US EPA RECORDS CENTER REGION 5
496946

REMOVAL PROGRAM QUALITY ASSURANCE SITE - SPECIFIC SAMPLING PLAN

MORGAN SITE
CHICAGO, ILLINOIS

JANUARY 2001

Prepared For:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Emergency and Enforcement Response Branch
77 West Jackson Boulevard
Chicago, Illinois 60604

Approvals:

		3/6/01	
Steve Faryan **On-Scene Coordinator**	**Date**	**Ron Bugg** **START Project Manager**	**Date**
3/6/01			
Ben Maradkel **START Site Lead**	**Date**		

GENERAL SITE INFORMATION:

SITE NAME: ___Morgan Site_____ TDD#: _0101-004_____
SAMPLERS: ___Ben Maradkel, Ron Bugg_____ NO. OF SAMPLES: _____12_____
LAB: _____TBD_____ DATE OF SAMPLING: ____TBD____
_____ DATE SHIPPED:_____

Site Description: The site has surface which extends to a depth of ten to fifteen feet. The fill material include asphalt, concrete, brick, gravel, wood, coal, decomposed organic, clay, glass, and metal.

ANALYTICAL INFORMATION:

_____ QA Level I
(Field Screening, Appendix A)

_X_ QA Level II
(Laboratory Analysis, Appendix B)

_____ QA Level III
(Analyte Specific Laboratory Analysis, Appendix C)

TYPE OF LABORATORY: _____ Commercial _____ CLP START Sub Other

TURNAROUND TIME: (Verbal) 14 days (Hardcopy w/data package) 21days

PURPOSE OF SAMPLING:

(Check all applicable)

X Site Characterization
_____ Extent of Contamination
_____ Confirm Presence of Suspected Contaminant/Characterize Unknown Contaminant
_____ Disposal/Treatment of Materials
_____ Confirm Efficiency of Existing Treatment Systems
_____ Other: _____

MATRIX	NO. OF SAMPLES
Soil	12
Sludge	
Drum/Tanks/Vats/Containers	
Wipe	
Surface Water	
Groundwater	
Air	
Waste	
Other: _____	

TYPE OF SAMPLING:

_____Biased (non-random, judgmental) X Unbiased (random, systematic grid)

ATTACHMENTS:

1 Sample Location Maps
2 Chain-of-Custody
3 Field Data Sheets
4 Other: _____

SAMPLING METHODS (SOPs):

(Check all applicable)

X	Soil	(Appendix D, Section 1)
	Sediment	(Appendix D, Section 2)
	Drum/Tank/Sludge/Waste	(Appendix D, Section 3)
	Wipe	(Appendix D, Section 4)
	Surface Water	(Appendix D, Section 5)
	Groundwater	(Appendix D, Section 6)
	Air	(Appendix D, Section 7)
	Other: _____	

DECONTAMINATION PROCEDURES (SOPs):

X	Personnel	(Appendix E, Section 1)
X	Equipment	(Appendix E, Section 2)
X	Instrument	(Appendix E, Section 3)
	Radiation	(Appendix E, Section 4)

DECONTAMINATION MATERIALS AND INVESTIGATIVE DERIVED WASTE:

All used PPE materials will be properly contained, bagged, and left on site to be disposed of at the discretion of the U.S. EPA.

HAZARD CATEGORIZATION (HAZCAT):

_____	Hazard Categorization (HAZCAT) Inventory and Procedures . . . . . (Appendix F, Section 1)

REFERENCE SITES ON THE INTERNET:

Environmental Response Team (ERT)
www.ert.org
www.ert.org/respns_resres/sops.asp

ATSDR
www.atsdr.cdc.gov/atsdrhome.html

U.S. EPA SW846 Analytical Test Methods
www.epa.gov/epaoswer/hazwaste/test/main.html

U.S. EPA AMTIC Air Toxic Methods
www.epa.gov/ttnamti1/airtox.html

Environmental Test Methods/Guidelines
www.epa.gov/cpahome/standards.html

MSDS
www.msdsonline.com
msms.pdc.cornell.edu/issearch/msdssrch.html
hazard.com/msds/index.html

NIOSH Pocket Guide
www.cdc.gov/niosh/npg/npgdname.html

NIOSH Manual of Analytical Methods
www.cdc.gov/niosh/nmam/nmammenu.html

NAERG
hazmat.dot.gov/gydebook.html

SOIL

No. of Surface Samples	12	No. of Composite	_____
No. of Depth Samples	TBD	No. of Grab	12
No. of Duplicates	2		

ANALYSIS	NO. OF SAMPLES INCLUDING DUPL. & BLANKS		NO. OF CONTAINERS PER SAMPLE	TOTAL NO. OF CONTAINERS	
Semivolatile Organics	12	x	1	12	8 oz. glass
PCB/Pesticides	12	x	1	12	8 oz. glass
Volatile Organics	12	x	2	24	8 oz. glass
Organics	14	x	1	14	8 oz. glass
Dioxin	12	x	1	12	4 oz. glass
Metals (Totals,TCLP)	12	x	1	12	8 oz. glass
Cyanide		x	1		8 oz. glass
TPH (DRO,GRO,Oil & Grease)		x	1		8 oz. glass
Other		x			

METAL SAMPLE SUFFICES

Inorganics		x	1		120 ml. glass
Compatibility		x	1		8 oz. glass

TOTAL NUMBER OF CONTAINERS REQUIRED

_____	8 oz. glass	_____	Other: _____
_____	4 oz. glass		
_____	120 ml. glass		

ICE REQUIRED AS PRESERVATIVE: _____ Yes _____ No

AIR SAMPLES

COMPOUNDS OR ELEMENTS SAMPLING FOR: _____

_____

_____ High Volume Sampling

_____ Low Volume Sampling

- _____ Gilian
- _____ RAM
- _____ Mini-RAM
- _____ Draeger
- _____ Other: _____

_____ Strip Chart

- _____ OVA
- _____ HNU
- _____ Snapshot G.C.
- _____ FID
- X Other:_____Multi Rae, XRF Unit

COLLECTION MEDIA

_____ Tube

- _____ Collection
- _____ Colorimetric
- _____ Other: _____

_____ Filter

- _____ Cassette
- _____ Type
- _____ SUMMA Canister
- _____ Tedlar Bags
- _____ Hi-Vol
- _____ Pore Size

