UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

FINAL RCRA FACILITY INVESTIGATION OF TEN LANDFILLS

JUNE 1997

for:

U.S. Army Corps of Engineers
Baltimore District

USACE Contract No. DACA31-94-D-0017
Delivery Order No. 75

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DIVISION OF SOLID & HAZARDOUS MATERIAL

US Army Corps
of Engineers

Malcolm Pirnie, Inc.
104 Corporate Park Drive
White Plains, NY 10602

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1.0 INTRODUCTION

1.1 Project Background

The United States Military Academy (USMA) is located on the western slope of the Hudson River at West Point, Orange County, New York. The USMA was established in 1802 as a training facility for officers in the military service. The Department of the Army (DA) owns, controls and operates the USMA. The location of the USMA is shown on Figures 1-1 and 1-2.

Various studies, assessments and investigations concerning the environmental conditions of the USMA have been conducted by the DA since 1980. Two recent reports developed by Woodward-Clyde Federal Services (WCFS) are particularly relevant to the development of this report. The first report is the January 1994 Resource Conservation and Recovery Act Facility Assessment Work Plan of Ten Landfills that described the investigation procedures to evaluate ten landfills located throughout the USMA. The ten landfills correspond to ten solid waste management units (SWMUs). SWMU No. USMA-15 has been divided into two landfills (USMA-15A and USMA-15B). The landfills and the corresponding SWMU Number are referred to as:

- PX Landfill (USMA-1)
- Michie Stadium Parking Lot Landfills, Lots A, B, C and E (USMA-2, 3, 4 and 6)
- Professor's Row Landfill (USMA-8)
- Village Farm Landfill (USMA-13)
- Morgan Farm Road Landfill (USMA-15A)
- High School Landfill (USMA-15B); and
- Camp Buckner Landfill (USMA-35).

The second report is the June, 1995 RFA of Ten Landfills Report. The report presents the findings of the RFA Work Plan.

Based upon the results presented in the RFA of Ten Landfills Report, the New York State Department of Environmental Conservation (NYSDEC) required the USMA to further assess the environmental conditions associated with nine of the Ten Landfills (except the Professor's Row Landfill) in a letter dated December 11, 1995 (Attachment A-1). The Professor's Row landfill was excluded because it could not be located during the investigation.

To further assess the environmental conditions associated with the ten landfills as requested by the NYSDEC, Delivery Order Number 0075 was issued by the United States Army Corps of Engineers (USACE) Baltimore District to Malcolm Pirnie, Inc. (Malcolm Pirnie) under Contract Number DACA31-94-D-0017 on April 18, 1996. While conducting the work detailed in Delivery Order 0075 of the USMA Ten Landfill Investigation, additional tasks were identified by the USMA and by the NYSDEC. A modification request was approved by the USMA for Malcolm Pirnie to conduct the additional work. This report summarizes the scope of work and results of the investigation for Delivery Order Number 0075 and Modification 1 to this Delivery Order.

1.2 Project Objective and Scope

The USACE authorized Malcolm Pirnie to develop and implement a RFI Work Plan Addendum for the Ten Landfills (Figures 1-3a and 1-3b). The objective of the addendum was to perform additional sampling and investigation of landfills investigated under the 1995 Ten Landfill RFA Report as requested by the NYSDEC. This objective was met by completing the following tasks:

1) Installation, development and sampling of three monitoring wells at the Village Farm and Camp Buckner Landfills (total of six monitoring wells).

Originally three wells were also to be installed at the Morgan Farm Road Landfill, but additional seep and surface water sampling and a review of the closure report, was an approved substitute by the NYSDEC (Attachment A-2).

2) Collection of groundwater samples from nineteen previously installed monitoring wells located at the PX Landfill, High School Landfill and Michie Stadium Parking Lot Landfills A, B, C and E. All groundwater samples were analyzed for unfiltered Target Analyte List (TAL) metals.

3) Completion of an explosive soil gas survey of the PX Landfill, Michie Stadium Parking Lots A, B, C and E, Village Farm Landfill, High School Landfill, and Camp Buckner Landfill. This included the layout of sampling points at each landfill, advancement of sampling boreholes, and field testing of the vapor space in the sampling hole for percent explosive gas. This same procedure was also used at Michie Stadium Parking Lot F in accordance with Modification 1 to Delivery Order 0075.

4) In place of the proposed excavation and soil sampling from two test pits at Camp Buckner Landfill, two soil borings were advanced using a drill rig. One boring was advanced through the landfill and a soil sample was collected from the native material below the waste material. The second boring was advanced upgradient from the landfill to collect a background soil sample. Both soil samples were analyzed for TAL metals. Four test pits were excavated by Miller Environmental Group at the Village Farm Landfill. From the four test pits, two composite soil samples were collected from the fill material. Both of these soil samples were analyzed for TAL metals and Toxicity Characteristic Leaching Procedures (TCLP) for cadmium, lead and mercury.

The objectives presented in the Modification 1 Delivery Order 0075 were accomplished by performing the following tasks:

1) The repair of seven damaged flush mount monitoring wells in Michie Stadium Parking Lots.

2) Monitoring well PXMW-02 was a flush mount well located at the PX Landfill. During the July 1996 groundwater sampling event, this well was found to be covered with approximately 20 cubic yards of soil. In an attempt to prevent future disturbance of the well, three protective four inch diameter steel posts filled with cement (bollards) were installed around the well. The well was also converted from a flush mount to a stickup by extending the PVC well casing three feet above ground and installing a protective casing and lockable cap over the well.

3) The collection and analysis of two surface water and one seep sample to determine the need for installing the three monitoring wells at the Morgan Farm Road Landfill. The NYSDEC used the analytical results of these samples and the closure report to determine that there was no need for the installation of the three monitoring wells that were proposed in the original scope of work for this landfill (Attachment A-2).

2.0 SCOPE OF WORK

Section 2.0 describes the details of the scope of work completed for this investigation.

2.1 Groundwater Investigation

The groundwater investigation consisted of four specific tasks:

- Monitoring Well Installation;
- Monitoring Well Development;
- Monitoring Well Survey; and
- Monitoring Well Sampling.

Each of these tasks are described in the following sections.

2.1.1 Monitoring Well Installation

Six monitoring wells were installed as part of this RFI Work Plan Addendum (three monitoring wells each at the Village Farm (MWVF-01, MWVF-02, MWVF-03) and Camp Buckner Landfills (MWCB-01, MWCB-02, MWCB-03) Figures 2-1 and 2-2, respectively.

Boreholes for the monitoring wells were drilled with a truck-mounted George E. Failing SS-25 drill rig using either four or six and one-quarter inch diameter hollow stem augers or a six-inch diameter air percussion hammer. The hollow stem augers were used to drill through the overburden. The air percussion hammer was used to drill into the shallow bedrock and at locations where auger drilling encountered refusal because of cobbles in the overburden. Soil samples were collected from each borehole using a stainless steel split spoon sampler to visually classify the material and to screen the material for organic vapors using a HNu photoionization detector (PID). These samples were collected at two foot intervals beginning at the ground surface and continuing to the base of the borehole. Samples were not collected where refusal was encountered or from the shallow bedrock.

Monitoring well MWVF-01 was installed upgradient of the Village Farm Landfill at a depth of 14 feet below the ground surface. The water table was encountered at approximately seven feet below the ground surface and bedrock was at 14 feet below ground. The well screen was installed from 4 to 14 feet below ground surface so that the screen bridged the surface of the water table.

Monitoring wells MWVF-02 and MWVF-03 were installed downgradient of the Village Farm Landfill at depths of 44 feet and 16 feet below the ground surface, respectively. Competent bedrock was encountered at approximately 32 feet below the ground surface at MWVF-02 and at approximately 13 feet below the ground surface at MWVF-03. The water table was at approximately 31 feet below ground at MWVF-02 and at approximately eight feet below ground at MWVF-03. A 15 foot well screen was installed from 29 to 44 feet in MWVF-02 and a 10 foot well screen was installed from 6 to 16 feet in MWVF-03 in order to bridge the surface of the water table in each well. See boring logs and well construction logs for details (Attachment B).

Monitoring well MWCB-02 was installed upgradient of the Camp Buckner Landfill to a depth of 12.5 feet below the ground surface and bedrock was encountered eight feet below grade. The well screen was installed from 2.5 to 12.5 feet below ground so that the screen bridged the surface of the water table.

Monitoring wells MWCB-01 and MWCB-03 were installed downgradient of the Camp Buckner Landfill at depths of 29.5 feet and 13.5 feet below the ground surface, respectively. Both wells were screened directly above the bedrock surface. The water table was encountered at approximately five feet below grade at MWCB-01 and at approximately eight feet below grade at MWCB-03. MWCB-01 was screened to bridge the water table from 3.5 to 13.5 feet below grade. MWCB-03 was installed deeper because the first water bearing unit was still within the landfill mass. The landfill extended to approximately 17 feet below grade, so the well was screened from 19.5 to 29.5 feet below grade. See boring logs and well construction logs for details (Attachment B).

