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New Jersey Department
of Environmental Protection
Division of Responsible Party
Site Remediation
Bureau of Field Operations
Southern Field Office
CN 407
Trenton, NJ 08625

APR 5 2001

Attention: Mike Tompkins

Re: Remedial Investigation Workplan
AABCO Steel Drum, Inc.
City of Camden, Camden County
Case #95-9-14-12-6-53
Our File #0408V123

Dear Mr. Tompkins:

Remington & Vernick Engineers, on behalf of the City of Camden, is forwarding the enclosed Remedial Investigation Workplan for the above referenced site.

If you have any questions, please contact Mark Muraczewski at (856) 216-1890.

Sincerely,

REMINGTON & VERNICK ENGINEERS, INC.

By

Terence Vogt, P.E., P.P., C.M.E.

TV/MM/gar
enclosure

cc: Edward Stankiewicz, NJDEP
Gwendolyn Faison, Mayor; Edward Williams, Supervising Planner
Alison Devine (w/encl.); Fred Martin (w/encl.)
Edward Vernick, P.E., C.M.E., President
Michael G. Meyer, P.E., C.M.E.; K. Wendell Bibbs, P.E., C.M.E.
Frederick E. Hunter; Mark Muraczewski
Bradley A. Blubaugh, Director of Operations



APR 15 2001

REMEDIAL INVESTIGATION WORKPLAN
HAZARDOUS DISCHARGE SITE REMEDIATION FUND
AABCO STEEL DRUM, INC.
BLOCK 62, LOTS 38 & 45; BLOCK 65, LOT 103
CAMDEN CITY, CAMDEN COUNTY
CASE #95-9-14-1206-53
OUR FILE #0408V0123

Prepared by:
REMINGTON & VERNICK ENGINEERS, INC.
232 KINGS HIGHWAY EAST
HADDONFIELD, NJ 08033

March 22, 2001



Edward Vernick, P.E.
NJ Lic. No. 25691

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1.0 INTRODUCTION

Remington & Vernick Engineers, on behalf of the City of Camden, has completed a Preliminary Assessment/Site Investigation (PA/SI) on a property known as the ABBCO STEEL DRUM, INC. (Case #95-09-14-1206-53) located along 308-322 North Front Street in the City of Camden, Camden County, New Jersey. The PA/SI was generated by funding provided through the New Jersey Hazardous Discharge Site Remediation Fund (HDSRF) Municipal Grant Program.

On December 18, 1996, the PA was submitted to the NJDEP, Division of Responsible Party Site Remediation for review. The PA report identified several areas of environmental concern (AOC's) at the site as defined by N.J.A.C. 7:26E. Based upon a review of the PA by the NJDEP-Site Remediation Program, the SI was performed to investigate the AOC's identified in the PA report.

On June 3, 1999, the SI was submitted to the NJDEP-Site Remediation Program for review. Based on review of the SI, additional information was requested. A revised SI, dated June 25, 1999, was submitted for review to the NJDEP-Site Remediation Program. The revised SI identified several AOC's with contaminant concentrations above NJDEP Soil Clean-up Criteria and Groundwater Quality Criteria. In accordance with N.J.A.C. 7:26E, these AOC's must be investigated to delineate the vertical and horizontal limits of contaminants. Therefore, the HDSRF grant was amended to include performing a Remedial Investigation (RI).

2.0 HISTORICAL INFORMATION

A. Historical Site Plans/ As Built Drawings

Sanborn Maps provided historical information on the past use of the parcel. The maps show that the parcel had been the site of industrial/manufacturing facilities (first appearing in the 1885 map).

B. Aerial Photograph Interpretation

Historical aerial photographs were obtained and reviewed for this facility. The photos are from the following years: 1940, 1951, 1965, 1975 and 1985.

The photos reveal that Block 65, Lot 103 contained a building until approximately 1975, when the structure disappeared from photos. Currently there are no structures on the site.

The photos also reveal that Block 62, Lots 38 and 45 have always contained buildings in various configurations. The structure,

which occupied the central portion of the site, appears to have had process piping and vents on the roof along with an associated water tank. The building disappeared from the photos in 1985. Sometime between 1965 and 1975, two new flat roofed buildings were constructed on-site.

C. General Historical Overview

Block 65, Lot 103 has historically been the site of a residential dwelling or a vacant lot. It does not appear that any industrial or manufacturing activities have taken place on this parcel.

