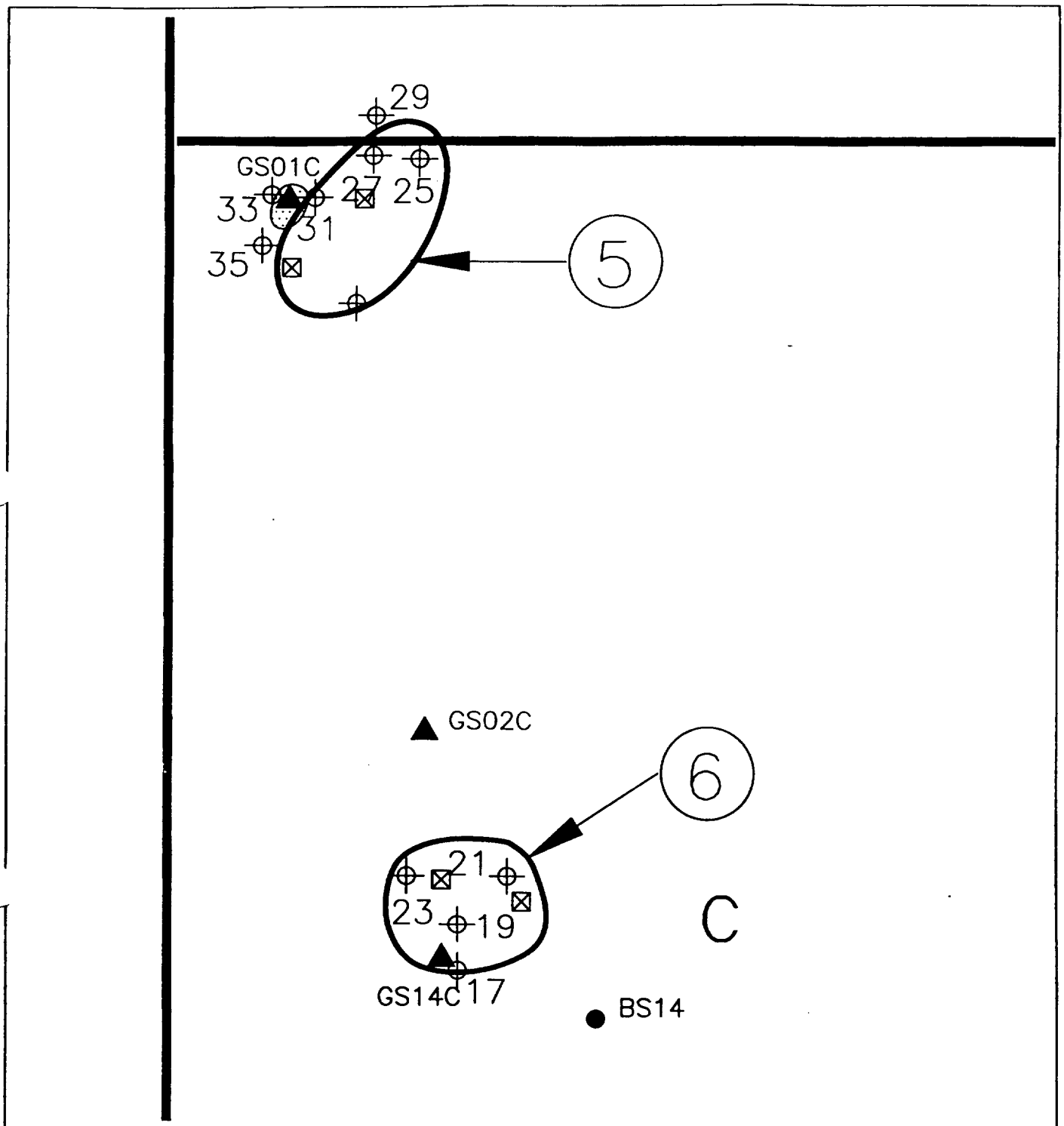


figure 2.1
ADDITIONAL SOIL SAMPLING LOCATIONS
South Andover Salvage Yards

4769–6/04/93–M



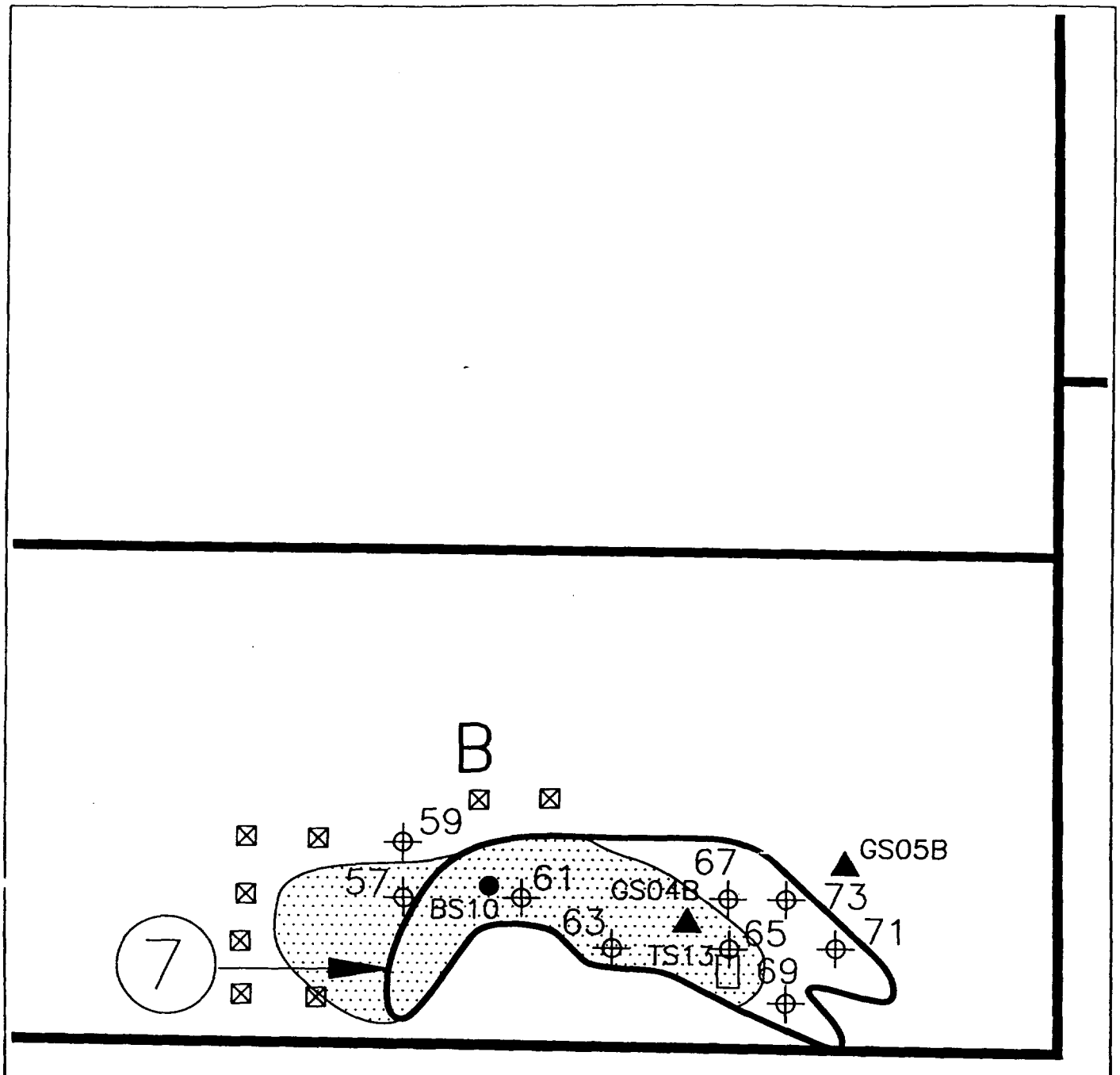
LEGEND

- SOIL BORING–DONOHUE, 1990
- SOIL SAMPLE–DONOHUE, 1990
- TRENCH SOIL SAMPLE–DONOHUE, 1990
- SOIL SAMPLE–CRA, 1992
- EPA ESTIMATE OF EXTENT OF SOIL >REMEDIAL ACTION LEVELS
- CRA ESTIMATE OF EXTENT OF SOIL >REMEDIAL ACTION LEVELS
- ADDITIONAL SOIL SAMPLING LOCATION