2.1.2 Monitoring Well Development

Upon completion of the monitoring well installation, each newly installed well was developed with a two-inch submersible pump and dedicated discharge hose. The pump was decontaminated after it's use at each well by scrubbing with a non-phospate detergent and by pumping a deionized water and detergent mix through the pump. The pump was also rinsed with deionized water prior to it's use at the next well location. During development, the turbidity of the discharged water was measured with a Hach 2100P Turbidimeter. Development continued at each location until the turbidity of the groundwater discharge was less than 50 nephelometric turbidity units (NTUs). The final turbidity in wells MWVF-01, MWVF-02 and MWVF-03 was 45 NTU's, 47 NTU's and 20 NTU's, respectively. Both wells MWVF-01 and MWVF-02 were pumped dry during development and were allowed to recharge prior to continuing the well development. The final turbidity in wells MWCB-01, MWCB-02 and MWCB-03 was 49 NTU's, 42 NTU's and 42 NTU's respectively.

2.1.3 Monitoring Well Survey

The newly installed wells were surveyed by Badey & Watson Surveying and Engineering, a New York licensed surveyor to obtain vertical and horizontal reference points. The monitoring well that was extended at the PX Landfill (MWPX-02) was also resurveyed to obtain its new elevation. Ground elevation was measured to the nearest 0.1 foot and well casings to the nearest 0.01 foot. All vertical measurements were referenced to existing site data (e.g. previously installed and surveyed monitoring wells).

2.1.4 Monitoring Well Sampling

Groundwater samples were collected from the six newly installed wells at Camp Buckner and Village Farm Landfills (three from each landfill) and from the 20 previously installed monitoring wells. Groundwater samples were collected from the newly installed wells two weeks after the completion of the well development. Prior to the collection of groundwater samples, groundwater level measurements were obtained.

The hydrogeologic conditions encountered, caused a variation in the groundwater sampling procedure stated in the approved Work Plan Addendum. After reviewing the groundwater sampling logs produced by Woodward-Clyde and the present site conditions, modifications were made to the purging technique. These changes were discussed with the USMA and were also performed by Woodward-Clyde. Modifications included varying the well evacuation device from a 2-inch diameter submersible pump to a bailer, depending on the height of water in the wells. Several wells did not produce enough yield to evacuate the three to five times the standing water volume minimum as proposed in the Work Plan Addendum. Monitoring wells were purged until they were dry, or three well volumes were removed or until the field parameters of temperature, specific conductance, pH and turbidity were within 10% variation while purging (Attachment C). Groundwater samples were collected within two hours of the completion of purging.

The submersible pump and electric cable were properly decontaminated between wells and a dedicated discharge hose was used at each well. Groundwater samples were collected using disposable polyethylene bailers and submitted to the laboratory for unfiltered TAL metal analyses.

2.2 Explosive Soil Gas Survey

An explosive soil gas survey was completed in accordance with the approved work plan at the PX Landfill, Michie Stadium Parking Lots A, B, C, E and F, Village Farm Landfill, High School Landfill, and Camp Buckner Landfill. Prior to the soil gas survey, a sampling grid was established at each landfill with an approximate 100 foot spacing, except at Michie Stadium Parking Lot B, Village Farm and Camp Buckner Landfills where a variable spacing between 50 and 100 feet was used due to access constraints.

At each soil gas survey location, a nominal 1-inch diameter sampling hole was advanced to a depth of approximately 5 feet or refusal using a truck mounted, hydraulically driven probe. A vacuum pump was connected to the probe to facilitate the movement of soil

vapors into the sampling hole. The vacuum was disconnected and the tip of a combustible gas indicator (CGI) was placed above the probe to field screen for percent combustible gas. Upon completion, the sampling hole was filled with bentonite and previously paved surfaces were restored with an asphalt patch.

2.3 Test Pit Excavation

In place of the proposed excavation of two test pits at Camp Buckner Landfill, two soil borings were advanced. One boring was advanced through the landfill and a soil sample was collected from underneath the waste material. The second boring was advanced upgradient from the landfill to collect a background soil sample. Both soil samples were analyzed for TAL metals.

On December 18, 1996, IT Corporation under contract through the Omaha District Army Corps of Engineers performed a test pit survey at Village Farm Landfill. Nineteen test pits were excavated to define the limits and volume of the fill area. Soil samples were not collected from the test pits excavated by IT Corporation. It was estimated that the landfill consists of approximately 2,000 cubic yards of fill material. The landfill debris consisted of plastic, cloth, tires, wood and scrap metal. The test pit survey was utilized to ensure the monitoring wells were located up and downgradient of the landfill.

In addition on April 9, 1997, four test pits were excavated by Miller Environmental Group at the Village Farm Landfill. From the four test pits, two composite soil samples were collected from the fill material. Both of these soil samples were analyzed for TAL metals and Toxicity Characteristic Leaching Procedures (TCLP) for cadmium, lead and mercury.

3.0 RESULTS

3.1 Groundwater Analytical Results

The 26 groundwater samples that were analyzed for unfiltered TAL metals in accordance with the Army Corps of Engineers January 22, 1996 Scope of Work, were compared to the New York State Department of Environmental Conservation Water Quality Regulations Surface Water and Groundwater Classifications and Standards (water quality standards) New York State Codes, Rules and Regulations, Title 6, Chapter X parts 700-705, water class GA. Water class GA is for fresh groundwater. A total of 10 different metals were detected above the water quality standards from the 26 groundwater samples that were collected and analyzed. The metals that were detected are cadmium, iron, sodium, manganese, lead, arsenic, chromium, zinc, copper and mercury.

At the High School Landfill, two metals, cadmium (0.023 mg/l) and iron (1.62 mg/l), were detected in well HSMW-01 above the water quality standards of 0.010 mg/l and 0.3 mg/l respectively (Table 3-1). The 1995 Woodward-Clyde RFA Report did not report the detection of cadmium. The iron concentration reported at 1.62mg/L exceeded the 1995 reported concentration of 0.599 mg/l. There is no background well to compare these values too, but high concentrations of iron are known to be in the rock of this area.

The groundwater sample collected from the monitoring well upgradient of lots A, B, C and E, MWLD-02 in Parking Lot D of Michie Stadium, indicated that iron (8.49 mg/l) and sodium (960 mg/l) were at concentrations above the class GA water quality standards of 0.3 mg/l and 20 mg/l respectively (Table 3-1).

Metal constituents that exceeded water quality standards at the Michie Stadium Parking Lots A, B, C and E monitoring wells include iron, manganese and sodium. The concentrations of these constituents are relative to the concentrations in the upgradient well MWLD-02. However, manganese tends to be slightly elevated at Lots A, B, C and E (Table

3-2 to 3-5) when compared to the upgradient well. Manganese concentrations ranged from 0.075 mg/l in the upgradient well, MWLD-02, to 2.24 mg/l in LAMW-03. Iron concentrations also tend to be elevated at Lot E (ranging from 0.218 mg/l to 60.7 mg/l) when compared to the concentration detected in the upgradient well MWLD-02 (8.49 mg/l). The highest concentration of sodium was detected in the upgradient well MWLD-02 (960 mg/l). Concentrations of the above mentioned constituents are similar to those reported by Woodward-Clyde in the 1995 RFA Report.

Four groundwater samples (one upgradient and three downgradient) were collected from the PX Landfill. The groundwater quality near this landfill indicates that there were exceedances of the water quality standards for the following metals: arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, sodium, and zinc in these samples (Table 3-6). The number of and concentrations of the constituents detected in these four samples have increased compared to the 1995 RFA Report data. For example, cadmium and mercury were not detected in 1995, and arsenic, copper, and zinc were detected but at concentrations below the water quality standards. Chromium, lead, iron, manganese and sodium were detected above the standards in the 1995 Report. The groundwater sample collected at upgradient well PXMW-01 had a septic odor and was turbid and black in appearance. Apparently a recently discovered sewer main leak contributed to this well's groundwater quality. The sewer main is currently undergoing replacement.

The three newly installed wells at the Camp Buckner Landfill, also reported detection of metals (Table 3-7) above water quality standards. Iron was detected above the water quality standard of 0.3 mg/l in all three samples. Iron concentrations ranged from 3.12 mg/l in CBMW-01, the upgradient well, to 170 mg/l in CBMW-03, one of the downgradient wells. CBMW-03 also had exceedances of the water quality standards for arsenic, chromium, lead, manganese, and zinc.

The three newly installed wells at Village Farm Landfill, reported levels of iron, manganese and lead at concentrations which exceeded water quality standards (Table 3-8).

Iron was detected above the water quality standard of 0.3 mg/l in all three samples. Iron concentrations ranged from 16.2 mg/l in the upgradient well, MWVF-01, to 57.8 mg/l in MWVF-03, one of the downgradient wells. Manganese was detected above the water quality standard of 0.3 mg/l in all three well samples. The lowest concentration of manganese (0.407 mg/l) was detected in the upgradient well, MWVF-01. The highest concentration (1.04 mg/l) was detected in the downgradient well MWVF-03. Lead was detected in downgradient well MWVF-02 (0.054 mg/l) above the water quality standard of 0.025 mg/l.