NO. OF SAMPLE STATIONS		NO. OF BLANKS		TOTAL	COLLECTION MEDIA REQUIRED
N/A_____	+	_____	=	_____	_____
_____	+	_____	=	_____	_____
_____	+	_____	=	_____	_____
_____	+	_____	=	_____	_____

COLLECTION MEDIA IN SERIES: _____ Yes _____ No

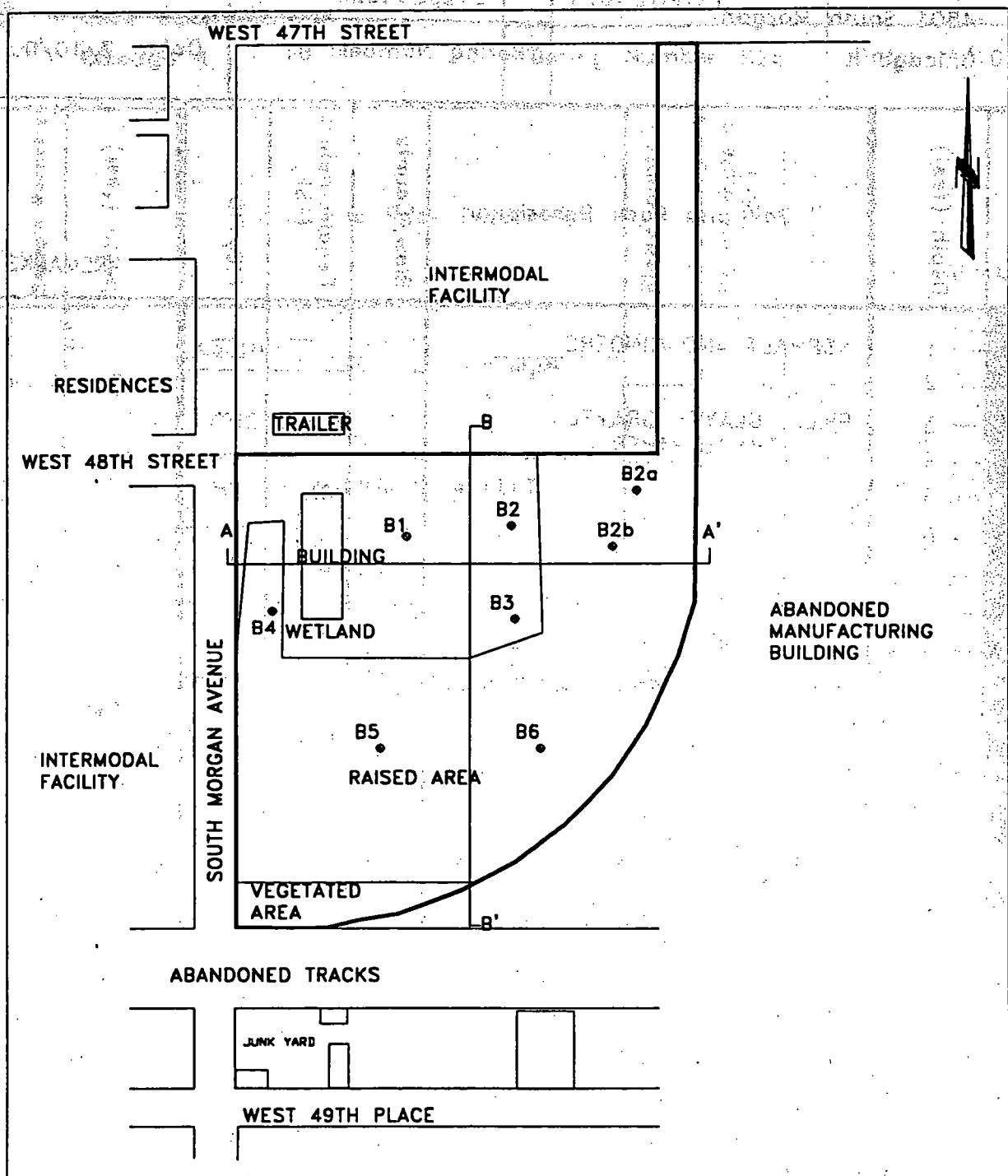
CALIBRATION METHOD (Attach calibration sheets): _____

_____

_____

Attachment 1

Sample Location Map(s)



CARNOW, CONIBEAR & ASSOC., LTD.
ENVIRONMENTAL ENGINEERING DEPT.
333 West Wacker Dr. Suite 1400
Chicago, IL 60606
PHONE (312)782-4486
FAX # (312)782-5145

EXHIBIT I – SITE PLAN
INTERMODAL FACILITY
4801 SOUTH MORGAN AVENUE
CHICAGO, ILLINOIS

DRAWN BY: EZM
CHECKED BY: AES
DATE: 7/5/00
SCALE: 1" = 200'