SCALE: 1"=100'

figure 2.2
ADDITIONAL SOIL SAMPLING LOCATIONS
South Andover Salvage Yards

4769–6/04/93–M



LEGEND

- SOIL BORING–DONOHUE, 1990
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- SOIL SAMPLE–CRA, 1992
- EPA ESTIMATE OF EXTENT OF SOIL >REMEDIAL ACTION LEVELS
- CRA ESTIMATE OF EXTENT OF SOIL >REMEDIAL ACTION LEVELS

CRA

- ADDITIONAL SOIL SAMPLING LOCATION

N

SCALE: 1"=100'

figure 2.3
ADDITIONAL SOIL SAMPLING LOCATIONS
South Andover Salvage Yards

4769–6/04/93–M

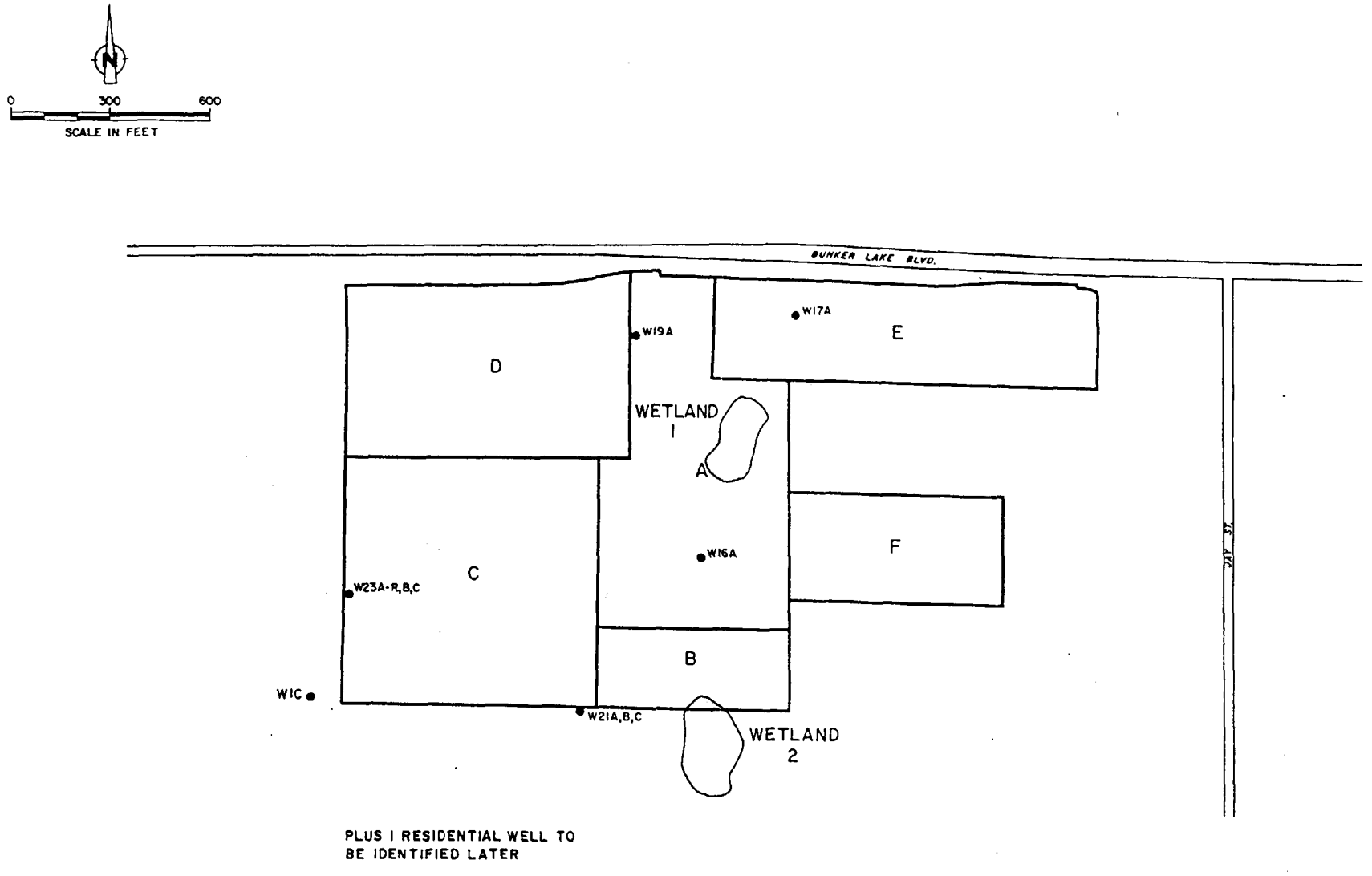

figure 2.4
WETLAND AND MONITORING WELL LOCATIONS
South Andover Site

CRA

4769-6/04/92-M

TABLE 2.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
SOUTH ANDOVER SALVAGE YARDS SITE*

Sample Matrix	*Frequency***	*Field Parameters*	*Lab Parameters*	*Estimated Number of Investigative Samples per Sampling Event*	*Field (Rinsate) Blanks*	*Field Duplicates*	*MS/MSD Set****
Groundwater	Semi-Annual	Water Level, pH, Temp., Conductivity	Select VOC by SW 8240	11	2	2	1
			Select Metals**** by SW 6010/7000 Series	11	2	2	1
Groundwater	Semi-Annual, Quarterly for one year after on-site treatment unit dismantled, if necessary	Water Level, pH, Temp., Conductivity	cPAH by SW 8270	To be determined	1:10*****	1:10*****	1:20******
Surface Water	Semi-Annual	Water Level, pH, Temp., Conductivity	pH by EPA 150.1	8	1	1	1
			Hardness by EPA 130.2	8	1	1	1
			TOC by EPA 415.1	8	1	1	1
			Chloride by EPA 325.2	8	1	1	1

TABLE 2.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
SOUTH ANDOVER SALVAGE YARDS SITE*

Sample Matrix	*Frequency***	*Field Parameters*	*Lab Parameters*	*Estimated Number of Investigative Samples per Sampling Event*	*Field (Rinsate) Blanks*	*Field Duplicates*	*MS/MSD Set****