Block 62, Lots 38 & 45 have historically been utilized for industrial/manufacturing purposes. The Sanborn Maps show that the parcel has been the site of industrial/manufacturing facilities since (at least) 1885. AABCO Steel Drum, Inc. was a facility that reconditioned steel drums. The reconditioning process consisted of cleaning and painting open-ended drums. A 3% to 4% caustic soda wash, rinse, and steam dry was used to clean the drums. Exterior rust, labels and markings were removed using a wire brush. Dents were banged out, if possible. Once the drums were clean, they were painted using a black, waterbase, fast air dry painting hood. All reconditioning processes were performed indoors.

According to available records, the facility only accepted drums that could be cleaned using a caustic soda process. These drums contained substances such as hydraulic oil, food, juices, soap and low viscosity fluids. Drums that required cleaning by other methods such as thermal processes or chemical or solvent treatments were set aside and then sent to other drum reconditioning facilities.

Hazardous wastes were generated at the facility. They consisted of residual oil wastes from the drums and rinse water associated with the drum washing process. As oil drums were delivered to the facility, any residual material was drained into a collection drum. Later, a waste oil tank allegedly replaced the collection drum. The accumulated material was removed within 90 days by a licensed hazardous waste hauler.

The caustic soda rinse water associated with the drum washing process discharged into the sanitary sewer system. Prior to reaching the sanitary system, the effluent passed through a concrete, subsurface oil/water separator. Sludge settled to the bottom and oil floated to the top. The liquid in the center was released to the sanitary sewer. A pretreatment tank was allegedly installed to treat the effluent (by raising the pH) prior to the

effluent's discharge into the oil/water separator. According to CCMUA personnel, the facility consistently exceeded its discharge permit, regardless of any pretreatment processes that were installed.

Wastes that may have been associated with the paint booth (paint and solvent wastes) were not discussed in any of the available documentation. The paint booth is described as being a "black water base fast air dry painting hood." Documentation sent to the NJDEP by AABCO states that the paint filters were water soluble and destroyed in water at the end of each day. It is assumed that the paint used was water base and any waste generated was disposed of within the sanitary sewer system. However, it is unclear as to the type of paint used in the painting process and the method of disposal for paint waste.

D. Preliminary Assessment Summary

A PA report was prepared for the AABCO STEEL DRUM, INC. Many AOC's were identified. The State approved the PA in February of 1997. Below see areas of concern identified during the preliminary assessment:

- Aboveground waste oil tank (A1)
- Aboveground water treatment tank (A2)
- Underground storage tanks (B)
- Pits (C)
- Pit (Cc)
- Caustic wash area (C1)
- Drum rinse area (C2)
- Drum rinse area (C3)
- Caustic wash area (C4)
- Drum rinse area (C5)
- Loading/off loading areas (D1)
- Loading/offloading areas (D2)
- Loading/off loading areas (D3)
- Drum storage area/Yard area (E)
- Chemical storage cabinets (F)
- Floor drains/trenches/piping (G)
- Roof leaders (H)
- Underground piping (I)
- Spill Areas (J)
- Loading/transfer areas (K)
- Boiler room (L)
- Hazardous material storage or handling areas (M)
- Paint booth (N)
- Oil & water separator (O)
- Elevator shaft (P1)
- Elevator shaft (P2)

Lead based paint/asbestos (Q/R)
 Non-contact cooling water discharges (S)

E. Site Investigation Summary

Upon NJDEP approval of the PA, an SI was performed to confirm or deny the presence of contamination at each AOC. The following is a summary of the soil and groundwater sampling results, where compounds were detected above the applicable NJDEP limits:

AOC	SAMPLE ID	CONTAMINANT
Building #1 Drum Rinsing Area (SI AOC's C1 through C5)	C4A	TPHC VOC's Metals
	C4B	TPHC VOC's Metals
	C1	VOC's
	C1A	VOC's
	C1B	VOC's
	C2A	BN's Metals
	C2B	VOC's
	C3A	VOC's
	C3B	BN's Metals
	C5A	BN's
Raised loading area	B1	TPHC Metals VOCs BNs
10,000 Gallon UST (SI AOC B1)	E2	TPHC VOC's
	E7	TPHC
1,000 Gallon UST (SI AOC B3)	F2	Metals
1,000 Gallon UST (SI AOC B3)	F4	TPHC Phenol VOC's BN's
Oil/Water Separator (SI AOC O)	A1	TPHC VOC's BN's Metals