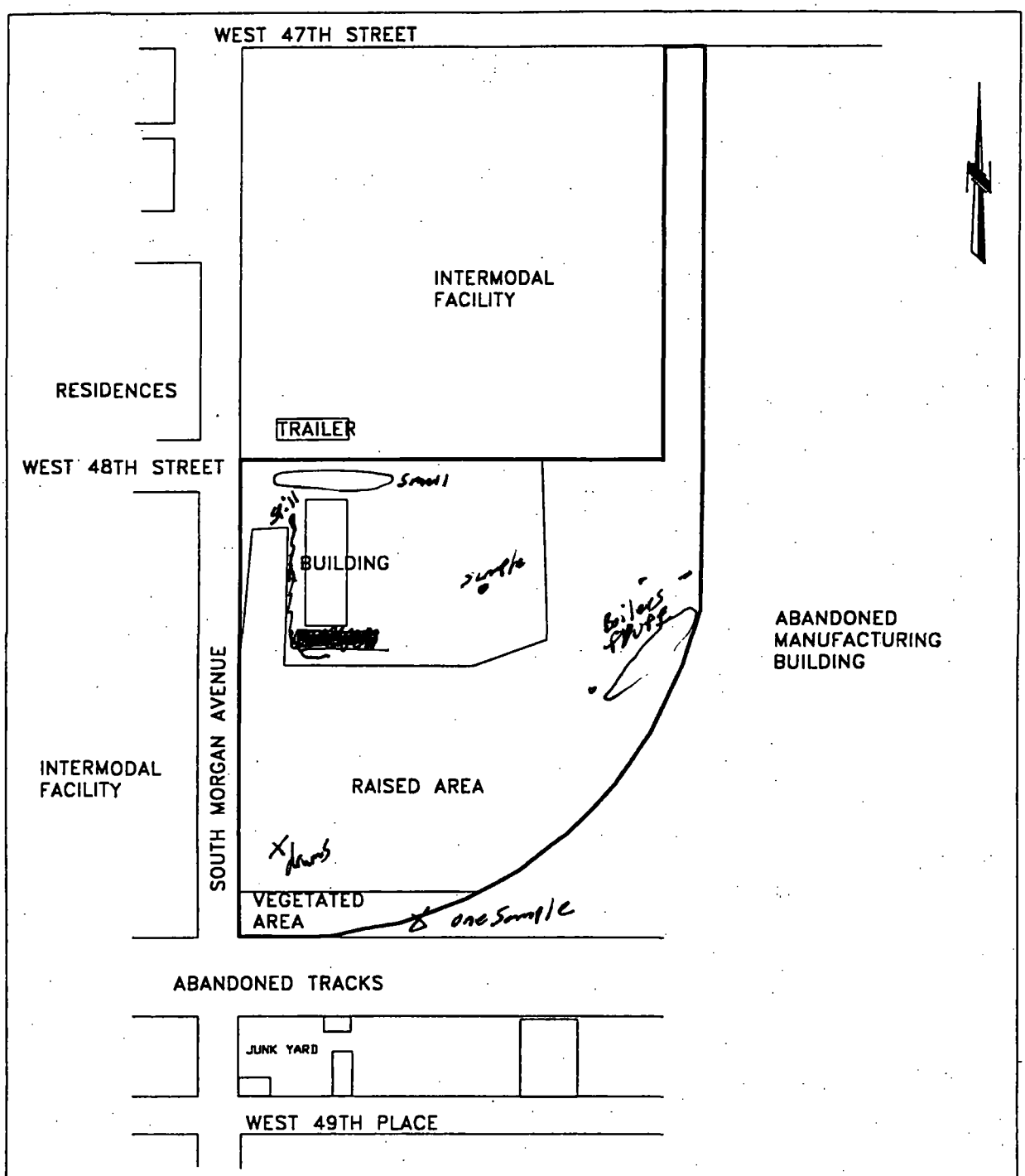


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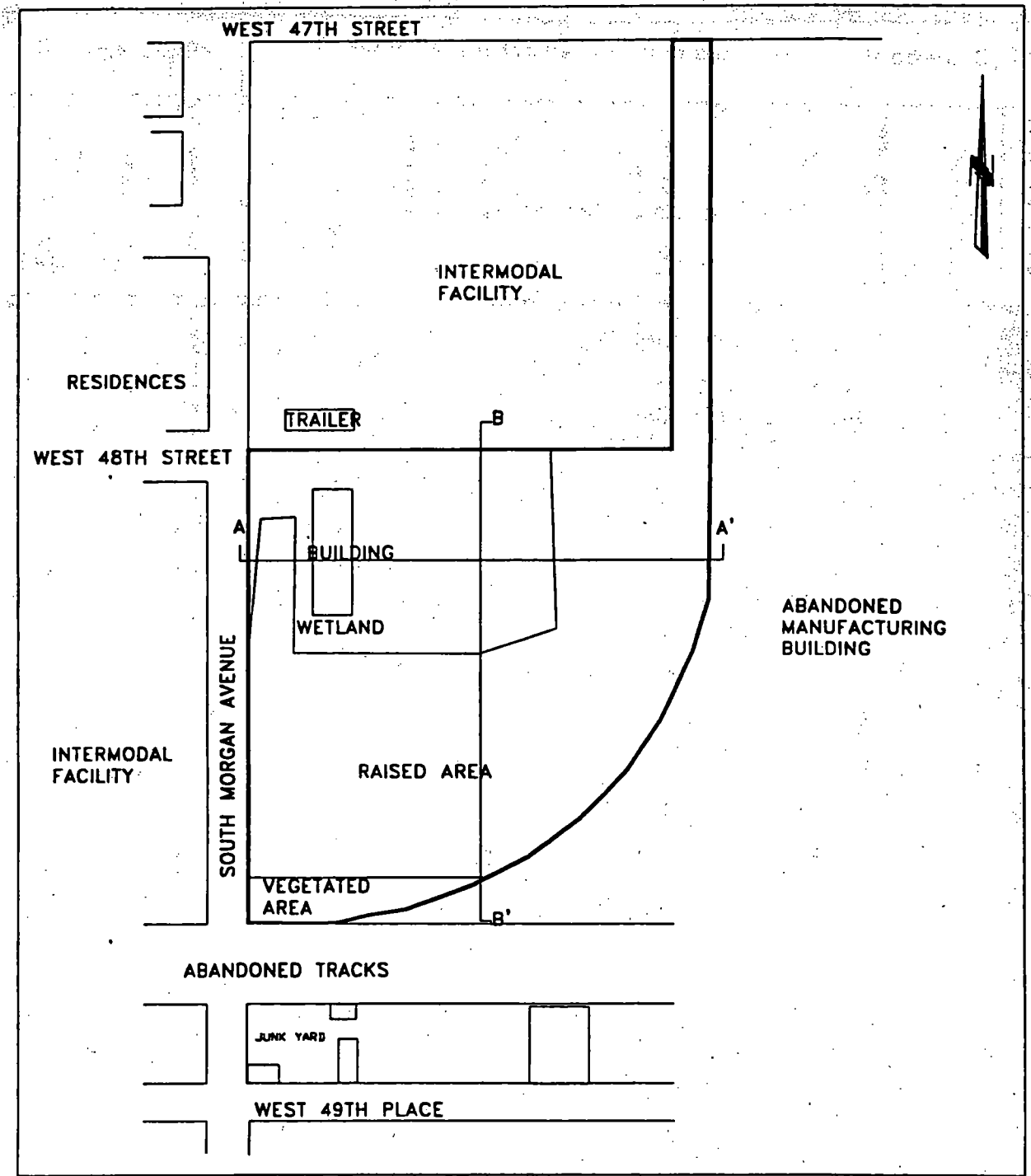
EXHIBIT III – SITE PLAN
INTERMODAL FACILITY
4801 SOUTH MORGAN AVENUE
CHICAGO, ILLINOIS

DRAWN BY: EZM
CHECKED BY: AES

DATE: 7/5/00
SCALE: 1" = 200'



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CHICAGO, ILLINOIS

DRAWN BY: EZM	DATE: 7/5/00
CHECKED BY: AES	SCALE: 1" = 200'

Attachment 2

Chain of Custody

e Print Legibly)
pany Name: _____
ch or Location: _____
ct Contact: _____
hone: _____
ct Number: _____
ct Name: _____
ct State: _____
pled By (Print): _____

EN CHEM INC.