3.2 Explosive Soil Gas Survey Results

An explosive soil gas survey, which consisted of measuring the percent lower explosive limit (LEL) in a borehole with a combustible gas indicator (CGI), was completed in accordance with the approved work plan and modification at the Camp Buckner Landfill, Michie Stadium Parking Lots A, B, C, E and F, Village Farm Landfill, High School Landfill and the PX Landfill. Soil gases were not detected from any of the sample boreholes at the Village Farm Landfill, High School Landfill, or the PX Landfill (Figures 3-1 to 3-3 and Tables 3-9 to 3-11).

At the Camp Buckner Landfill (Figure 3-4 and Table 3-12), ten soil gas borings were advanced in a sampling grid layout with 50 foot intervals. From the ten boreholes sampled, only three showed positive percent LEL readings which ranged from 5 to 9 percent. These results indicate that this landfill is producing very low levels of explosive gases.

At Michie Stadium, Parking Lot A Landfill (Figure 3-5 and Table 3-13), ten soil gas borings were advanced in a sampling grid layout with 100 foot intervals. From the ten borings sampled, one had a percent LEL reading of 3 to 4 percent and two had a percent LEL readings of 100 percent. The other seven boreholes had non-detect LEL readings. While there are two 100% LEL readings, the results generally suggest low explosive gas production at this landfill.

Michie Stadium Parking Lot B Landfill (Figure 3-5 and Table 3-14) had eight soil gas boreholes advanced in a sampling grid layout with 50 to 100 foot intervals. Only one sample location exhibited a percent LEL reading (16) all other boreholes had non detectable levels of explosive gas. These results indicate that this landfill is producing very low levels of explosive gases.

Michie Stadium Parking Lot C Landfill (Figure 3-5 and Table 3-15) had 11 soil gas boreholes advanced in a sampling grid layout with 100 foot intervals. All of these locations had percent LEL detections of soil gas. Three of the samples had percent LEL readings ranging from 24 to 94 percent, while the remaining seven samples all had detections of 100 percent. These results indicate that this landfill is producing relatively high levels of explosive gases.

Michie Stadium Parking Lot E Landfill (Figure 3-5 and Table 3-16) had 20 soil gas boreholes advanced in a sampling grid layout with 100 foot intervals. Two of the 20 sampling locations had low detections of soil gas ranging from 4 to 6 percent. Of the 18 remaining sampling locations, 15 had percent LEL readings of 100 and the remaining three samples did not have soil gas detections. These three samples were located by the entrance to the parking lot on the north end. These results indicate that this landfill is producing relatively high levels of explosive gases.

At Michie Stadium, Parking Lot F Landfill (Figure 3-5 and Table 3-17), 18 soil gas boreholes were advanced in a sampling grid layout with 100 foot intervals. From the 18 locations sampled, two had percent LEL readings ranging from 20 to 30 percent, and eight had percent LEL readings of 100. The remaining eight locations had non-detect LEL readings. These results indicate that this landfill is producing relatively high levels of explosive gases. It should be understood that the gas maybe measured in its concentrated form in escaping through the sampling penetration in the surface of a large area.

3.3 Test Pit Excavation Results

In place of the proposed excavation of two test pits at Camp Buckner Landfill, two soil borings were advanced. One boring was advanced through the landfill and a soil sample was collected from underneath the fill (CB-TP-1-1). The second boring was advanced upgradient from the landfill to collect a background soil sample (CB-TP-2-1). These two soil samples were compared to the New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives for Heavy Metals (Revised 12/93) (Table 3-18).

The analytical results indicated that the metals detected in the soil sample beneath the landfill are very similar in concentration to metals detected in the background soil sample. Iron, mercury and zinc are common constituents in both samples which exceeded the NYSDEC criteria. Although the concentrations of those three metals detected in the landfill sample are slightly higher then the background sample, there are other metals where the reverse is true such as beryllium and nickel which exceeded the NYSDEC criteria in the background sample but not the landfill sample. Therefore, it is inconclusive to determine if the landfill has impacted the underlying soils or whether the differences in metal concentrations is due to natural variability.

IT Corporation under contract through the Omaha District Army Corps of Engineers excavated test pits at the Village Farm Landfill to define the limits of the landfill area, however no soil samples were collected at that time. The limits of the landfill area, were used to locate the monitoring wells up and downgradient of the landfill. Upon the completion of the monitoring well installation, four test pits were excavated by Miller Environmental Group. Two composite samples were collected from the fill material in the four test pits. These samples were analyzed for TAL metals.

The analytical results of the fill material showed exceedances of the NYSDEC criteria for copper, iron, lead, magnesium, manganese, mercury, nickel and zinc (Table 3-19).

After reviewing the exceedances of the NYSDEC criteria for the fill material, a Toxicity Characteristic Leaching Procedure (TCLP) was preformed on the two samples for cadmium, lead and mercury. The analytical results of the TCLP were below the standards for classifying materials as hazardous (Table 3-19).

3.4 Morgan Farm Road Landfill Seep Sampling

The analytical results of the surface water and seep samples were compared to the New York State Department of Environmental Conservation Water Quality Regulations Surface Water and Groundwater Classifications and Standards New York State Codes, Rules and Regulation Title 6, Chapter X Parts 700 - 705 for Class B Streams (Table 3-20). The upgradient (SW-3) and downgradient (SW-1) surface water samples had detections of iron (0.355 mg/l and 0.347 mg/l, respectively) above the NYSDEC criteria. The first seep sample (SW-2) did not have any detections above the NYSDEC criteria. The second seep sample (Seep-2) had detections of aluminum, cobalt, iron, lead, manganese, and vanadium above the NYSDEC criteria. The surface water and seep sample locations can be seen on Figure 3-6. These results were submitted to the NYSDEC by Eugene Rood (USMA) in his January 10, 1997 letter. The NYSDEC in its January 15, 1997 letter response (Attachment A-2) decided that monitoring wells were not required at the Morgan Farm Road Landfill.

3.5 Groundwater Movement

Groundwater levels were measured from each monitoring well prior to sampling. Groundwater elevations are summarized in Table 3-21. Groundwater contour maps for the Michie Stadium Lots A, B, C, D and E (Figure 3-7) and the PX Landfill (Figure 3-8) indicate similar groundwater movement as compared to the 1995 data. Groundwater movement at Camp Buckner is to the southeast (Figure 3-9) and at Village Farm to the south - southeast (Figure 3-10).

TABLE 3-1

TEN LANDFILLS
USMA WEST POINT

High School Landfill and Michie Stadium Parking Lot D Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC(1) Water Quality Regualtions	HSMW-01 7/12/96 mg/L	MWLD-02 7/18/96 mg/L
Aluminum	N/A	0.351 J	0.707
Antimony		< 0.06 J	< 0.06
Arsenic	0.025	< 0.010 J	< 0.010
Barium	1	0.071 J	0.117 J
Beryllium	N/A	< 0.005 J	< 0.005
Cadmium	0.010	**0.023** J	0.004 J
Calcium		46.8 J	85.5
Chromium	0.050	< 0.01 J	0.006 J
Cobalt	N/A	< 0.05 J	0.005 J
Copper	0.2	0.012 J	0.020 J
Iron	0.3	**1.62** J	**8.49**
Lead	0.025	0.008 J	< 0.010
Magnesium	N/A	4.70 J	12.0
Manganese	0.3	0.226 J	0.075
Mercury	0.002	< 0.0005 J	< 0.0005
Nickel	N/A	0.008 J	< 0.04 J
Potassium		9.38 J	6.96
Selenium	0.01	< 0.005 J	< 0.005 J
Silver	0.05	< 0.010 J	< 0.010
Sodium	20	13.8 J	**960**
Thallium	N/A	< 0.010 J	< 0.010 J
Vanadium	N/A	< 0.05 J	< 0.05
Zinc	0.3	0.251 J	0.078

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-2

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot A Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	LAMW-01 7/18/96 mg/L	LAMW-02 7/18/96 mg/L	LAMW-03 7/18/96 mg/L
Aluminum	N/A	0.357	1.16	0.212
Antimony		< 0.06	< 0.06	< 0.06
Arsenic	0.025	< 0.010	< 0.010	< 0.010
Barium	1	0.062 J	0.061 J	0.122 J
Beryllium	N/A	< 0.005	< 0.005	< 0.005
Cadmium	0.010	0.004 J	< 0.005	< 0.005
Calcium		54.2	60.9	42.0
Chromium	0.050	< 0.01	0.008 J	< 0.01
Cobalt	N/A	0.009 J	0.006 J	0.012 J
Copper	0.2	0.012 J	0.015 J	0.033
Iron	0.3	**2.29**	**1.63**	**2.12 J**
Lead	0.025	0.003 J	0.004 J	0.004 J
Magnesium	N/A	11.2	20.9	7.71
Manganese	0.3	**0.922**	0.172	**2.24**
Mercury	0.002	< 0.0005	< 0.0005	< 0.0005
Nickel	N/A	0.008 J	0.010 J	0.050 J
Potassium		7.90	9.30	5.85
Selenium	0.01	< 0.005 J	< 0.005 J	< 0.005 J
Silver	0.05	< 0.010	< 0.010	< 0.010
Sodium	20	**108**	**178**	**163**
Thallium	N/A	< 0.010 J	< 0.010 J	< 0.010 J
Vanadium	N/A	< 0.05	< 0.05	< 0.05
Zinc	0.3	0.118	0.164	0.080