AOC's	SAMPLE ID	CONTAMINANT
Oil/Water Separator (SI AOC O)	A2	TPHC Phenol VOCs BNs Metals
	A3	TPHC VOCs
	A4	TPHC VOCs Metals
	A5	TPHC VOCs Metals
	A6 (inside pipe)	TPHC VOCs
Loading Area #1 (SI AOC D1)	J1	BN's
	J2	BN's
	J3	BN's
Loading Area #2 (SI AOC D2)	I1	BN's
	I3	BN's Metals
Elevator Shaft (SI AOC P1)	P1B	Metals
	P1D	Metals
Building #2 Pit Location (SI AOC CC)	CC	Metals BN's
Drum Storage Area/Yard Area (SI AOC's E and J)	D1-D16,D22	TPHC BN's Metals Pesticides
Floor Drain/ Piping/Trench (SI AOC G)	G1	Phenols TPHC BN's Metals
	G1A	Metals
	G1B	Metals TPHC, Phenols, VOC's BN's
Floor Drain/ Piping/Trench (SI AOC G)	G2	Metals
	G4	Metals
Groundwater	MW-1	VOC's
	MW-2	Metals
	MW-3	Metals

Various AOCs were reported (in the SI) to contain cadmium above the applicable NJDEP limits. Since the SI was submitted, the applicable limit for cadmium was increased from 1 ppm to 39 ppm. Therefore, various samples that were considered contaminated with cadmium in the SI are not listed in the table above, if cadmium was below the current limit of 39 ppm. Therefore, those locations will not be investigated for cadmium as part of the RI.

Furthermore, a "No Further Action" (NFA) has been issued for the following areas:

A2 - Above Ground Water Treatment Tank
B2 - 1,000 gallon UST (Conditional NFA)
P2 - Elevator shaft

AOC's Q (asbestos containing material) and R (lead based paint) were remediated as part of demolition operations that have occurred at the subject site.

3.0 SITE PHYSICAL CONDITIONS

A. General

Block 62, Lots 38 & 45 are located along North Front Street (between Penn Street and Linden Street) in the northwestern section of the City. The site is located just south of the Benjamin Franklin Bridge. The operations portion of the facility was located on these two (2) parcels. Two (2) separate buildings and an associated courtyard area are located on the parcels.

Block 65, Lot 103 is located along North Second Street (between Penn Street and Linden Street). The lot is currently vacant. On numerous occasions, cars have been observed parked on the lot.

B. Soils

The USDA-Soil Conservation Service, Camden County Soil Survey does not map the City of Camden due to the urban nature of the area. However, it should be noted that the analytical results of the soil sampling performed at the site indicate the presence of chemical constituents commonly found in historic fill.

Furthermore, the USEPA has removed approximately 1.5' to 2.0' of soil from the site, and replaced with certified backfill. Areas of soil removal can be found in Appendix D.

C. Hydrology

Based on the surface water in the area and the site topography, the shallow groundwater below the site travels west towards the Delaware River. The groundwater varied between 8.5' to 15' below grade. The groundwater depth and flow direction likely fluctuate due to seasonal influences and precipitation.

D. Topography

All three (3) parcels are relatively flat. According to the USGS Camden and Philadelphia Quadrangles the site is located between elevations 10 and 20, NGVD 1929. The surrounding area consists of a mix of residential, commercial and industrial uses.

E. Geology

The subject site falls within the New Jersey inner coastal plain physiographic province. The coastal plain consists of a southeastward-dipping, seaward-thickening wedge of unconsolidated to loosely consolidated sediments. According to the USGS New Jersey Coastal Plain Mapping, the subject site is mainly underlain by the Magothy Formation. This formation makes up the upper aquifer unit of the Potomac-Raritan-Magothy Aquifer System.

F. Surface Water Bodies

The Delaware River is located approximately a quarter of a mile west of the subject site.

G. Wetlands

No wetlands are located on the subject site or on the NJDEP Freshwater Wetland Maps. Please note that the NJDEP Freshwater Wetland Maps show the upper wetland boundary (UWB) of coastal wetlands, when applicable.

H. Surrounding Land Use

The surrounding area consists of a mix of residential, commercial and industrial uses. Currently, the site is unoccupied.

4.0 DESCRIPTION OF AOC'S

The following describes the SI performed at each of the AOC's that require additional investigation. Note that the sample locations listed are only those that contained compounds above the applicable NJDEP limits.

Furthermore, as stated above, the cadmium limit has change since the SI was submitted. Therefore, certain samples that were reported to have cadmium contamination in the SI are not discussed below, if cadmium was detected below the current limit of 39 ppm.