☐ 1241 Bellevue St., Suite 9
Green Bay, WI 54302
920-469-2436
FAX 920-469-8827

☐ 525 Science Drive
Madison, WI 53711
608-232-3300
FAX: 608-233-0502

CHAIN OF CUSTODY

61676

Page _____ of _____
P.O. # _____ Quote # _____
Mail Report To: _____
Company: _____
Address: _____
Invoice To: _____
Company: _____
Address: _____
Mail Invoice To: _____

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=EnCore F=Methanol G=NaOH
H = Sodium Bisulfate Solution I = Other

FILTERED? (YES/NO)
PRESERVATION (CODE)*

ANALYSES REQUESTED

TOTAL # OF BOTTLES SENT

a Package Options
ase circle if requested)
ults Only
hem Level III (Subject to Surcharge)
hem Level IV (Subject to Surcharge)

Regulatory Program
UST
RCRA
SDWA
NPDES
CERCLA

Matrix Codes
W=Water
S=Soil
A=Air
C=Charcoal
B=Biota
Sl=Sludge

ABORATORY ID (Lab Use Only)	FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX									CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)

sh Turnaround Time Requested (TAT) - Prelim
sh TAT subject to approval/surcharge)
e Needed: _____
nsmit Prelim Rush Results by (circle):
Phone Fax E-Mail
one #: _____
: #: _____
Mail Address: _____

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

En Chem Project No.

Sample Receipt Temp.

Sample Receipt pH (Wet/Metals)

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 1.0: 9/00

Appendix B

QA Level II

QA LEVEL II
Laboratory Data Package Deliverable Requirements

A. Metals

1. Case Narrative: -Observations and/or Problems.
   -Methods used.

2. Sample Holding Times: -Analysis dates.

3. Analytical Results for:
   - Samples.
   - Standards: -Number of standards.
     -Concentration of standards.
   - Initial Calibration: % Recoveries (%R) of true value.
   - Continuing Calibrations: % Recoveries (%R) of true value.
   - Calibration Blanks.
   - Method Blank(s): -Detection limit.
     -Amount detected in blank.
   - Matrix Spike/Matrix Spike Duplicate, if applicable: -% Recoveries (%R)
     -% Difference (%D)
   - Laboratory Control Samples.
   - ICP Interference Check Samples, if applicable.
   - ICP Serial Dilutions, if applicable.
   - Standard Additions, if applicable.

4. Copies of Raw Data for all Analytical Results: Peak areas for all items in No. 3.

5. Compound Quantitation Calculations: -Dilutions.
   -Concentrations.
   -Dry weights.
   -Etc.

6. Chain-of-Custody (COC): Photocopy of COC form.

B. Pesticides by Gas Chromatograph (GC)

1. Case Narrative: -Observations and/or Problems.

2. Sample Holding Times: -Extraction dates.
   -Analysis dates.

3. Analytical Results for:
   - Samples: Verification of positive hits by GC/MS or dissimilar column.

   - Initial Calibration: -Pesticide standard retention time windows and standard Rts.
     -Response factors (RF).
     -% relative standard deviation (%RSD) of response factors for aldrin, endrin, DBC, DDT, DCB.
     -% Breakdown for endrin and 4,4-DDT in Evaluation Standard Mix B.
     -Surrogate compound retention times.

   - Continuing Calibrations: -Retention times (RT).
     -Response factors (RF).
     -%Relative standard deviation (%RSD) of response factors for aldrin,

endrin, DBC, DDT, DCB.
-Analytical sequence.

- Method Blank(s): -Detection limit.
  -Amount detected in blank.
  -Calibration blank.

- Surrogate Recoveries: -% recovery.
  -Control limits.
  -List compound(s) used as surrogate.

4. Copies of Raw Data for all Analytical Results:
   -Sample chromatograms and ion spectra for GC.
   -Enhanced or background subtracted chromatograms and ion spectra for GC.
   -Standard chromatograms and ion spectra for GC.

5. Compound Quantitation Calculations: -Dilutions.
   -Concentrations.
   -Dry weights.
   -Etc.

6. Chain-of Custody: Photocopy of COC form.

C. Organics by GC/MS

1. Case Narrative: -Observations and/or Problems.
   -Methods used.

2. Sample Holding Times: -Extraction dates.
   -Analysis dates.

3. Analytical Results for:
   - Samples: -Relative retention times.
     -Mass Spectra.
     -Ion chromatograms.

   - GC/MS Tuning: BFB/DFTPP ion abundances.

   - Initial Calibration: -Retention times (RT).
     -Response factors (RF and RRF).
     -% relative standard deviation (%RSD).

   - Continuing Calibrations: % difference from initial standard.

   - Method Blank(s): -Detection limits.
     -Amount detected in blank.

   - Surrogate Recoveries: -% recoveries.

   - Tentatively Identified Compounds, if applicable: Ion relative intensities.

4. Copies of Raw Data for all Analytical Results:
   -Sample spectra.
   -Enhanced or background subtracted spectra.
   -Standard spectra. (For tentative identified compounds, provide a reference mass spectra

from the spectral library.)

5. Compound Quantitation Calculations: -Dilutions.
   -Concentrations.
   -Dry weights.
   -Etc.

6. Chain-of Custody: Photocopy of COC form.

D. Polychlorinated Biphenyls (PCBs) by GC.

1. Case Narrative: -Observations and/or Problems.
   -Methods used.

2. Sample Holding Times: -Extraction dates.
   -Analysis dates.

3. Analytical Results for:
   - Samples: -Retention time windows.
   - Initial Calibration: -3-point calibration for each aroclor of interest.
     -Response factors (RF).
     -% relative standard deviation (%RSD).
   - Continuing Calibrations: % difference from initial standard.
   - Method Blank(s): -Detection limits.
     -Amount detected in blank.
   - Matrix Spike/Matrix Spike Duplicate, if applicable: % recovery.
   - Surrogate Recoveries: -% recovery.
     -Control limits.
     -List compound(s) used as surrogate.

4. Copies of Raw Data for all Analytical Results:
   -Sample chromatograms.
   -Enhanced or background subtracted chromatograms.
   -Standard chromatograms.