Surface Water, cont'd			Fluoride by EPA 340.1/2	8	1	1	1
			Sulfite by EPA 377.1	8	1	1	1
	Semi-Annual	Water Level, pH, Temp., Conductivity	Sulfate by EPA 375.2	8	1	1	1
			Nitrite/Nitrate by EPA 353.2	8	1	1	1
			TAL Metals**** by SW 6010/7000 Series	8	1	1	1
Surface Water	Annual		Ceriodaphnia Survival/Reproduction & Fathead Minnow Embryo Survival Tests by EPA 600/4-89/001	2	0	0	0

TABLE 2.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
SOUTH ANDOVER SALVAGE YARDS SITE*

Sample Matrix	*Frequency***	*Field Parameters*	*Lab Parameters*	*Estimated Number of Investigative Samples per Sampling Event*	*Field (Rinsate) Blanks*	*Field Duplicates*	*MS/MSD Set****
Soil	To be determined	pH, PCB	PCB by SW 8080	To be determined	1:10*****	1:10*****	1:20******
			cPAH by SW 8270	To be determined	1:10*****	1:10*****	1:20******
	To be determined	pH, PCB	Lead by 7470	To be determined	1:10*****	1:10*****	1:20******
			Antimony by SW 6010	To be determined	1:10*****	1:10*****	1:20******
Sediment	Semi-Annual	pH	Grain Size by ASTM D422	8	0	0	0
			TOC by SW 9060	8	1	1	1
			TVS by EPA 160.4	8	1	1	1
Sediment, cont'd			TAL Metals by SW 6010/7000 Series	8	1	1	1
Sediment	Annual		Ceriodaphnia Survival/Reproduction & Fathead Minnow Embryo Survival Tests	2	0	0	0

TABLE 2.1

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
SOUTH ANDOVER SALVAGE YARDS SITE*

Sample Matrix	*Frequency***	*Field Parameters*	*Lab Parameters*	*Estimated Number of Investigative Samples per Sampling Event*	*Field (Rinsate) Blanks*	*Field Duplicates*	*MS/MSD Set****

* One trip blank, which consists of two filled 40-mL preserved glass vials for VOC water samples, shall be shipped with each cooler of VOC water samples.