A. 10,000 Gallon UST – Locations E2 and E7

A 10,000 gallon UST was identified within the yard area and adjacent to the northeast corner of building # 2. According to NJDEP records, the UST was registered as a 1,000 gallon UST #0065946. In addition, it was discovered that five (5) lines exit Building #1 and connect to the oil/water separator. The five (5) lines were observed alongside the northwest side of the UST.

Five (5) soil samples were collected from the tank perimeter (two (2) samples per side and one (1) sample from the northeastern end of the tank). A sixth sample could not be collected at the southwestern end of the tank due to its proximity to the building. All samples were collected from 8' below grade (0" – 6" above the water table). Of all of the samples collected, only sample E2 (which was analyzed for PP+40, TPHC, pH and total sodium) contained compounds above the applicable NJDEP limits. Specifically, TPHC and VOC's were detected at elevated levels.

Furthermore, one (1) sample was collected from 0" – 6" beneath the UST piping (3' below grade) and analyzed for TPHC and VOC's. Sample E7 contained TPHC above the applicable NJDEP limits.

See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

B. 1,000 Gallon UST – Locations F2 and F4

A UST was located adjacent/parallel to Building #1. The capacity of the tank is 1,000 gallons and it is believed to have contained liquid waste from the drum rinse/wash operations that occurred inside the building.

Four (4) soil samples were collected from the tank perimeter tank (one sample per side and one sample from each end). All samples were collected from 8' below grade (0" – 6" above the water table) and analyzed for PP+40, TPHC, pH and total sodium.

The results of the soil sampling indicate that sample F2 contained lead, and sample F4 contained phenol, TPHC, BN's and VOC's, above the applicable NJDEP limits.

See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

C. **Building #1 Drum Rinsing Area** – Locations C1, C1A, C1B, C2A, C2B, C3A, C3B, C4A, C4B and C5A

Five (5) pits were present inside Building #1. The pits were used for a caustic wash process. Because of the close proximity and similar analytical results from all of the five (5) pits, they will be combined to form one (1) AOC for purposes of performing the RI.

Each pit was investigated by performing a boring through the bottom of the pit and collecting a soil sample from the 0" – 6" zone directly beneath the pit. All associated piping was also investigated by collecting a soil sample from the 0" – 6" zone beneath the piping. Furthermore, if sediment was present in the pit, a grab sample was collected. All samples, which were collected from depths ranging from 1' – 2' below grade (depth range not including sediment samples), were analyzed for TPHC and PP + 40.

Analytical results indicate the presence of cadmium, lead, zinc, TPHC, VOC's and BN's above the applicable NJDEP limits in this AOC. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

D. **Building #2 Pit Location** – Location CC

A 4'x2'x2' concrete pit was present inside the northwest corner of Building #2. The bottom of the pit was filled with solid waste.

A boring was performed through the bottom of the concrete pit and a soil sample (CC) was collected 0" – 6" below the concrete pit bottom (2.5' below grade). The soil sample was analyzed for TPHC and PP + 40.

Analytical results indicate the presence of lead and BN's above the applicable NJDEP limits in this AOC. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

E. **Loading Area #1** – Locations J1, J2 and J3

Loading docks were located at the northeast corner of Building #1 and adjacent to Second Street. Three (3) soil samples were collected from this AOC. The samples were biased towards low

points and cracked/deteriorated pavement and were collected 0" – 6" below the pavement. All samples were analyzed for PP + 40 and TPHC. The volatile portion of the PP + 40 scan was collected from 1.5' – 2' below the pavement.

The analytical results indicate that all three (3) soil samples contained BN's above the applicable NJDEP limits. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

F. Loading Area #2 – Locations I1 and I3

A raised loading ramp was present along the southwest corner of Building #1. Three (3) soil samples were collected from this AOC. The soil samples were collected at the soil/pavement interface, 0" – 6" below the pavement. All samples were analyzed for PP + 40 and TPHC. The volatile portion of the PP + 40 scan was collected from 1.5' – 2' below the pavement.

The analytical results indicate that two (2) of the three (3) samples collected contained compounds above the applicable NJDEP limits. Specifically, sample I1 contained BN's, and sample I3 contained BN's and lead, above the limits. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

G. Drum Storage Area/Yard Area – Locations D1 through D16 and D22

The yard area was utilized for drum storage. A building (with a basement) existed at this location between 1977 and 1982. To investigate this AOC, the yard area was divided into a grid pattern of 22 sections, approximately 30' by 30' each (some grids are smaller due to the location of buildings/structures). From each section a soil sample was collected from the surface (VOC portion was collected from 1.5' – 2' below grade). Each soil sample was analyzed for PP + 40, TPHC and pH.