5. Compound Quantitation Calculations: -Dilutions.
   -Concentrations.
   -Dry weights.
   -Etc.

6. Chain-of Custody: Photocopy of COC form.

E. Miscellaneous Analysis

1. Case Narrative: -Observations and/or Problems.
   -Methods used.

2. Sample Holding Times: -Extraction dates.

-Analysis dates.

3. Analytical Results for:
   - Samples.
   - Calibration or Standardization.
   - Duplicates.
   - Reagent Blank Results.
   - Spike Recoveries.

4. Copies of Raw Data for all Analytical Results.

5. Compound Quantitation Calculations: -Dilutions.
   -Concentrations.
   -Dry weights.
   -Etc.

6. Chain-of-Custody: Photocopy of COC form.

F. QA/QC Analytical Methods Reference

Analytical Parameter	Analytical Method
VOCs	**SW846 1311/8260**
SVOCs	**SW846 1311/8270**
PCBs	**SW846 8082**
Pesticides	**SW846 8081**
Metals (total) **Metals (TCLP)** **Mercury**	**SW846 6010 or 6020** **SW846 1311** **SW846 7470 or 7471**
Cyanide	**SW846 9010**
Flash point	**SW846 1010 (closed cup)**
pH	**SW846 9045c**
Dioxin	**SW846 8290**
TPH **(DRO,GRO, Oil&Grease)**	**SW846 8015**

Draft
1/25/01
LJK

SITE ASSESSMENT TECHNICAL ASSISTANCE
STANDARD OPERATING PROCEDURE

SOP 302
SURFACE SOIL SAMPLING

1.0 INTRODUCTION

START

The purpose of this Standard Operating Procedure (SOP) is to provide Roy F. Weston, Inc. (WESTON®), ~~Site Assessment Technical Assistance (SATA)~~ members with a step-by-step guide for collecting representative surface soil samples using scoops and bucket augers.

2.0 MATERIALS REQUIRED

Below is a list of the materials needed for surface soil sampling events. Both dedicated and reusable sampling equipment are required.

- Personal protective equipment (as specified in the Health and Safety Plan)
- Sampling plan
- Maps/sketches
- Compass
- Tape measure (up to 300 ft)
- Survey flags/stakes
- Aluminum homogenization pans
- Sample jars
- Logbook
- Sample labels/tags
- Chain-of-custody forms and custody seals
- Field data sheets
- Coolers
- Ice
- Decontamination equipment (brushes, buckets, garden sprayer, phosphate-free soap, water, etc.)
- Ziploc® bags
- Plastic sheeting
- Paper towels
- Ball-point pen
- Permanent marker
- Grease pencil
- Marking spray paint
- Camera with film
- Air monitoring equipment [combustible gas indicator (CGI), Microtip, etc.]
- Plastic sample scoops, if applicable
- Bucket auger, if applicable
- Thin-walled tube sampler, if applicable
- Plastic garbage bag

- Scissors

3.0 SAFETY PRECAUTIONS

Due to unknown constituents of the soil media, the exposure potential for personnel exists and must be of primary concern. Before any soil sampling is performed, a Health and Safety Plan (HASP) must be approved by the Regional Safety Officer.

1. Follow the HASP safety schedule.
2. Determine the appropriate levels of protection to be worn by personnel.
3. Conduct air monitoring in the breathing zones and screen the sample location holes once they are selected.
4. Ensure that equipment is properly decontaminated and in working condition prior to the mobilizing to the site.
5. Coordinate efforts and staffing with the client or agency with which you are working.

4.0 SAMPLING PROCEDURES

1. Perform a general site reconnaissance to verify actual site conditions consistent with the HASP.
2. Identify and mark all sampling locations using sample flags or stakes as specified in the sampling plan. *All sample locations should be measured, documented, and mapped in reference to a permanent marker, i.e. specified utility pole, benchmark, property marker, etc.*
3. Mark the pertinent site information in a site logbook and on field data sheets. *When large amounts of samples are collected, field data sheets allow for easy organization in addition to logbook entries.*
4. Make sure all sampling equipment is properly decontaminated prior to sampling.
5. Wear clean, disposable surgical gloves for each sampling location.
6. Begin sampling by cutting or pulling back debris with a stainless steel or dedicated plastic scoop.
7. Cover the sample location area with plastic sheeting if the soil has a high probability of contamination.
8. Continue cutting to the required depth. Generally, surface sampling is considered 0-3 inches below the surface. It is recommended sample holes be kept the same size diameter (suggested 6 inches) even when using scoops to keep samples relative to each other. Sample collection will focus on soil particles, not plant and tree roots, stones, rocks, concrete and other materials intermixed in the soil matrix.
9. If a grab sample is to be collected, transfer the sample volume directly into the sample container using a sampling device. *Check the preferred sampling apparatus list for various analytical parameters.* A grab sample pertains to a discreet depth or area in a given matrix.
10. Transfer the sample volume to a homogenization container if the sample is a composite sample or a pseudo-grab sample. A composite sample is a mixture of different depths, areas, and/or strata. Composite samples are not recommended for the collection of VOC samples because mixing causes volatile compounds to

evaporate.

11. There are several homogenization techniques. The "quartering technique" requires the total volume of samples be divided into fourths inside the aluminum pan. Each quarter is then mixed individually, then the quarters are combined. This technique is repeated until a thorough mixing has occurred. The second method is the "bakers technique", which simply entails mixing the soil volume with hands covered by surgical gloves or sampling scoops. The "shake and bake technique" allows the cleanest mixing. This technique requires emptying the sample volume into a Ziploc® bag, sealing the bag, and then shaking the bag until the sample volume is thoroughly mixed. Note the qualities (color, texture, etc.) of the homogenized sample.
12. Place the sample in the designated sample container after the sample has been homogenized.
13. Label the sample container. Sample labels and tags are to be filled out with a permanent marker (*ball point pen ink bleeds when wet).* Use a grease pencil to fill out labels and tags for samples to be analyzed for VOCs. Additionally, it is recommended that the bottom of the sample jar be marked with the time of collection, the sample location, and the sampler's initials, in case the labels are rendered illegible.
14. Place the sample jar into an appropriate sized Ziploc® bag.
15. Place the sample on ice, if applicable. Generally, soil samples do not require any preservative; however, unless told otherwise, it is always good practice to put samples on ice.
16. Decontaminate the sampling apparatus using the proper procedure (see Section 6.0 Decontamination of Sampling Equipment).
17. Complete the chain-of-custody form in a clear and concise manner.
18. Repeat steps 1-17 for each sample location.