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-3

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot B Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	LBMW-01 7/18/96 mg/L	LBMW-02 7/18/96 mg/L	LBMW-03 7/18/96 mg/L
Aluminum	N/A	0.276	0.124 J	0.256
Antimony		< 0.06	< 0.06	< 0.06
Arsenic	0.025	< 0.010	< 0.010	< 0.010
Barium	1	0.026 J	0.030 J	0.164 J
Beryllium	N/A	< 0.005	< 0.005	< 0.005
Cadmium	0.010	< 0.005	< 0.005	< 0.005
Calcium		21.5	32.2	89.2
Chromium	0.050	< 0.01	< 0.01	< 0.01
Cobalt	N/A	< 0.05	< 0.05	0.025 J
Copper	0.2	0.021 J	0.012 J	0.007 J
Iron	0.3	**3.72**	0.130	**29.9**
Lead	0.025	0.025	0.002 J	0.003 J
Magnesium	N/A	4.32 J	6.07	17.8
Manganese	0.3	**0.606**	0.157	**1.66**
Mercury	0.002	< 0.0005	< 0.0005	< 0.0005
Nickel	N/A	< 0.04 J	< 0.04 J	< 0.04 J
Potassium		< 5.0	7.24	8.74
Selenium	0.01	< 0.005 J	< 0.005 J	< 0.005 J
Silver	0.05	< 0.010	< 0.010	< 0.010
Sodium	20	**35.6**	**75.4**	**317**
Thallium	N/A	< 0.010 J	< 0.010 J	< 0.020 J
Vanadium	N/A	< 0.05	< 0.05	< 0.05
Zinc	0.3	0.087	0.103	0.123

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-4

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot C Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	LCMW-01 7/17/96 mg/L	LCMW-02 7/17/96 mg/L	LCMW-03 7/17/96 mg/L
Aluminum	N/A	0.197 J	0.576	1.95
Antimony		< 0.06	< 0.06	< 0.06
Arsenic	0.025	< 0.010	< 0.010	< 0.010
Barium	1	0.032 J	0.034 J	0.094 J
Beryllium	N/A	< 0.005	< 0.005	< 0.005
Cadmium	0.010	0.005	< 0.005	< 0.005
Calcium		40.5	25.7	70.2
Chromium	0.050	< 0.01	0.006 J	< 0.01
Cobalt	N/A	< 0.05	< 0.05	0.006 J
Copper	0.2	0.019 J	0.011 J	0.009 J
Iron	0.3	**6.80**	**0.883**	**26.0**
Lead	0.025	0.002 J	0.003 J	0.003 J
Magnesium	N/A	9.80	5.14	14.0
Manganese	0.3	0.158	0.020	0.493
Mercury	0.002	< 0.0005	< 0.0005	< 0.0005
Nickel	N/A	6.98 J	< 0.04 J	< 0.04 J
Potassium		< 0.04	1.92 J	7.97
Selenium	0.01	< 0.005 J	< 0.005 J	< 0.005 J
Silver	0.05	< 0.010	< 0.010	< 0.010
Sodium	20	**70.8**	**88.9**	**182**
Thallium	N/A	< 0.010 J	< 0.010 J	< 0.010 J
Vanadium	N/A	< 0.05	< 0.05	< 0.05
Zinc	0.3	0.105	0.100	0.100

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-5

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot E Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	LEMW-01 7/17/96 mg/L	LEMW-02 7/17/96 mg/L	LEMW-03 7/18/96 mg/L	LEMW-04 7/17/96 mg/L	LEMW-05 7/18/96 mg/L
Aluminum	N/A	0.309	0.242	1.03	3.70	0.670
Antimony		< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Arsenic	0.025	< 0.010	< 0.010	0.003 J	0.002 J	< 0.010
Barium	1	0.125 J	0.043 J	0.023 J	0.295	0.082 J
Beryllium	N/A	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cadmium	0.010	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Calcium		65.8	15.3	8.28	99.8	35.6
Chromium	0.050	< 0.01	< 0.01	< 0.01	0.009 J	< 0.010
Cobalt	N/A	< 0.05	< 0.05	0.022 J	< 0.05	0.024 J
Copper	0.2	0.010 J	0.010 J	0.016 J	0.016 J	0.012 J
Iron	0.3	**60.7**	0.218	**9.11**	**50.3**	**32.4**
Lead	0.025	0.003 J	< 0.005	0.002 J	0.013	0.003 J
Magnesium	N/A	14.4	2.57 J	2.11 J	28.7	9.91
Manganese	0.3	**1.82**	0.27	0.149	**1.08**	**1.90**
Mercury	0.002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Nickel	N/A	< 0.04 J	< 0.04 J	0.016 J	< 0.04 J	< 0.04 J
Potassium		5.39	2.31 J	< 5.0	22.2	4.59 J
Selenium	0.01	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005
Silver	0.05	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010 J
Sodium	20	**139**	**120**	10.5	**143**	**150**
Thallium	N/A	< 0.010 J	< 0.010 J	< 0.020 J	< 0.010 J	< 0.020 J
Vanadium	N/A	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	0.3	0.098	0.101	0.103	0.138	0.086

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-6

TEN LANDFILLS
USMA WEST POINT

PX Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	PXMW-01 8/5/96 mg/L	PXMW-02 8/5/96 mg/L	PXMW-03 8/5/96 mg/L	PXMW-04 8/5/96 mg/L
Aluminum	N/A	160	13.3	2.73	49.9
Antimony		0.051 J	< 0.06	< 0.06	0.038 J
Arsenic	0.025	**0.052**	**0.025**	< 0.010	0.002 J
Barium	1	0.734	0.118	0.037 J	0.405
Beryllium	N/A	0.016	< 0.005	< 0.005	0.003 J
Cadmium	0.010	**0.019**	**0.094**	< 0.005	0.004 J
Calcium		109	85.9	258	93.6
Chromium	0.050	**0.213**	0.014	0.005 J	**0.101**
Cobalt	N/A	0.106	0.017 J	0.005 J	0.061
Copper	0.2	**0.840**	0.037	0.014 J	0.172
Iron	0.3	**217** J	**24.7** J	**5.99** J	**110** J
Lead	0.025	**1.51**	**0.048**	< 0.010	**0.160**
Magnesium	N/A	50.7	22.8	83.5	48.3
Manganese	0.3	**1.86**	**0.605**	**0.065**	**1.77**
Mercury	0.002	**0.006**	< 0.0005	0.0015	< 0.0005
Nickel	N/A	0.224	0.023 J	0.008 J	0.074
Potassium		22.7	10.5	5.57	18.8
Selenium	0.01	< 0.025	0.003 J	< 0.025	< 0.005
Silver	0.05	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	20	**34.2**	**139**	**329**	**171**
Thallium	N/A	< 0.010	< 0.05	< 0.05	< 0.010
Vanadium	N/A	0.220	0.021 J	0.010 J	0.144
Zinc	0.3	**3.62**	**0.552**	0.061	**0.307**

J - Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-7

TEN LANDFILLS
USMA WEST POINT

Camp Buckner Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	CBMW-01 8/5/96 mg/L	CBMW-02 8/5/96 mg/L	CBMW-03 8/5/96 mg/L
Aluminum	N/A	1.52	7.20	74.3
Antimony		< 0.06	< 0.06	< 0.06
Arsenic	0.025	< 0.010	0.002 J	**0.046**
Barium	1	0.028 J	0.058 J	0.448
Beryllium	N/A	< 0.005	< 0.005	0.004 J
Cadmium	0.010	< 0.005	< 0.005	< 0.005
Calcium		30.3	18.1	156
Chromium	0.050	0.006 J	0.010	**0.101**
Cobalt	N/A	< 0.05	0.008 J	0.073
Copper	0.2	0.017 J	0.030	0.183
Iron	0.3	**3.12** J	**14.0** J	**170** J
Lead	0.025	0.002 J	0.014	**0.212**
Magnesium	N/A	5.24	4.76 J	56.0
Manganese	0.3	0.228	0.401	**4.34**
Mercury	0.002	< 0.0005	< 0.0005	< 0.0005
Nickel	N/A	0.011 J	0.013 J	0.151
Potassium		1.77 J	3.76 J	8.26
Selenium	0.01	< 0.005	< 0.005	< 0.025
Silver	0.05	< 0.010	< 0.010	< 0.010
Sodium	20	2.88 J	3.32 J	4.74
Thallium	N/A	< 0.010	< 0.010	< 0.010
Vanadium	N/A	0.004 J	0.009 J	0.110
Zinc	0.3	0.066	0.107	**0.500**