Of the 22 samples collected, 17 soil samples contained compounds above the applicable NJDEP limits. Specifically, TPHC, BN's, lead, mercury, cadmium, arsenic, zinc, copper, antimony and pesticides were detected above the limits. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

H. Floor Drain/Piping/Trench – Locations G1, G1A, G1B, G2 and G4

Floor drains, piping and a trench with matting material were located in the vicinity of Building #1. These are believed to be associated with the following AOC's: Building #1 Drum Rinsing Area, 1,000 Gallon UST and Oil/Water Separator.

Soil samples were collected from the drains piping and trench in accordance with N.J.A.C.7:26E. Specifically, soil samples were collected from depths ranging from grade to 3' below grade. All samples were analyzed for TPHC, PP+40, pH and total sodium.

Analytical results indicate the presence of phenols, TPHC, BN's and lead above the applicable NJDEP limits in samples G1 and G1B (G1B also contained VOC's above the limits). Furthermore, G1A contained lead and zinc, G2 contained lead, and G4 contained lead and antimony above the applicable NJDEP limits.

See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

I. Elevator Shaft – Locations P1B and P1D

An elevator shaft was identified at the southwest corner of Building #1. Local interviews indicated that solvents possibly were discharged into the shaft. Four (4) test pits were performed to a depth of 5' below grade along each side (one test pit per side) of the elevator (bottom of the shaft was approximately 4.5' below grade). A soil sample was collected from each test pit from 5' below grade and was analyzed for TPHC and PP+40.

Analytical results indicated the presence of lead in sample P1B and P1D above the applicable NJDEP limit. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

J. Oil/ Water Separator – Locations A1 through A6 and B1

An oil/water separator was present on-site, located in the yard area adjacent to Building #1 and across from the raised, concrete loading dock associated with Building #2. Caustic wash water from the drum rinsing process was discharged into the oil/water separator. From there, the discharge went into the sanitary sewer system. The pipe that connects the oil/water separator to the sanitary sewer system exits the separator and runs parallel to Building #1. The pipe discharged into the sewer system at Front Street.

Six (6) soil samples were collected from this AOC from depths ranging from 3' – 6' below grade. The samples were all analyzed for PP+40, TPHC, pH and total sodium. TPHC, VOC's, BN's, phenol, beryllium, cadmium and zinc was detected above the applicable NJDEP limits. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

K. Groundwater

Based on the results of the soil investigation, three (3) monitoring wells were installed and sampled. MW-1 is located in the area of the former oil/water separator. MW-2 and MW-3 are in the vicinity of the drum storage/yard area. All samples were analyzed for PP+40.

Analytical results indicate the presence of lead above the applicable NJDEP limit in MW-2 and MW-3. Furthermore, VOC's were detected above the applicable limits in MW-1. See the section below, entitled "Proposed Remedial Investigation" for a description of the proposed additional investigation of this AOC.

5.0 PROPOSED REMEDIAL INVESTIGATION

It should be noted that soil and/or groundwater contamination may extend off-site. If contamination does extend into neighboring properties, gaining legal access of those properties to complete the investigation will be pursued in a timely manner so as not to delay the project.

A. Proposed Soil Delineation (Locations E2, E7, F2, F4 and CC)

Certain AOC's contained contamination that displayed reliable field delineation qualities (i.e., high PID readings, odor and soil staining). Specifically, the areas of the 10,000 gallon UST, the 1,000 gallon UST and the Building #2 pit location contained soil contamination that was obvious. Therefore, one (1) soil boring will be performed in each of the above-listed locations to determine the upper and lower vertical limits of soil contamination. A soil sample will be collected from the 0" – 6" zone directly above the contaminated zone in the soil column, based on field indicators. Once it appears, through field indicators, that the boring reached the "clean" zone, a soil sample will be collected to confirm this assumption.

Once the vertical limits of soil contamination have been established, additional soil samples will be collected, radiating 15' – 20' away from the SI sampling location, to determine the horizontal limit of contamination. By collecting samples 15' – 20' away from the SI sampling location, the perimeter samples will be

*Maxi mit vertik
Soil samples
vertical zone delineation*

spaced approximately 25' - 30' apart, which is in accordance with N.J.A.C.7:26E. The horizontal delineation samples will be collected from the depth determined to be the lower vertical limit of contamination.