5.0 SAMPLING DEVICES

Three common sampling devices used by SATA personnel include the sample scoop, the auger, and the thin-walled sampler/corer. The sample scoop includes both dedicated disposable plastic scoops and stainless steel scoops. Augers include bucket augers and hand augers. The thin-walled sampler/corer is the least used device of the three.

5.1 Scoops

Scoops make sampling quick and easy. Any time rough terrain is encountered, scoops are the ideal device. Generally disposable scoops are used because no wet decontamination is required. Never reuse dedicated scoops and always make sure proper decontamination has been performed for non-disposable sample scoops.

5.2 Bucket and Hand Augers

Augers are manually driven stainless steel sampling devices. The hand auger is a

smaller version of the bucket auger. Augers tend to fluff sample volumes. Because of their design, augers are recommended for composite sampling. Augers are not recommended for VOC sampling because volatiles will be driven off.

5.2.1 Auger Sampling Procedures

1. Decontaminate augers before collecting first sample.
2. Cut a 12-inch hole in the plastic sheeting around sample location using scissors.
3. Discard debris and other surface material.
4. Place the auger perpendicular to the ground and twist the "T" handle in a clockwise rotation until the desired depth is achieved. To determine the depth of the sample measure the actual removed core or the depth of the newly bore hole.
5. Retrieve the specified sample volume. Any additional sample volume can be returned to the sample hole.
6. Place the sample volume into a homogenization pan and mix thoroughly.
7. Place the sample in the designated sample container. Note: Only VOA *containers are to be packed tightly.*
8. Label the sample container. Sample labels and tags are to be filled out with a permanent marker (*ball point pen ink bleeds when wet).* Use a grease pencil to fill out labels and tags for samples to be analyzed for VOCs. Additionally, it is recommended that the bottom of the sample jar be marked with the time of collection, the sample location, and the sampler's initials, in case the labels are rendered illegible.
9. Place the sample jar into an appropriate sized Ziploc® bag.
10. Place the sample on ice, if applicable. Generally, soil samples do not require any preservative; however, unless told otherwise, it is always good practice to put samples on ice.
11. Decontaminate the auger using the proper procedure (see Section 6.0 Decontamination of Sampling Equipment).
12. Complete the chain-of-custody form in a clear and concise manner.
13. Repeat steps 1-12 for each sample location.

Note: A major drawback for auger sampling is that roots, stones and other materials will not allow for good penetration. Different sample locations may have to be selected to collect samples.

5.3 Thin-Walled Sampler/Corer

The thin-walled sampler/corer is the least used of the common sampling devices. It works similar to an auger; however, it has a much smaller diameter and the core is visible from the side of the sampler barrel. This device is even more prone to refusal than the bucket auger. This device works well in moist soils with small grain sizes.

5.3.1 Corer Sampling Procedures

1. Decontaminate the augers before collecting the first sample.

2. Cut a 12-inch hole into plastic sheeting around sample location.
3. Discard debris and other surface material.
4. Place the thin-walled sampler perpendicular to the ground and twist the "T" handle in a clockwise rotation until desired depth is achieved.
5. Retrieve the specified sample volume. Any additional sample volume can be returned to the sample hole.
6. Place the sample volume into a homogenization pan and mix thoroughly.
7. Place the sample in the designated sample container.
8. Label the sample container. Sample labels and tags are to be filled out with a permanent marker only (*ball point pen ink bleeds when wet*). Use a grease pencil to fill out labels and tags for samples to be analyzed for VOCs. Additionally, it is recommended that the bottom of the sample jar be marked with the time of collection, the sample location, and the sampler's initials, in case the labels are rendered illegible.
9. Place the sample jar in an appropriate sized Ziploc® bag.
10. Place the sample on ice, if applicable. Generally, soil samples do not require any preservative; however, unless told otherwise, it is always good practice to put samples on ice.
11. Decontaminate the auger using the proper procedure (see Section 6.0 Decontamination of Sampling Equipment).
12. Complete the chain-of-custody form.
13. Repeat steps 1-12 for each sample location.

6.0 DECONTAMINATION OF SAMPLING EQUIPMENT

This procedure is arguably the most important step in sound sample collection. Poor decontamination will result in cross-contamination and inaccurate sample results. The adequacy of the decontamination is generally tested by daily rinsate blanks. The following procedures pertain to the three sampling devices noted in this SOP.

1. Determine an area to be used as a decontamination station and lay plastic sheeting down.
2. Fill and pressurize a garden sprayer with distilled water. Fill one decontamination bucket with distilled water and Alconox®. Fill and pressurize another garden sprayer (if available) with de-ionized water for the final rinse.
3. Brush off soil residue from the sampling device with a dry brush.
4. Quickly spray the sampling device with the garden sprayer to loosen the soil before placing the sampling device into the soapy water.

5. Put the sampling device into soapy water bucket. Remove soil residue with a long-handled brush, toilet brush or cleaning device. Spray off soap residue with distilled water.
6. Place the sampling device into another bucket and spray the sampling device thoroughly again with distilled water.
7. Final rinse the sampling device with de-ionized water. If solvents or weak acids are used for the final rinse, see SATA SOP No. 406, Investigative Derived Waste.
8. If stainless steel scoops are used, use multiple scoops so that decontamination does not have to be after every hole.
9. Repeat steps 1-7.
10. Contact the OSC to determine if decontaminated water may be dumped on site. Be sure to address this issue before the sampling event occurs. All PPE and other refuse generated can be disposed as solid industrial waste.

7.0 REFERENCES

EPA. 1991. *Compendium of Emergency Response Team (ERT) Soil Sampling and Surface Geophysic Procedures.* Office of Solid Waste and Emergency Response, Washington, DC. EPA/540/P-91/006.

EPA 1991. *Removal Program Representative Sampling Guidance.* Volume 1 - Soil. Office of Solid Waste and Emergency Response, Washington, DC. 9630.4-10 P892-963408.

WESTON® (Roy F. Weston, Inc.) 1993. *Standard Practices Manuel for Soil Sampling With a Spade, Scoop and Stainless Surface Soil Sampler Auger and Tube Sampler.* West Chester, PA.

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SITE ASSESSMENT TECHNICAL ASSISTANCE
STANDARD OPERATING PROCEDURE

Draft
LJK
1/25/01

SOP 304
SUBSURFACE SOIL SAMPLING

1.0 INTRODUCTION

START

The purpose of this Standard Operating Procedure (SOP) is to provide Roy F. Weston, Inc. (WESTON®), ~~Site Assessment Technical Assistance (SATA)~~ members with a step-by-step guide for collecting representative subsurface soil samples.