NTU = 40 NTU 47. NTU > 1000 Turbid

J- Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-8

TEN LANDFILLS
USMA WEST POINT

Village Farm Landfill
Metals Groundwater Results

Location ID Date Collected Units	NYSDEC[1] Water Quality Regualtions	MWVF-01 2/12/97 mg/L	MWVF-02 2/12/97 mg/L	MWVF-03 2/12/97 mg/L
Aluminum	N/A	8.43 J	24.80 J	37.8 J
Antimony		< 0.06 J	< 0.06 J	< 0.06 J
Arsenic	0.025	0.003 J	< 0.010 J	< 0.010 J
Barium	1	0.55 J	0.141 J	0.283 J
Beryllium	N/A	< 0.005 J	0.002 J	0.002 J
Cadmium	0.010	< 0.005 J	< 0.005 J	< 0.005 J
Calcium		10.4 J	43.9 J	14.8 J
Chromium	0.050	0.005 J	0.020 J	0.024 J
Cobalt	N/A	< 0.05 J	0.015 J	0.016 J
Copper	0.2	0.034 J	0.064 J	0.072 J
Iron	0.3	**16.2** J	**42.9** J	**57.8** J
Lead	0.025	0.01 J	**0.054** J	0.025 J
Magnesium	N/A	4.29 J	14.9 J	8.94 J
Manganese	0.3	**0.407** J	**0.825** J	**1.04** J
Mercury	0.002	< 0.0005 J	< 0.0005 J	< 0.0005 J
Nickel	N/A	0.008 J	0.025 J	0.028 J
Potassium		2.06 J	4.63 J	3.62 J
Selenium	0.01	< 0.005 J	< 0.005 J	< 0.005 J
Silver	0.05	< 0.010 J	< 0.010 J	0.011 J
Sodium	20	2.42 J	5.54 J	2.35 J
Thallium	N/A	< 0.010 J	< 0.010 J	< 0.010 J
Vanadium	N/A	0.004 J	0.045 J	0.047 J
Zinc	0.3	0.066 J	0.092 J	0.130 J

J- Estimated Value
1 - NYSDEC Water Quality Standards for class GA waters.

Exceedances of the water quality standards are bolded and underlined.

TABLE 3-9

TEN LANDFILLS
USMA WEST POINT

Village Farm Landfill
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
VF - 1	(ND)	3	refusal
VF - 2	(ND)	2	refusal
VF - 3	(ND)	2.5	refusal
VF - 4	(ND)	3.5	refusal
VF - 5	(ND)	2	refusal
VF - 6	(ND)	2	refusal
VF - 7	(ND)	2.5	refusal
VF - 8	(ND)	4	refusal
VF - 9	(ND)	5	
VF - 10	(ND)	5	
VF - 11	(ND)	1	
VF - 12	(ND)	5	
VF - 13	(ND)	5	
VF - 14	(ND)	2	
VF - 15	(ND)	2.5	
VF - 16	(ND)	2	hit water
VF - 17	(ND)	2	hit water
VF - 18	(ND)	2.5	hit water
VF - 19	(ND)	2	hit water
VF - 20	(ND)	2.5	refusal
VF - 21	(ND)	2	refusal

TABLE 3-10

TEN LANDFILLS
USMA WEST POINT

High School Landfill - Playing Field Area
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
PF - 1	(ND)	3.5	refusal
PF - 2	(ND)	2	refusal
PF - 3	(ND)	2.5	refusal
PF - 4	(ND)	3	refusal
PF - 5	(ND)	2.5	refusal
PF - 6	(ND)	2	refusal
PF - 7	(ND)	2.5	refusal
PF - 8	(ND)	2	refusal
PF - 9	(ND)	2	refusal
PF - 10	(ND)	2.5	refusal
PF - 11	(ND)	2	refusal
PF - 12	(ND)	2.5	refusal
PF - 13	(ND)	4	refusal
PF - 14	(ND)	2.5	refusal
PF - 15	(ND)	2.5	refusal
PF - 16	(ND)	2.5	refusal
PF - 17	(ND)	3	refusal
PF - 18	(ND)	3	refusal
PF - 19	(ND)	2.5	refusal
PF - 20	(ND)	2	refusal

TABLE 3-10 (continued)

TEN LANDFILLS
USMA WEST POINT

High School Landfill - Track Area
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
T - 1	(ND)	2.5	refusal
T - 2	(ND)	4.5	refusal
T - 3	(ND)	2	refusal
T - 4	(ND)	2	refusal
T - 5	(ND)	2	refusal
T - 6	(ND)	2	refusal
T - 7	(ND)	2.5	refusal
T - 8	(ND)	4	refusal
T - 9	(ND)	2	refusal
T - 10	(ND)	4	refusal
T - 11	(ND)	2	refusal
T - 12	(ND)	2.5	refusal
T - 13	(ND)	2	refusal
T - 14	(ND)	2	refusal
T - 15	(ND)	3.5	refusal
T - 16	(ND)	2.5	refusal
T - 17	(ND)	3	refusal
T - 18	(ND)	3.5	refusal
T - 19	(ND)	3.5	refusal
T - 20	(ND)	3	refusal
T - 21	(ND)	2	refusal
T - 22	(ND)	4	refusal
T - 23	(ND)	2.5	refusal
T - 24	(ND)	2.5	refusal
T - 25	(ND)	2.5	refusal

TABLE 3-11

TEN LANDFILLS
USMA WEST POINT

PX Landfill
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
PX - 1	(ND)	5	
PX - 2	(ND)	3	refusal
PX - 3	(ND)	5	
PX - 4	(ND)	4.5	refusal
PX - 5	(ND)	5	
PX - 6	(ND)	4.5	refusal
PX - 7	(ND)	5	
PX - 8	(ND)	4.5	refusal
PX - 9	(ND)	5	
PX - 10	(ND)	5	
PX - 11	(ND)	5	
PX - 12	(ND)	5	
PX - 13	(ND)	4	refusal
PX - 14	(ND)	4.5	refusal
PX - 15	(ND)	4.5	refusal
PX - 16	(ND)	3	refusal
PX - 17	(ND)	4	refusal
PX - 18	(ND)	5	
PX - 19	(ND)	5	
PX - 20	(ND)	5	
PX - 21	(ND)	3.5	refusal
PX - 22	(ND)	2	refusal
PX - 23	(ND)	2.5	refusal
PX - 24	(ND)	3	refusal
PX - 25	(ND)	2	refusal
PX - 26	(ND)	5	
PX - 27	(ND)	5	

TABLE 3-12

TEN LANDFILLS
USMA WEST POINT

Camp Buckner Landfill
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
CB - 1	(ND)	2.5	refusal
CB - 2	9	3.5	refusal
CB - 3	(ND)	3.5	refusal
CB - 4	(ND)	2	refusal
CB - 5	9	3.5	refusal
CB - 6	(ND)	3.5	refusal
CB - 7	5	4	refusal
CB - 8	(ND)	3.5	refusal
CB - 9	(ND)	2	refusal
CB - 10	(ND)	4	refusal

TABLE 3-13

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot A
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
A-1	(ND)	4 - 4.5	refusal
A-2	3 - 4	4 - 4.5	refusal - moist
A-3	(ND)	4 - 4.5	refusal - hit water
A-4	100	5	
A-5	(ND)	4.5	
A-6	100	5	
A-7	(ND)	4	moist
A-8	(ND)	3.5	refusal
A-9	(ND)	4	refusal
A-10	(ND)	4.5	

TABLE 3-14

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot B
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
B-1	(ND)	4	
B-2	(ND)	4.5	
B-3	(ND)	2.5	refusal
B-4	(ND)	3.5	refusal
B-5	(ND)	2.5	refusal
B-6	(ND)	4.5	
B-7	16	4.5	
B-8	(ND)	3.5	refusal

TABLE 3-15

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot C
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
C-1	100	4	
C-2	94	3	refusal
C-3	100	4	refusal
C-4	100	3.5	refusal
C-5	24	2	refusal
C-6	56	3.5	refusal
C-7	100	3	refusal
C-8	100	5	
C-9	100	5	
C-10	100	5	
C-11	100	3.5	refusal

TABLE 3-16

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot E
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
E-1	100	5	odor
E-2	100	5	odor
E-3	100	5	odor
E-4	100	5	odor
E-5	100	3.5	refusal
E-6	6	5	odor
E-7	4	5	
E-8	100	5	odor
E-9	100	5	odor
E-10	100	5	odor
E-11	100	5	odor
E-12	100	3	refusal - faint odor
E-13	100	5	odor
E-14	100	5	odor
E-15	100	5	odor
E-16	(ND)	2	refusal
E-17	(ND)	2.5	refusal
E-18	(ND)	3	refusal
E-19	100	5	
E-20	100	4.5	refusal - odor

TABLE 3-17

TEN LANDFILLS
USMA WEST POINT

Michie Stadium Parking Lot F
Explosive Soil Gas Survey Results

Location	% LEL Reading	Depth (feet below grade)	Comments
F-1	100	5	odor
F-2	(ND)	5	
F-3	(ND)	5	
F-4	100	5	odor
F-5	100	3	odor
F-6	(ND)	2.5	
F-7	100	5	odor
F-8	(ND)	5	
F-9	100	4	odor
F-10	100	5	odor
F-11	20	5	
F-12	(ND)	2.5	
F-13	100	5	odor
F-14	30	3	odor
F-15	(ND)	3	
F-16	(ND)	4	
F-17	100	5	odor
F-18	(ND)	2.5	