** The frequency of sampling is as follows:

Soil - Samples will be collected until treatment and removal of soil meets established performance standards.

Groundwater - Monitoring wells will be sampled the first May or October after the Consent Decree is signed, whichever is sooner. The wells will be analyzed semi-annually through the implementation of the non-cPAH soil remedy and conclude three years after the non-cPAH soil remedy has been completed.

Surface Water - Samples will be collected on a semi-annual basis with one of the sampling events occurring during spring snow-melt. Sampling shall begin once excavation begins and shall continue until three years after the last excavation. Chronic aquatic testing hall occur annually during the three years of post soil excavation monitoring.

Sediment - Same as Surface Water

*** **While it is not required, a MS/MSD sample set will be analyzed with each batch for inorganic and metals analyses.**

**** **Groundwater samples will be collected unfiltered for metals analysis.**

***** One field duplicate sample and one rinsate blank sample will be analyzed for every 10 or fewer investigative samples. ***If more than 10 (11) groundwater samples are collected, 2 field blanks and 2 field duplicates will be collected.***

******One matrix spike/matrix spike duplicate set will be analyzed for every 20 or fewer investigative samples.

3.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

It is USEPA and Region V Policy to follow the USEPA Region V sample custody, or the chain-of-custody protocols as described in "NEIC Policies and Procedures", EPA-330/9-78-DDI-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 they:

i) are in your possession;
ii) are in your view, after being in your possession;
iii) are in your possession and you place them in a secured location; or
iv) are in a designated secure area.

3.1 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.

3.1.1 Field Procedures

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.

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. A listing of the sample identification numbers with written descriptions of sample location, type and date will be maintained by CRA field personnel. A typical example of a sample numbering system to be used as follows:

Example	S-041693-AA-XXX	
where:	S	• Designates sample type (S - Soil, SW - Surface Water, GW - Groundwater, SED - Sediment)
	041693	• date of collection
	AA	- sampler initials
	XXX	- sequential number starting with 001

3.1.2 Field Logbooks/Documentation

The 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 make, the information will be crossed out with a single strike mark and initialed. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass and distance taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the Section 6.0. 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. A sample identification number will be assigned during sample collection. Field QC samples (blanks and duplicates), which will receive an entirely separate sample identification number, will be submitted blind to avoid laboratory bias of field QC samples.

3.1.3 Transfer of Custody and Shipment Procedures

1. Samples are 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, 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.

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
SOUTH ANDOVER SALVAGE YARDS SITE

Analysis	*Containers*	*Preservation*	*Holding Time**	*Sample Volume*	*Shipping*	*Packaging*
A. Groundwater						
VOC	Three 40 mL volatile organic analysis (VOA) vials	HCl to pH <2, Iced, 4°C	14 days to analysis	Fill completely, no air bubbles	Overnight Courier	Foam Liner or equivalent
Metals	One 1-liter plastic bottle	HNO3 to pH < 2, Iced, 4°C	6 months to analysis (28 days-Mercury)	Fill to shoulder of bottle	Overnight Courier	Bubble Pack or equivalent
cPAH	Two 1-liter amber glass	Iced, 4°C	7 days to extraction; 40 days to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
B. Surface Water						
pH, Chloride, Fluoride, Sulfate	Two 500-mL plastic bottle	Iced, 4°C	Chloride, Fluoride, Sulfate-28 days to analysis; pH-24 hours to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
Sulfite	One 500-mL plastic bottle	Iced, 4°C	Analyze immediately	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
SOUTH ANDOVER SALVAGE YARDS SITE