2.0 MATERIALS REQUIRED

Equipment requests should be completed and issued to the equipment room at least one week in advance of site operations. *Pre-assemble all sampling equipment that requires assembly prior to departure* (especially split-spoon apparatus).

Equipment for subsurface sampling is as follows:

- Personal protective equipment (as specified in the Health and Safety Plan)
- Sampling plan
- Maps/sketches
- Compass
- Tape measure (up to 300 ft)
- Survey stakes/flags
- Aluminum homogenization trays
- Sample jars
- Logbook
- Sample labels/tags
- Chain of custody forms and custody seals
- Field data sheets
- Coolers
- Ice
- Decontamination supplies (brushes, baskets, garden sprayer, phosphate-free soap, de-ionized water, etc.)
- Ziploc® bags
- Plastic sheeting
- Paper towels
- Ball-point pen
- Permanent marker
- Grease pencil
- Camera with film
- Plastic sample scoops
- Stainless steel trowels
- Plastic garbage bags
- Scissors

- Methanol/hexane/nitric acid
- Screw auger
- Bucket auger
- Post-hole auger
- T-handle
- Extension rods
- Split spoon halves (2 sets) with shoes (2)
- Plastic sample baskets
- Adapter
- Drive head
- Bit(s)
- Extension (optional)
- Slam bar (manual sampling only)
- Slam hammer (manual sampling only)
- Extraction head
- Gas can
- Generator oil
- Generator
- Jackhammer (rental)
- Heavy duty lift-jack
- Wheel barrow
- Ground fault interrupter (GFI)
- 24-inch pipe wrenches (2)
- Manual sledge hammer
- Rubber mallet
- Spray-lubricant (ingredients must not interfere with analysis parameters)
- Shovel/spade
- Roofing nails
- Tool box (vice grips, adjustable wrenches, pliers, channel locks, etc.)
- Back support belt(s)

3.0 SAFETY PRECAUTIONS

Due to unknown constituents of the soil media, the exposure potential for personnel exists and must be of primary concern. Before any soil sampling is performed, a Health and Safety Plan (HASP) must be approved by the Regional Safety Officer.

1. Follow the HASP safety schedule.
2. Determine the appropriate levels of protection to be worn by personnel.
3. Conduct air monitoring in the breathing zones and screen the sample location holes once they are selected.
4. Ensure that equipment is properly decontaminated and is in working condition prior to mobilization to the site.
5. Coordinate efforts and staffing with the client or agency with which you are working.

4.0 SAMPLING PROCEDURES

4.1 Sampling Preparation

1. Perform a general site reconnaissance to verify actual site conditions consistent with the HASP.
2. Identify and mark all sampling locations using sample flags or stakes as specified in the sampling plan. *All sample locations should be measured, documented, and mapped in reference to a permanent marker, i.e. specified utility pole, benchmark, property marker, etc.* Note: It is often convenient (for residential properties, etc.) to hammer roofing nails into wooden stakes which can be driven below the surface; therefore, a hand-held metal detector can be used to find exact sample locations.
3. Make sure all sampling equipment is properly decontaminated prior to sampling.
4. Notify utility companies to check sampling areas for underground utilities prior to digging, boring, or coring operations. Most states require 7-day notice, and have a toll-free number to arrange a single, all-inclusive, free inspection.

4.2 Auger Sampling

1. Wear appropriate personal protective equipment (PPE), as defined by the site Health and Safety Plan (HASP). *Remember that a clean pair of sample gloves must be worn for each sample collected.*
2. Assemble the auger unit, if required.
3. Clear the area to be sampled of any surface debris.
4. Spread plastic sheeting near the sample location to allow for easy accessibility and to prevent equipment contamination.
5. Remove surface soil to expose the desired depth of soil to be sampled using a screw auger, bucket auger, post-hole auger, power auger, shovel, or backhoe. The sampling device (auger, split-spoon, etc.) can be marked with a grease pencil.
6. Stage removed soil on plastic sheeting near the hole. *Special care should be taken to avoid allowing surface soil to cross-contaminate soil at the desired sampling depth.*
7. Use auger extension rods to sample to depths up to approximately 9 feet.
8. Use a *decontaminated* auger to collect sample(s) after digging or boring to the desired sample depth. The best way to retrieve desired soil, while avoiding cross-contamination, is with a bucket auger. Each 6-inch bucket auger will hold approximately 3-4 inches of augered ("fluffed") soil.
9. Decontaminate the augers after each sample-depth is collected. Note: Discarding the top inch of soil from the retrieved sample also reduces cross-contamination.
10. Transfer a portion of the sample directly into an appropriate, labeled sample container(s) with a stainless steel trowel if volatile organic analysis is to be performed.

11. Deposit sample into a homogenization tray for analysis other than volatile organics and thoroughly mix the soils to obtain a homogenous, representative sample.
12. Place homogenized sample into an appropriate, labeled sample container with a plastic scoop or stainless steel trowel, depending on the requested analysis.
13. Record all field notes on field data sheets and in the site logbook as specified in the sampling plan. The sample location should reference a permanent marker, and should be mapped and described in the field notes.
14. Photograph sample locations with landmarks in view. Keep in mind that sample locations may need to be referenced in the future, often years after your sampling event.
15. Abandon the sample hole(s) in accordance with state regulations. Generally, holes can be backfilled with removed soil materials.
16. Decontaminate all sampling equipment in accordance with SOP No. 301 Decontamination Procedures.