TABLE 3-18

TEN LANDFILLS
USMA WEST POINT

Camp Buckner Landfill
Soil Test Pit Results

Location ID Date Collected Units	NYSDEC Criteria*	CB-TP-1-1 7/2/96 mg/kg	CB-TP-2-1 7/2/96 mg/kg
Aluminum	33,000	5800	8093
Antimony	N/A	< 15.7	< 6.65
Arsenic	7.5	6.31	0.55 J
Barium	300	37.8 J	44.6
Beryllium	0 - 1.75	0.26 J	**33.2**
Cadmium	10	< 1.31	< 0.55
Calcium	35,000	8215	1519
Chromium	50	8.14	10.5
Cobalt	30	4.72 J	7.65
Copper	25	**29.1**	18.7
Iron	2,000	**11260**	**9911**
Lead	4 - 61	12.4 J	6.90 J
Magnesium	100 - 5,000	2940	3337
Manganese	50 - 5,000	217 J	191 J
Mercury	0.1	**0.83** J	**0.28** J
Nickel	13	9.19 J	**14.3**
Potassium	43,000	553 J	956
Selenium	2	< 1.31 J	< 0.55 J
Silver	N/A	< 2.62	< 1.11
Sodium	6,000 - 8,000	73.5 J	51.8 J
Thallium	N/A	< 2.62 J	< 1.11 J
Vanadium	150	11.3 J	8.87
Zinc	20	**114**	**57.6**

Total Solids	38.10%	90.20%

J - Estimated Value
* - New York State Department of Enviromental Conservation Recommended Soil Cleanup Objectives for Heavy Metals.

Exceedances of the NYSDEC criteria are bolded and underlined.

TABLE 3-19

TEN LANDFILLS
USMA WEST POINT

Village Farm Landfill
Soil Test Pit Results

Metals

Location ID Date Collected Units	NYSDEC Criteria*	TP-1 4/9/97 mg/kg	TP-2 4/9/97 mg/kg
Aluminum	33,000	12000	11500
Antimony	N/A	7.97 U	7.49 U
Arsenic	7.5	1.33 U	1.25 U
Barium	300	134	161
Beryllium	0 - 1.75	0.664 U	0.624 U
Cadmium	10	2.2	3.13
Calcium	35,000	4060	5940
Chromium	50	21	18.4
Cobalt	30	11.4	10.4
Copper	25	**173**	**58.4**
Iron	2,000	**33500**	**21200**
Lead	4 - 61	**726**	**594**
Magnesium	100 - 5,000	4240	**5530**
Manganese	50 - 5,000	1000	382
Mercury	0.1	**0.279**	**0.795**
Nickel	13	**34**	**18.5**
Potassium	43,000	984	1060
Selenium	2	0.664 U	0.624 U
Silver	N/A	1.33 U	1.25 U
Sodium	6,000 - 8,000	135	84.1
Thallium	N/A	1.33 U	1.25 U
Vanadium	150	22.7	22.5
Zinc	20	**655**	**429**

Total Solids		75.3	80.1

Toxicity Characteristic Leaching Procedure (TCLP)

	Regulatory Level**	TP-1 Mg/L	TP-2 Mg/L
Cadmium	1.0	0.100 U	0.100 U
Lead	5.0	2.03	4.40
Mercury	0.2	0.00300 U	0.00300 U

* - New York State Department of Enviromental Conservation Recommended Soil Cleanup Objectives for Heavy Metals.
U - Undetected
** - USEPA 40 CFR Part 261.24 toxicity characheristics.

Exceedances of the NYSDEC criteria are bolded and underlined.

TABLE 3-20

TEN LANDFILLS
USMA WEST POINT

Morgan Farm Road Landfill
Surface Water and Seep Results

Location ID Date Collected Units	NYSDEC Criteria Class B Stream	SW-1 7/12/96 mg/L (downgradient)	SW-2 7/12/96 mg/L (seep-1)	SW-3 7/12/96 mg/L (upgradient)	Seep 11/19/96 mg/L
Aluminum	0.1	0.057 J	0.072 J	0.060 J	**121**
Antimony	N/A	< 0.06 J	< 0.06 J	< 0.06 J	< 0.06
Arsenic	0.190(1)	< 0.010 J	< 0.010 J	< 0.010 J	0.020
Barium	1(2)	0.017 J	0.031 J	0.011 J	0.781
Beryllium	1.1(3)	< 0.005 J	< 0.005 J	< 0.005 J	0.012
Cadmium	0.5(4)	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005
Calcium	N/A	7.16 J	41.8 J	5.72 J	139
Chromium	5.8(4)	0.007 J	< 0.01 J	< 0.01 J	0.079
Cobalt	0.005(6)	< 0.050 J	< 0.05 J	< 0.05 J	**0.161**
Copper	2.9(5)	0.029 J	0.007 J	< 0.01 J	0.161
Iron	0.3	**0.347** J	0.058 J	**0.355** J	**833**
Lead	0.05(4)	0.006 J	0.007 J	0.004 J	**0.377**
Magnesium	35(2)	1.70 J	7.30 J	1.44 J	27.3
Manganese	0.3(2)	0.026 J	0.031 J	0.023 J	**12.7**
Mercury	0.002(2)	0.00076 J	< 0.0005 J	< 0.0005 J	< 0.0005
Nickel	5.0(4)	0.143 J	< 0.04 J	< 0.04 J	0.075
Potassium	N/A	2.17 J	2.39 J	< 5.0 J	6.48
Selenium	0.01(6)	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005
Silver	0.05(7)	< 0.010 J	< 0.010 J	< 0.010 J	0.013
Sodium	N/A	12.2 J	36.2 J	3.47 J	31.8
Thallium	0.008(6)	< 0.010 J	< 0.010 J	< 0.010 J	< 0.050
Vanadium	0.014(6)	< 0.05 J	< 0.05 J	< 0.05 J	**0.209**
Zinc	4.9(5)	0.087 J	0.103 J	0.121 J	0.875

N/A = Not Applicable
(1) = Standard applies to dissolved form.
(2) = A class B criteria does not exist. Therefore a more stringent criteria of a class A stream was used.
(3) = 1,100 ug/L when hardness is greater than 75 ppm.
(4) = Standard is calculated based on listed formula. Standard applies to acid-soluable form.*
(5) = Standard is calculated based on listed formula. Standard applies to dissolved form.*
(6) = Standard applies to acid-soluable form.
(7) = Standard applies to ionic silver.
* = An average value for calcium and magnesium was used to calculate the average hardness value used in calculating the standards derived from formulas. As provided in Groundwater by Freeze and Cherry (1979).
** = Average hardness value is equal to 168 mg/L.
*** = Exceedances of criteria have been bolded and underlined.

TABLE 3-21

TEN LANDFILLS
USMA WEST POINT

Groundwater Elevations

Location	Well ID	Elevation at Top of PVC (feet)*	Depth to Water from TOC (feet)**	Groundwater Elevation
High School - Playing Field	HSMW-01		23.12	
Michie Stadium Parking Lot A	LAMW-01	412.49	1.00	411.49
	LAMW-02	409.93	15.95	393.98
	LAMW-03	412.49	5.32	407.17
Michie Stadium Parking Lot B	LBMW-01	430.35	4.28	426.07
	LBMW-02	424.45	7.59	416.86
	LBMW-03	421.04	4.33	416.71
Michie Stadium Parking Lot C	LCMW-01	455.93	7.52	448.41
	LCMW-02	454.75	15.93	438.82
	LCMW-03	456.85	23.64	433.21
Michie Stadium Parking Lot D	MWLD-02	544.96	17.68	527.28
Michie Stadium Parking Lot E	LEMW-01	506.12	9.14	496.98
	LEMW-02	501.69	6.92	494.77
	LEMW-03	509.43	39.60	469.83
	LEMW-04	507.26	13.33	493.93
	LEMW-05	501.51	24.18	477.33
PX Landfill	PXMW-01	169.94	3.48	166.46
	PXMW-02(2)	165.23	60.48	104.75
	PXMW-03	166.73	53.05	113.68
	PXMW-04	166.47	44.50	121.97
Camp Buckner Landfill(1)	CBMW-01	662.20	7.26	654.94
	CBMW-02	665.40	7.22	658.18
	CBMW-03	660.60	7.24	653.36
Village Farm Landfill(1)	VFMW-01	876.21	7.24	868.97
	VFMW-02	816.45	33.54	782.91
	VFMW-03	822.54	9.05	813.49

* - Elevations were taken from the 1995 Woodward-Clyde RCRA Facility Assessment of Ten Landfills Report.

** - Depth to water was measured during the groundwater sampling event.

TOC - Top of Casing.

HSMW-01 was not surveyed.