Analysis	*Containers*	*Preservation*	*Holding Time**	*Sample Volume*	*Shipping*	*Packaging*
TOC	Two 40-mL VOA vials	H2SO4 to pH < 2, Iced, 4°C	28 days to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
Nitrite/Nitrate	One 250-mL plastic bottle	H2SO4 to pH < 2, Iced, 4°C	28 days to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
Metals, Hardness	One 1-liter plastic bottle	HNO3 to pH < 2, Iced, 4°C	6 months to analysis (28 days-Mercury)	Fill to shoulder of bottle	Overnight Courier	Bubble Pack or equivalent
Ceriodaphnia Survival and Reproduction Test	One 4-liter plastic bottle or carboy	Iced, 4°C	36 hours to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
Fathead Minnow Embryo Survival Test	Two 4-liter plastic bottle or carboy	Iced, 4°C	36 hours to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
SOUTH ANDOVER SALVAGE YARDS SITE

Analysis	*Containers*	*Preservation*	*Holding Time**	*Sample Volume*	*Shipping*	*Packaging*
C. Soil						
PCB, cPAH	One 8-ounce wide-mouth glass jar	Iced, 4°C	14 days to extraction; 40 days to analysis	Fill 3/4 Full	Overnight Courier	Bubble Pack or equivalent
Lead, Antimony	One 4-ounce wide-mouth glass jar	Iced, 4°C	6 months to analysis	Fill 3/4 Full	Overnight Courier	Bubble Pack or equivalent
D. Sediment						
Grain Size	One 16-ounce wide-mouth glass jar	Iced, 4°C	Not Applicable	Fill 3/4 Full	Overnight Courier	Bubble Pack or equivalent

TABLE 4.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS SOUTH ANDOVER SALVAGE YARDS SITE

Analysis	*Containers*	*Preservation*	*Holding Time**	*Sample Volume*	*Shipping*	*Packaging*
TOC, TVS, Metals	One 8-ounce wide-mouth glass jar	Iced, 4°C	TVS-7 days to analysis;TOC-28 days to analysis; Metals-6 months to analysis (28 days--Mercury)	Fill 3/4 Full	Overnight Courier	Bubble Pack or equivalent
Ceriodaphnia Survival and Reproduction Test	One 4-liter plastic bottle or carboy	Iced, 4°C	36 hours to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent
Fathead Minnow Embryo Survival Test	Two 4-liter plastic bottle or carboy	Iced, 4°C	36 hours to analysis	Fill to neck of bottle	Overnight Courier	Bubble Pack or equivalent

* Holding time periods are based from time of sample collection to completion of analysis.

4.0 SAMPLE CONTAINER PREPARATION, SAMPLE PRESERVATION AND MAXIMUM HOLDING TIME

Containers for sample collection will be prepared using standard laboratory validated washing procedures that meet or exceed the requirements of the specific methods and "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers", USEPA, April 1990.

Requirements for sample containers, preservation, packaging and holding times are detailed in Table 4.1.

5.0 DECONTAMINATION PROCEDURES

The decontamination procedures detailed below will be followed for all sampling equipment before and between sampling events.

All field sampling equipment will be cleaned, wrapped and dedicated to a particular sampling point or location during a sampling episode. The aqueous sampling equipment cleaning and decontamination procedures are as follows:

1. laboratory grade glassware detergent plus tap water wash;
2. generous tap water rinse;
3. distilled and deionized water rinse;
4. isopropanol (pesticide grade) rinse;
5. total air dry; and
6. distilled and deionized water rinse

The non-aqueous sampling equipment cleaning and decontamination procedures are as follows:

1. laboratory grade glassware detergent and tap water scrub to remove visual contamination;
2. generous tap water rinse; and
3. distilled and deionized water rinse.

Note: If visual contamination persists, or gross contamination is suspected, the aqueous decontamination procedure will be followed.

Decontamination will be carried out over a container and the residual material will be properly disposed of in accordance with EPA Region V and MPCA policy.

6.0 SAMPLING PROCEDURES

The procedures and protocols for collecting samples and for performing related field activities are described in the following section.