If the above-described soil sampling does not delineate the entire horizontal limit of soil contamination, additional samples will be collected. The additional samples will be collected from the same frequency as described above, immediately surrounding any areas that were not fully delineated in the previous phase of horizontal delineation sampling. This process will be continued until the AOC is fully delineated. Sampling results obtained during the SI will be used to establish a horizontal limit of soil contamination, where applicable.

All samples collected for the horizontal and vertical soil delineation will be analyzed for all parameters detected above the applicable NJDEP limits in the SI.

B. Proposed Soil Delineation (Locations C, G, B1 and A)

As noted above, certain AOC's contained contamination that displayed reliable field delineation qualities. Therefore, due to ease of field delineation, only two (2) soil samples were proposed to determine the vertical zone of contamination. However, AOC's containing contamination that does not have reliable field indicators (i.e., chlorinated solvents, metals, no evidence of a discharge through soil discoloration, etc.), will require more extensive sampling to identify the vertical limits of soil contamination.

Specifically, in the areas of the Building #1 drum rinsing area, the floor drain/piping/trench area and the oil/water separator, compounds are present that can not be field delineated. Furthermore, because soil samples previously collected from these AOC's are consistent in compounds and concentrations detected, the entire AOC will be investigated together (as opposed to delineating individual samples).

One (1) soil boring will be performed in each of the above-listed AOC's, from the location of the most contaminated SI soil sample (locations C1B, G1 and A2) to determine the upper and lower vertical limits of soil contamination. A soil sample will be collected every 2' from grade to 5' into the groundwater table (from grade to approximately 15' below grade).

The sampling will be phased by analyzing only one (1) sample above the SI sample depth and only one (1) sample below the SI

sample depth. Selection of samples to be analyzed will continue in this manner until the upper and lower limits of soil contamination have been ascertained.

Once the vertical limits of soil contamination have been established, additional soil samples will be collected, radiating 15' - 20' away from the outermost SI sampling location in that AOC, to determine the horizontal limit of contamination. By collecting samples 15' - 20' away from the SI sampling location, the perimeter samples will be spaced approximately 25' - 30' apart, which is in accordance with N.J.A.C.7:26E. The horizontal delineation samples will be collected from the depth determined to be the lower vertical limit of contamination.

If the above-described soil sampling does not delineate the entire horizontal limit of soil contamination, additional samples will be collected. The additional samples will be collected from the same frequency as described above, immediately surrounding any areas that were not fully delineated in the previous phase of horizontal delineation sampling. This process will be continued until the AOC is fully delineated. Sampling results obtained during the SI will be used to establish a horizontal limit of soil contamination, where applicable.

All samples collected for the horizontal and vertical soil delineation will be analyzed for all parameters detected above the applicable NJDEP limits in any of the SI samples from that AOC.

C. Proposed Soil Delineation (Locations P, J, I and D)

Based on observations while conducting the SI, it appears that historic fill is present throughout the subject site. Specifically, while performing sampling in the elevator shaft area, loading areas and drum storage area/yard area, non-indigenous material, including construction/demolition debris was observed. Furthermore, the compounds detected above the applicable NJDEP limits in these AOC's consisted of (but were not limited to) benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, lead, cadmium, arsenic and zinc, which are typical contaminants of historic fill material.

Considering the evidence that historic fill is present throughout the site, which accounts for the contamination at the above-listed AOC's, those AOC's will be investigated in accordance with N.J.A.C.7:26E-4.6(b). We believe enough data has been generated during the SI (especially from the grid sampling performed in the drum storage area/yard area) to characterized the

quality of the historic fill. Furthermore, delineation of historic fill material is not required beyond the property boundary. Therefore, we propose to perform soil borings at each of the four (4) corners of the property (2 located along Front Street and 2 located along Second Street). The borings will be extended until native material is encountered to visually establish the vertical limit of historic fill.

D. Proposed Groundwater Investigation

As noted above, VOC's were detected in MW-1 above the applicable NJDEP limits. Furthermore, samples collected from MW-2 and MW-3 contained lead above the applicable NJDEP limits. Pursuant the N.J.A.C.7:26E-4.4(h)2., we propose to resample the monitoring wells to confirm the presence of contamination. This confirmation sampling will include collecting two (2) additional samples from each well, over a 30-day period. The results of which will be averaged with the original results to determine compliance with the NJDEP applicable limits. All samples will be analyzed for compounds detected above the applicable limits during the SI (i.e., lead or VOC's).

Because elevated levels of lead were found in MW-2 and MW-3, the "Low Flow Purging and Sampling Procedure for the Collection of Groundwater Samples" will be utilized to collect additional samples from these wells.