(1) - Elevations were surveyed by Badey & Watson, Surveying and Engineering, 1997.

(2) - This well has been extended to a stick up. The correct elevation as surveyed by Badey & Watson, Surveying and Engineering, is 169.09.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 Data Quality Objectives

The data quality objectives (DQOs) that were determined for the USMA RFA Work Plan Addendum have been achieved. The DQOs were developed to support a certain level of data quality useful to the investigation. The data quality levels that were determined for the different objectives of this report are stated below.

The explosive soil gas survey and the health and safety screening was preformed using a Level 1 data quality definition. A data quality Level 1 is defined as follows:

> Level 1 - Field screening or analysis using portable instruments. Results are often not compound specific and typically not quantitative, but collection of data of this quality is important because results are available in real-time.

The groundwater, surface water, and soil samples submitted for laboratory analyses were of Level III data quality. A Level III data quality is defined as follows:

> Level III - Analyses performed in an off-site laboratory using standard documented procedures. Level III analyses may or may not use contract laboratory procedures (CLP); but, although QA/QC may be rigorous, Level III analyses do not usually use the validation or documentation procedures required of Level IV CLP analysis.

4.2 Quality Assurance/Quality Control Parameters

To ensure that the DQOs have been met, the quality assurance and quality control parameters of precision, accuracy, comparability, completeness, representativeness, and sensitivity were utilized in the interpretation and validation of the analytic samples collected.

4.3 Data Validation

All analytical samples were validated in accordance with the Level III requirements. The data was reviewed for contractual and technical compliance. Qualifications were applied following the intent of the National Functional Guidelines with Region II modifications. Samples were qualified based on the following guidelines:

1. Sample Integrity
2. Holding Times
3. Initial and Continuing Calibration
4. Blank Contamination
5. Laboratory Control Sample
6. Matrix Spike and Matrix Spike Duplicate
7. Duplicate Sample Analysis

Details of the validation are included in Attachment D.

4.4 Data Usability

The results of the data validation have shown that the DQO's and the quality assurance and quality control parameters have been met. The data is therefore considered to be usable to this investigation.

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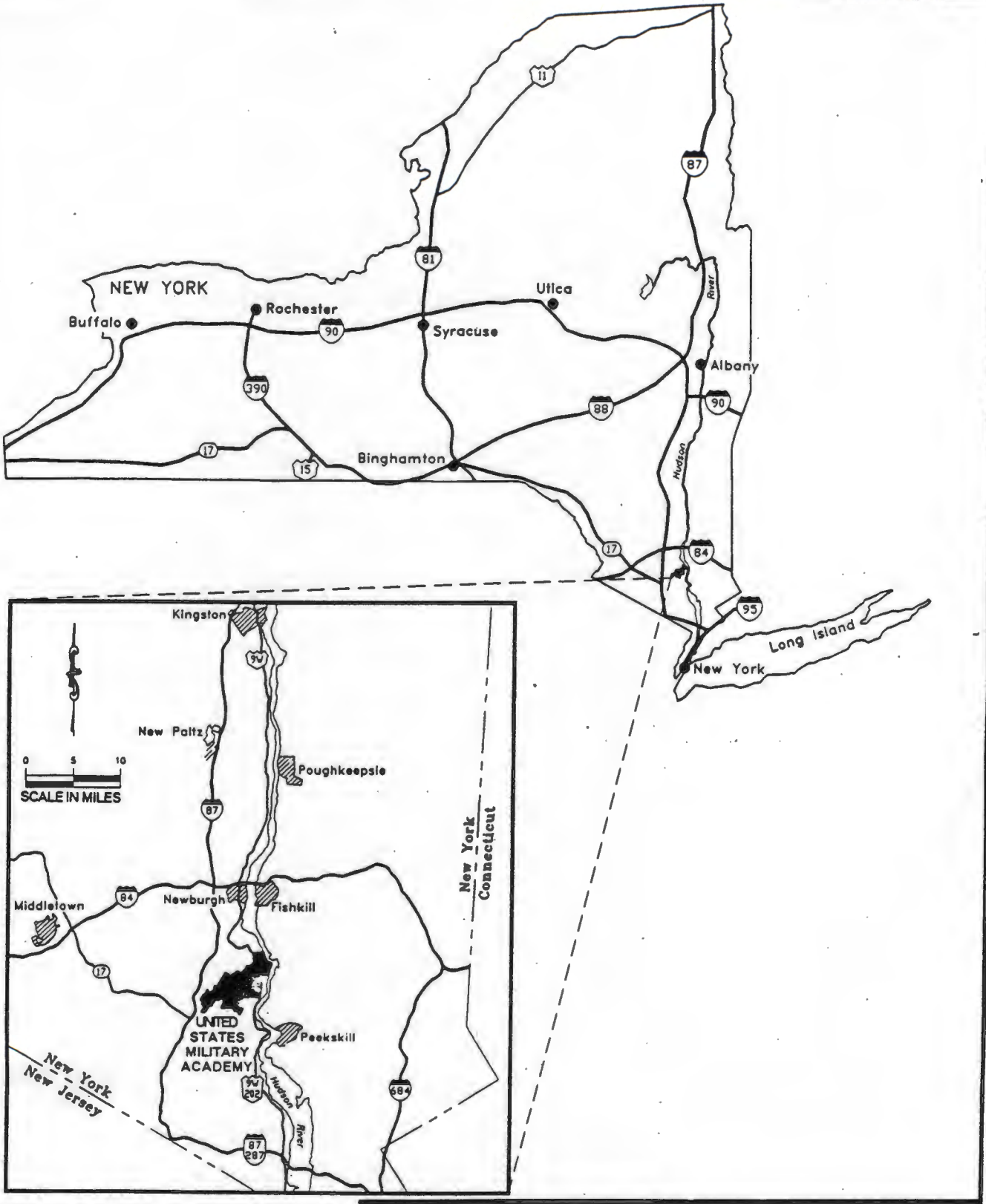


Source: WCFS, 1994 RFA

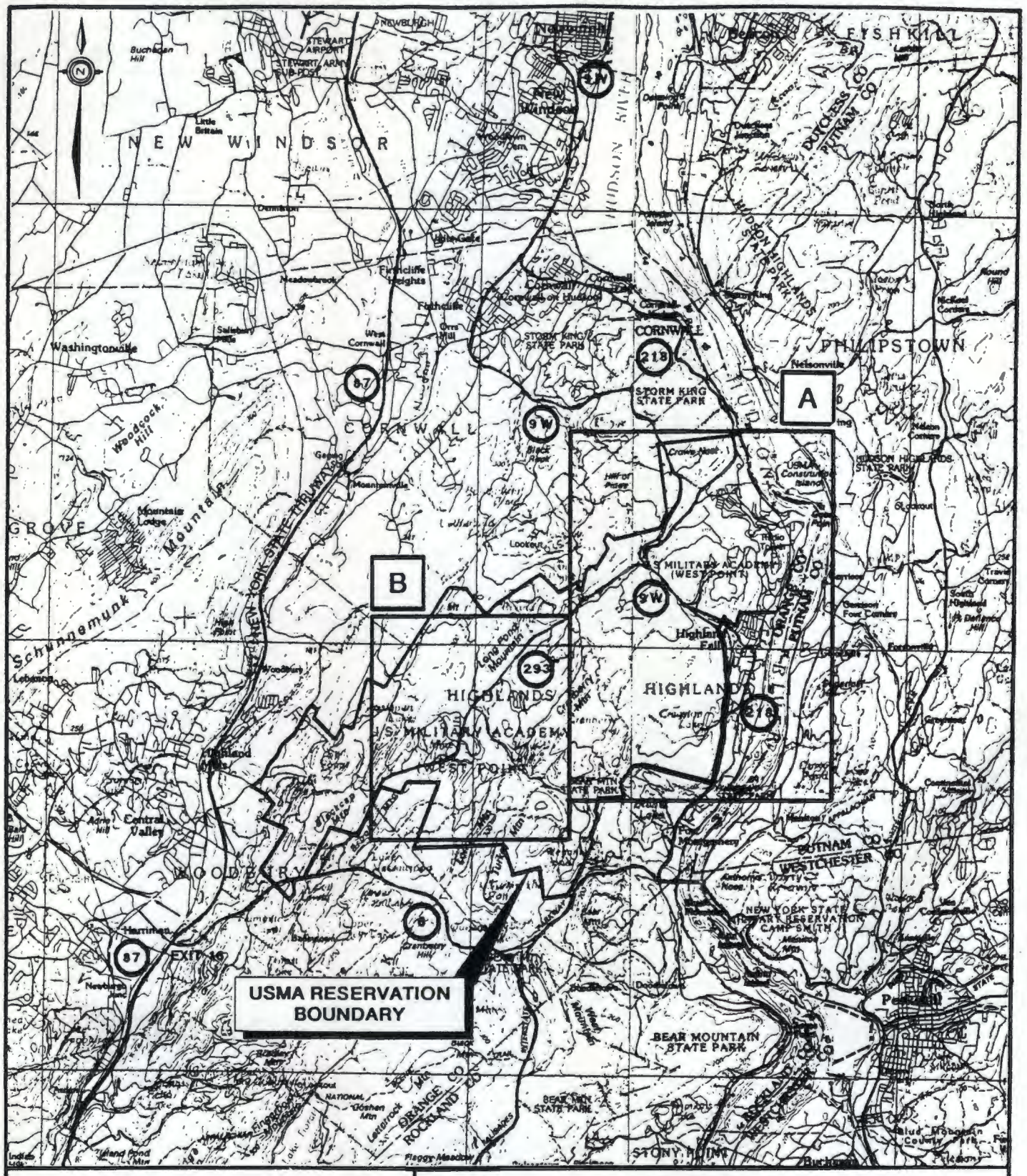
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

LOCATION MAP

SCALE AS NOTED

FIGURE 1-1



0 2 4 MI

SCALE

NOTE:
KEY MAPS A AND B ARE SHOWN AS FIGURES 1 – 3A AND 1 – 3B.