6.1 SOIL SAMPLING

The following protocol and procedures will be used for the collection of soil samples:

1. A new pair of disposable latex gloves will be used for each sample handled. Additional, new glove changes will be made as conditions warrant.

2. Stainless steel sampling tools will be used to collect the sample. The sampling tool will be precleaned using the non-aqueous equipment cleaning procedure outlined in Section 5.0.

3. Grab samples will be collected by transferring the waste material or soil directly into the sample jars.

4. Soil samples will be labeled noting the sampling location, depth, time and sampler's initials. A separate hard-cover field book will be maintained to document all soil samples and sampling events.

5. All soil and waste samples collected will be described and recorded on logs which will be maintained by a CRA technician and kept on file at CRA's office.

6. Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling.

6.2 SEDIMENT SAMPLING

1. New disposable latex gloves will be used to collect each sample. Additional, new glove changes will be made as conditions warrant.

2. Sediment sample locations will be equally spaced around the margins of each pond or wetland.

3. Water depth will be recorded prior to initiating sampling activities.

4. Samples will be collected using a stainless steel shovel. Water will be decanted, and two sediment grab samples will be immediately collected for VOC analysis. Additional sample will be transferred to sample jars for non-VOC parameters.

5. Excess sediment will be returned to the pond or wetland.

6. Samples will be labeled noting the sampling location, time and sampler's initials. A separate hard-cover field book will be maintained to document all samples and sampling events.

7. Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling.

6.3 GROUNDWATER SAMPLING

Monitoring wells will be evacuated and sampled according to the following protocol:

1. New disposable latex gloves will be used when sampling each well. Additional, new glove changes will be made as conditions warrant.

2. Prior to sampling, the depth to water in each well will be measured and recorded to the nearest 0.01 foot using an electric tape. The measuring device will be decontaminated in the following manner:

   a) remove visual debris with paper towel
   b) tap water and laboratory grade glassware detergent wash
   c) tap water rinse
   d) distilled and deionized water rinse

3. Three to five well volumes of water will be removed from each well prior to sampling by using either a stainless steel outer casing submersible sampling pump, stainless steel bailer or Teflon bailer. The well will be purged until three consecutive and consistent measurements of specific conductance, pH and temperature are recorded. In the event that a well is pumped or bailed dry prior to achieving stabilization, the well will be allowed to recover sufficiently for sample collection. Care should be taken to avoid sediment entry into the bailer.

   The equipment used for evacuation will be decontaminated (see Section 5.0) prior to use at each well.

4. Calibration of field instruments will be undertaken prior to use at each sampling location. Calibration procedures for the equipment used in these measurements are described in Section 7.0.

5. Samples will be collected using a stainless steel or Teflon bailer. Each bailer will be pre-cleaned according to protocols in section 5.0.

6. Samples will be labeled noting the sampling location, time and sampler's initials. A separate hard-cover field book will be maintained to document all samples and sampling events.

7. Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling.

6.4 SURFACE WATER SAMPLING

1. New disposable latex gloves will be used to collect each sample. Additional, new glove changes will be made as conditions warrant.

2. The depth to bottom of the pond or wetland will be measured with a weighted tape and the value recorded.

3. Field measurements (pH, temperature and conductivity) will be taken using calibrated equipment (see Section 7.0).

4. The weighted sampler will be lowered to one foot below the water surface. The stopper will be pulled out with a sharp jerk on the line. The sampler will be raised and the contents of the bottle carefully transferred to the appropriate samples. Preservative (if necessary) will be added in the field immediately after collection. Surface water samples will not be filtered.

5. Samples will be labeled noting the sampling location, time and sampler's initials. A separate hard-cover field book will be maintained to document all samples and sampling events.

6. Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling.

7.0 FIELD MEASUREMENTS/SCREENING

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. The field equipment will be maintained, calibrated and operated in a manner consistent with the manufacturer's guidelines and USEPA standard methods.

Dexsil L2000 PCB/Chloride Analyzer--Calibration and Use

1. The electrode will be filled with electrode filling solution and plugged into the back of the Dexsil unit. The electrode will be placed in a vial of rinse solution.