Please note that MW-1 may have been damaged during on-site demolition work. If so, the well will be repaired or replaced (if necessary) before conducting additional sampling.

Once the proposed sampling has been performed and groundwater contamination has been confirmed or denied, a proposal will be submitted regarding any further groundwater investigation (if necessary) at the subject site.

6.0 PROJECT SCHEDULE

- | | | |
|----|--|-----------------|
| A. | NJDEP review and approval of RIW | 4/1/01-4/30/01 |
| B. | Solicit quotes and prepare subcontracts for heavy equipment and laboratory services | 5/1/01-5/15/01 |
| C. | Schedule field work | 5/16/01-5/31/01 |
| D. | Perform field work, including collecting soil samples, collecting groundwater samples, performing soil borings, etc. | 6/1/01-6/15/01 |

- E. Survey sample locations 6/16/01-6/30/01
- F. Obtain and review analytical results/Prepare and submit RIR to the NJDEP 7/1/01-7/31/01
- G. NJDEP review of the RIR 8/1/01-8/31/01

7.0 PRINCIPAL PERSONNEL

The principal personnel that will conduct the RI are as follows:

- A. Terence Vogt, P.E., C.M.E. – Group Leader

As group leader, Terence Vogt is responsible for the overall performance of the RI and preparation of subsequent reports.

- B. Mark Muraczewski – Project Manager

As project manager, Mark Muraczewski is responsible for implementation of the RI, including performance of field work, generation of reports, solicitation of quotes, coordination of personnel, consultation with NJDEP and the City of Camden, etc.

- C. Marco Carulli – Health and Safety Officer

As health and safety officer, Marco Carulli is responsible for the selection of personal protective wear to insure that all field work is conducted in accordance with OSHA regulations. He will also be responsible for monitoring the air for dust and/or vapor hazards.

8.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

In order to generate analytical data of known and defensible quality, adherence to established quality assurance protocol is necessary. Quality assurance measures coupled with a statistically based sampling plan will improve sample collection methods, while maintaining the integrity of the samples prior to analysis. This section details the standard operating procedures proposed to maintain consistency in sample collection and handling. As will be demonstrated, the prime objective of the quality assurance requirements will be to maintain the physical form and chemical composition of the sample and to prevent contamination from other sources or changes in contaminant concentration.

- A. Analytical Methods

1. Volatiles, MTBE-SW-846 EPA Method 8021A
2. Purgeables-SW-846 EPA Method 8260

3. BN/AE-SW-846 EPA Method 8270B
4. Petroleum Hydrocarbons-USEPA 418.1
5. Metals (Soil)-SW 846 Methods including Nitric acid digestion followed by:
 - a. Furnace;
 - b. Flame Atomic Absorption;
 - c. Flameless Atomic Absorption; or
 - d. Inductively Coupled Plasma Analysis.
6. Lead-SW 846 EPA Method 7420
7. Lead (Aqueous)-SW EPA Method 846 7421
8. Metals (Aqueous)-Methods prescribed in Methods for Chemical Analysis of Water and Wastes, EPA-600-4-79-020, March 1983
9. Pesticides/PCB's-SW-846 EPA Method 8081
10. Phenols (Aqueous)-SW-846 EPA Method 9065
11. Cyanide (Aqueous)-EPA 335.2
12. Cyanide (Soil)-SW-846 EPA Method 9010

B. Sample Containers

Prior to the collection of the sample, consideration will be given to the type of container used to store and transport the sample. The container selection will be based upon the sample matrix and proposed analytical methods. The type of container including color, size, and closure will be as follows:

1. VOA (Aqueous)-2 Glass vials, Teflon lined septum cap, 40 ml.
2. VOA (Soil)-Glass wide mouth jar, Teflon lined lid, 4 oz.
3. TPHC (Aqueous)-Glass, 1 liter
4. TPHC (Soil)-Glass, 125 ml glass wide mouth, Teflon lined lid

5. BN/AE (Aqueous)-Glass, amber, Teflon lined cap, 1 or 2.5 gallons
6. BN/AE (Soil)-Glass, wide mouth with Teflon lined cap, 8 oz.
7. Metals (Aqueous)-Plastic or Glass, 600 ml.
8. Pesticides/PCB's (Aqueous)- Glass, amber, Teflon lined cap, 1 or 2.5 gallons
9. Pesticides/PCB's (Soil)-Glass, wide mouth with Teflon lined cap, 8 oz.
10. Phenols (Aqueous)- Glass, 1 liter
11. Cyanide (Aqueous)-Plastic or Glass, 1 liter or larger

C. Sample Handling, Packaging, and Shipping

All sample containers will be laboratory cleaned by the laboratory performing the analysis.