4.3 Split Spoon Sampling

1. Wear appropriate personal protective equipment (PPE), as defined by the site HASP. *Remember that a clean pair of sample gloves must be worn for each sample collected.*
2. Assemble cleaned spoon halves by aligning threads, inserting a clean sample basket, and screwing on the shoe.
3. Screw on the appropriate adapter for a slam bar or jackhammer apparatus. For manual sample collection, attach the slam bar to the adapter. For jackhammer-driven sample collection, attach the drive head to the adapter.
4. Clear the area to be sampled of any surface debris.
5. Spread plastic sheeting near the sample location.
6. Remove surface soil to expose the desired depth of soil to be sampled using a screw auger, bucket auger, post-hole auger, power auger, shovel, or backhoe.
7. Stage removed soil on plastic sheeting near the hole. *Special care should be taken to avoid allowing surface soil to cross-contaminate soil at desired sampling depth.*
8. Use a *decontaminated* split-spoon to collect the sample(s) after digging or boring to desired sample depth.
9. For the manual collection of a sample, slide the slam hammer over the slam bar. Slam the hammer repeatedly until the core is driven to desired depth.
10. For jackhammer-facilitated sampling, attach and lock the bit to the jackhammer. Carefully lift the jackhammer, slide the bit into the adapter, and drive the core to the desired depth. One person should support the spoon halves and the adapter during coring operations to insure that the apparatus remains vertical and that individual parts do not come unscrewed.
11. Attach the appropriate extraction head to the in-ground split spoon apparatus.
12. Using a heavy-duty lift-jack, carefully retrieve the sample core. This step usually requires two people: one to hold the jack in a vertical position while the other operates the jack.
13. Lay the core on clean plastic sheeting after the core is retrieved and carefully

unscrew the extraction head and the adapter.

14. Unscrew the shoe, but *make sure the split spoon core does not open.* Often, pipe wrenches are required to unscrew the shoe.
15. Lay out *labeled* homogenization trays alongside the sample core.
16. Open the split spoon and take care not to spill or disturb the sample core.
17. Measure the desired soil depths.
18. Use clean gloves and a clean polyethylene scoop to retrieve each sample. *Do not slide the soil down the spoon to retrieve it.* Instead, use the scoop to carefully lift the sample into a homogenization tray.
19. Transfer a portion of the sample directly into an appropriately labeled sample container(s) with a stainless steel trowel if volatile organic analysis is to be performed.
20. Deposit the sample into a homogenization tray for analysis other than volatile organics, and thoroughly mix the soils to obtain a homogenous, representative sample.
21. Place the homogenized sample into an appropriate, labeled sample container using a plastic scoop or stainless steel trowel, depending on the requested analysis.
22. Record all field notes on field data sheets and the site logbook, as specified in the sampling plan. The sample location should reference a permanent marker, and should be mapped and described in the field notes.
23. Photograph sample locations with landmarks in view. Keep in mind that sample locations may need to be referenced in the future, often years after your sampling event.
24. Abandon the sample hole(s) in accordance with state regulations. Generally, holes can be back filled with removed soil materials.
25. Decontaminate all sampling equipment in accordance with ERT SOP No. 2006
26. Sampling Equipment Decontamination.

5.0 REFERENCES

EPA. 1991. *Compendium of Emergency Response Team (ERT) Waste Sampling Procedures.* Office of Solid Waste and Emergency Response, Washington, DC. EPA/540/P-91/008.

EPA 1991. *Removal Program Representative Sampling Guidance.* Volume 1 - Soil. Office of Solid Waste and Emergency Response, Washington, DC. 9630.4-10 P892-963408.

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Appendix E

Decontamination SOPs

Draft

LJK 1/25/01

SITE ASSESSMENT TECHNICAL ASSISTANCE
STANDARD OPERATING PROCEDURES

SOP 301
DECONTAMINATION PROCEDURES

1.0 PURPOSE

To provide guidance for the decontamination of equipment used to sample, and install sample, and install sample points (monitor wells, soil borings and test pits), and make field measurements. This operating practice is not intended to be site specific or equipment specific, but to provide guidance in place of non-existent state or federal guidelines.

2.0 DISCUSSION

2.1 Introduction

The objective of decontamination procedures is to provide clean equipment for the retrieval of representative environmental samples. Decontamination procedures differ depending on the nature of the equipment used. The three categories of decontamination procedures are discussed below:

- Intrusive equipment used to install sample points including drilling (tools, augers, rods, etc.) and excavation equipment (backhoes, excavators, etc.).
- Equipment used to measure the characteristics of the media to be sampled including water level, pH, specific conductivity, and temperature probes. This category also includes pumps to purge water.
- Equipment that has contact with the sample to be submitted for laboratory analysis including bailer, split-spoons, hand auger, stainless steel bowls and scoops.

Because items from the first two categories do not contact the sample media that is sent to a laboratory for analysis, the decontamination procedures are less stringent. Dedicated and disposable equipment will be used whenever feasible to limit decontamination and the possibility of cross-contamination. This includes rope, tubing, filterware and, in some cases, soil scoops and bailers.

3.0 PROCEDURES

3.1 Intrusive Equipment

Drilling tools, including augers, rods, drill bits, hand tools, etc. will be steam cleaned prior to use and after each location. Split spoons will also be steam cleaned if not used for sample collection. Backhoe buckets and arms will also be steam cleaned prior to use and between each sample location.

3.2 Field Measurement Equipment

Water level probes will be cleaned using the following procedures:

- Wipe the probe with a paper towel.
- Alconox and potable water wash.
- Deionized water rinse.

Other measurement equipment should be rinsed with deionized water between readings.

Pumps used for well purging shall be decontaminated using the following procedures:

- Alconox and potable water scrub and pump through.
- Potable water rinse and pump through.

Rope and tubing used with the pump will be made of polyethylene and be dedicated (and disposable) to one sample location.

3.3 Sampling Equipment

Equipment used for sample collection include but are not limited to:

- Teflon bailers
- Stainless steel scoops and bowls
- Hand augers
- Split spoons

This equipment will be cleaned using the following procedures:

- Alconox and potable water scrub.
- Thorough potable water rinse.

- Deionized water rinse.
- 10% nitric acid rinse* (1% solution if used on low carbon steel split spoons).
- Deionized water rinse*.
- Acetone (pesticide grade) rinse**.
- Total air dry**.
- Deionized water rinse**.

* Only if sample is to be analyzed for metals.

** Only if sample is to be analyzed for organics.

Sampling instruments should be wrapped in aluminum foil after decontamination to keep clean before sampling.

4.0 DOCUMENTATION

Decontamination efforts should be documented in the field logbook. Decontamination fluids should be disposed of properly. Depending on site conditions, it may be appropriate to contain spent decontamination fluids. In that case, the appropriate vessel (i.e., drum) should be used depending on the ultimate disposition of the material.

5.0 INTERPRETATION

If there are questions on the interpretation or applicability of items in this operating practice, the Project Manager or Technical Manager should be consulted. In the absence of either of those, contact a Section Manager.

6.0 REFERENCES

New Jersey Department of Environmental Protection and energy Field Sampling Procedures Manual, May 1992.

"Standard Practice for Decontamination of Field Equipment Used at Non-radioactive Waste Sites", ASTM Designation D5088-90.