2. The electrode will be switched on and calibrated according to the following:

   a) An empty vial will be filled half full with calibration solution.

   b) The selector knob will be adjusted to the "CAL" position.

   c) The electrode will be removed from the rinse solution, dried with a tissue and placed in the calibration solution. The electrode will be swirled gently for a few seconds. When finished, the start button on the instrument will be pushed.

   d) When the "read" light comes on, the calibration knob will be adjusted so that the instrument reads "50".

   e) The electrode will be removed from the calibration solution, wiped dry and placed in the rinse solution.

f) If it is the first calibration since the instrument has been turned on or since the electrode has been filled, steps C, D and E will be repeated.

3. A 10-gram soil sample will be extracted according to Dexsil L2000 instructions. The extract solution will be allowed to temperature equilibrate for at least 5 minutes.

4. The specific analytical mode will be set on the L2000 (1242, 1260 or Askarel).

5. The electrode will be removed from the rinse solution and wiped carefully with a tissue. The electrode will be placed in the sample vial and swirled gently for several seconds.

6. After pushing the "start" button on the instrument, the sample result will be recorded.

a) pH Meter--Calibration and Use

The pH meter will be calibrated with commercially obtained pH 7, 4 and 10 buffer solutions. The pH calibration will be temperature compensated, and will be performed immediately before initiating a sampling event. Calibration checks will be performed with every sample collected. In the event that the result fails to be within 0.2 pH units, the meter will be recalibrated.

Calibration and measurement will be performed according to the following:

1) rinse the probe in deionized water;
2) insert probe in a fresh pH 7 buffer solution;
3) adjust the "CAL" potentiometer such that the display reads 7.00;
4) remove the probe; rinse in deionized water;
5) insert probe in a fresh pH 4 or pH 10 buffer solution;
6) adjust the slope potentiometer until the correct pH is displayed;
7) remove probe; rinse in deionized water; and

8) insert probe into the pH sample container and record the pH reading.

b) Specific Conductance Meter--Calibration and Use

The specific conductance meter is factory calibrated, but the calibration should be checked periodically and the probe thoroughly rinsed between samples:

1) rinse probe in deionized water;
2) wipe probe and allow to dry;
3) the conductivity displayed should be zero in air;
4) adjust the zero potentiometer if necessary;
5) immerse the probe in a solution of known conductivity;
6) adjust the "SPAN" potentiometer such that the correct conductivity is displayed;
7) rinse probe thoroughly with deionized water and allow to dry;
8) immerse the probe into the conductivity sample container and record the measurement.

c) Temperature Meter--Calibration and Use

Temperature measurements are performed in conjunction with specific conductance measurements. As noted above, the meter is factory calibrated. Immerse the temperature probe into the container, allow sufficient time for the probe to equilibrate to the sample, and record the measurement.

d) Water Level Meter--Calibration and Use

Water level measurements are obtained to the nearest 0.01 foot using an electronic sounding water level meter. No field calibration is possible. Water level probes will be rinsed with deionized water after each water level measurement.

8.0 PREVENTIVE MAINTENANCE

All analytical instruments to be used in this project will be serviced by the field 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 field personnel will be performed by the equipment manufacturer or its designated representative.

Daily checks of each instrument will be by the field personnel who have been assigned responsibility for that instrument. Manufacturer's recommended procedures will be followed in every case.

9.0 SAMPLE DISPOSAL

After completion of all analytical work or, as a minimum, for 30 days after receipt of the final report by CRA, all samples stored at the project laboratory will be properly disposed of. All samples slated for disposal will be divided into three groups by matrix: aqueous, non-aqueous liquids and solids. The aqueous samples (groundwater, surface water) will be rinsed through the laboratory neutralization sump. The non-aqueous liquids (oil and solvents) and the solid samples (i.e., soil, sediment) will be consolidated into respective drums and shipped off-site for incineration as hazardous waste.

All of Which is Respectfully Submitted,

CONESTOGA-ROVERS & ASSOCIATES

Ronald Frehner

Terrence E. Huntrods, P.E.