The sample bottles will be prepared for shipment accompanied by a chain of custody. The chain of custody will accompany the bottles during transportation to the field, sample collection, transportation back to the lab, during analysis, and identified final disposal of the sample container.

When collecting the sample, field personnel will record the sample identification number, consultant, date, and required analytical analysis on each sample. After the sample collection, the bottles will be immediately placed into the cooler.

Throughout the sampling process, care will be taken to avoid contamination of the coolers and bottles. Sample coolers and bottles will be stored and transported in clean environments. Clean sampling equipment will never be stored near solvents, gasoline, or other equipment that could be a potential source of contamination.

D. Sample Preservation

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. This will be accomplished by adding the preservative to the sampling bottles by the laboratory prior to shipment. The following is a summary of the matrix, required analysis, and preservation method:

1. VOA (Aqueous)-Cool, 4 deg. C, dark, 4 drops HCl.
2. BN/AE (Soil and Aqueous)-Cool, 4 deg. C.
3. Pesticides/PCB's (Soil and Aqueous)-Cool, 4 deg. C.
4. Metals (Aqueous)-HNO₃ to pH < 2
5. TPHC (Soil)-Cool, 4 deg. C.
6. Phenols (Aqueous)-Cool, 4 deg. C.
7. Cyanide (Aqueous)- -Cool, 4 deg. C, 0.6g Ascorbic acid, NaOH to pH < 2.

E. Field Decontamination Procedures

All equipment associated with sampling episodes will be cleaned prior to usage. The first step in decontamination procedures will include a detergent and water wash to remove all visible particulate matter and residual oils and grease. This will be followed by a tap water rinse and a distilled and deionized water rinse to remove the detergent.

When aqueous sampling will be performed, the following additional steps will be completed:

1. An acid rinse (if metal samples will be collected) followed by another water rinse.
2. A high purity solvent rinse will be used to remove trace organics.

F. Sampling Equipment

1. Soil
 - a. Stainless steel trowels for sampling 0" – 6" below grade.
 - b. Drill rig for the investigation of subsurface material deeper than 6" and the performance of soil borings. Soil samples will be collected from the split spoon utilizing a stainless steel trowel or directly with a sample jar.

2. Groundwater
 - a. Bottom-fill bailers (dedicated).
 - b. Peristaltic/submersible pump.

G. Field Blanks

The primary purpose of the field blank is to place a mechanism of control on sampling equipment handling, preparation, storage and shipment. The field blanks will consist of 2 sets of identical bottles; one set with demonstrated analyte free water provided by the laboratory and one set of clean, empty bottles. Volatile organic fraction field blanks will be provided in 40 ml vials. In a suspect area of the site the field blank water will be passed from the full set of bottles through the dedicated sampling equipment and into the empty set of bottles. The field blanks will travel with the sample bottles in the cooler.

H. Trip Blanks

Trip Blanks will be used exclusively for volatile organic analysis with the purpose to measure possible cross contamination during shipping. The trip blank will not be opened and will travel with the collected samples. The trip blank will consist of two (2) 40 ml vials filled with analyte free water.

I. Sample Collection

1. Soil
 - a. Select soil sampling location.
 - b. Select proper sampling equipment, methods and health and safety precautions.
 - c. Perform soil boring.
 - d. Log soil by accepted soil classification system.
 - e. Collect soil samples for laboratory analysis.
2. Groundwater

A qualified NJDEP certified laboratory will sample the groundwater in accordance with the applicable NJDEP sampling requirements. The groundwater monitoring wells will be installed in the following manner:

- a. Obtain well permits from the NJDEP.
- b. Well driller will be licensed with the NJDEP.
- c. Well permit number will be affixed to the top of the well casing.
- d. Wells will be developed to a turbid free discharge.
- e. If the groundwater is suspected to be contaminated, the development liquid and drill cuttings will be containerized while awaiting groundwater testing.

9.0 SOIL/GROUNDWATER CLEANUP CRITERIA

Throughout this report, soil and groundwater cleanup criteria are referred to as "applicable NJDEP limits". Specifically, the applicable NJDEP limits are as follows:

A. Soil

The current most stringent NJDEP Soil Cleanup Criteria, as revised on May 12, 1999. The most stringent cleanup limits may be either the residential direct contact soil cleanup or the impact to groundwater soil cleanup criteria, depending upon the compound.

B. Groundwater

The current NJDEP Class IIA Groundwater Quality Criteria.