Source: WCFS, 1994 RFA

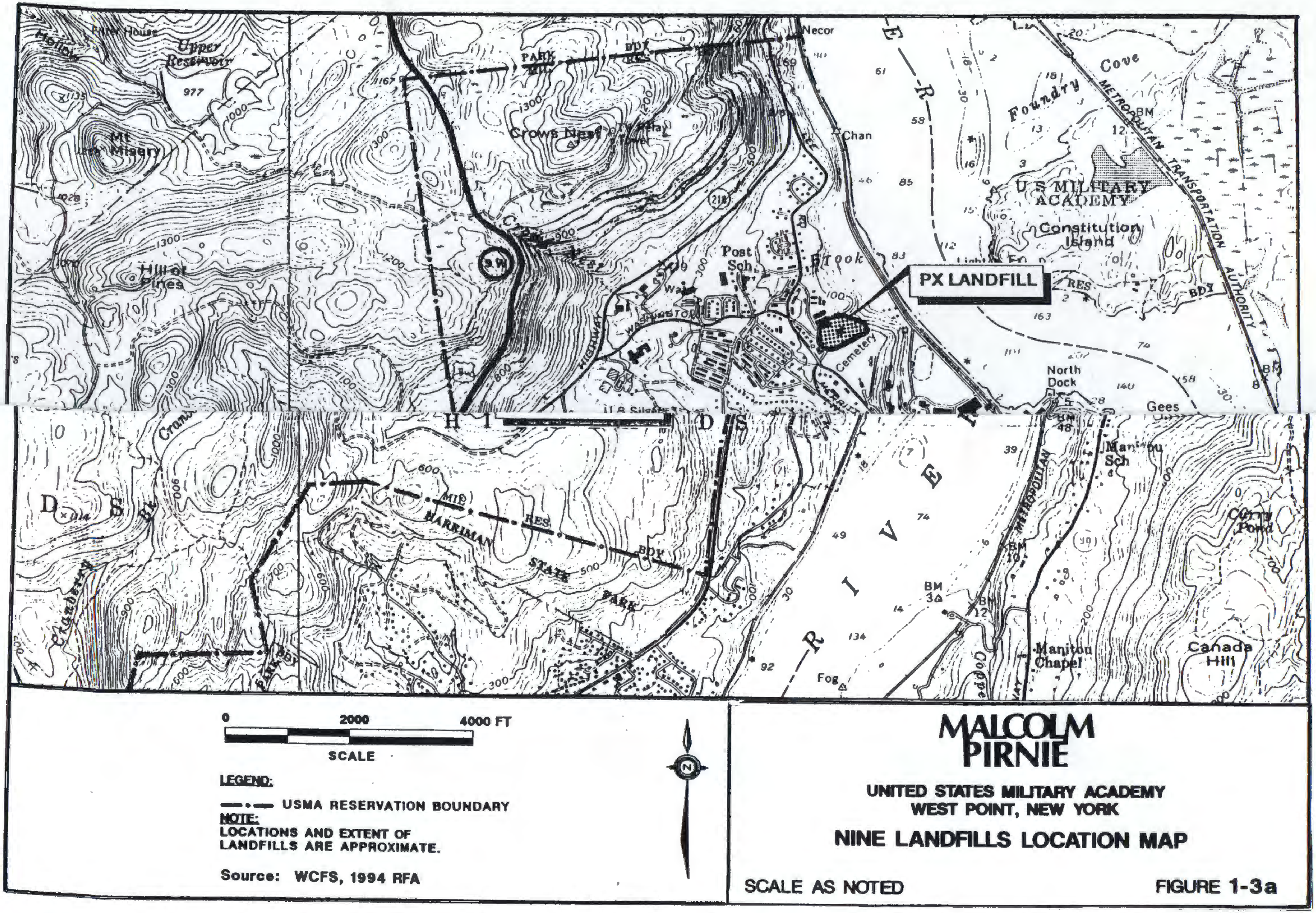
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

VICINITY MAP

SCALE AS NOTED

FIGURE 1-2



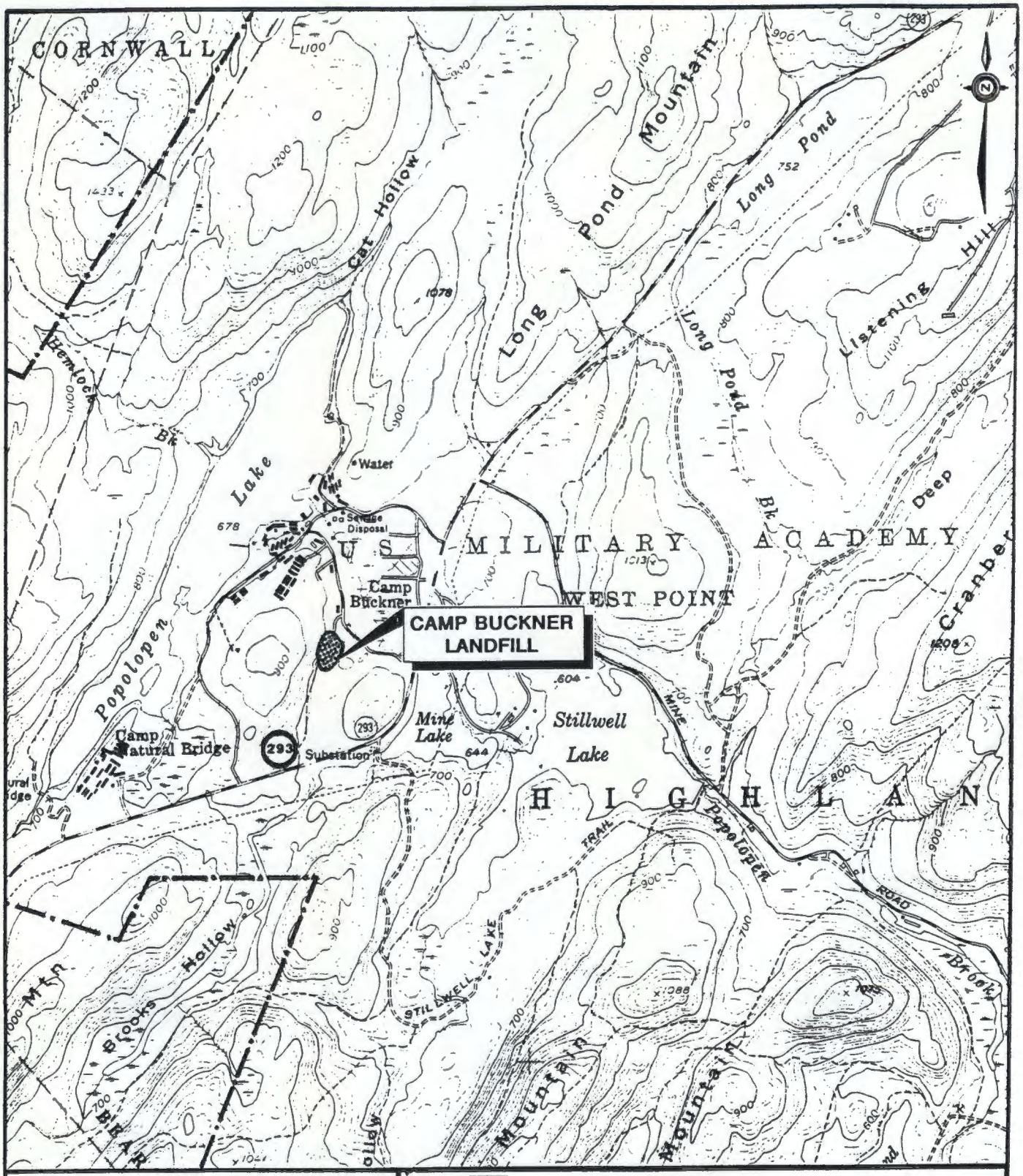
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

NINE LANDFILLS LOCATION MAP

SCALE AS NOTED

FIGURE 1-3a



0 2000 4000 FT

SCALE

LEGEND:

USMA RESERVATION BOUNDARY

NOTE:
LANDFILL LOCATION IS APPROXIMATE.

Source: WCFS, 1994 RFA

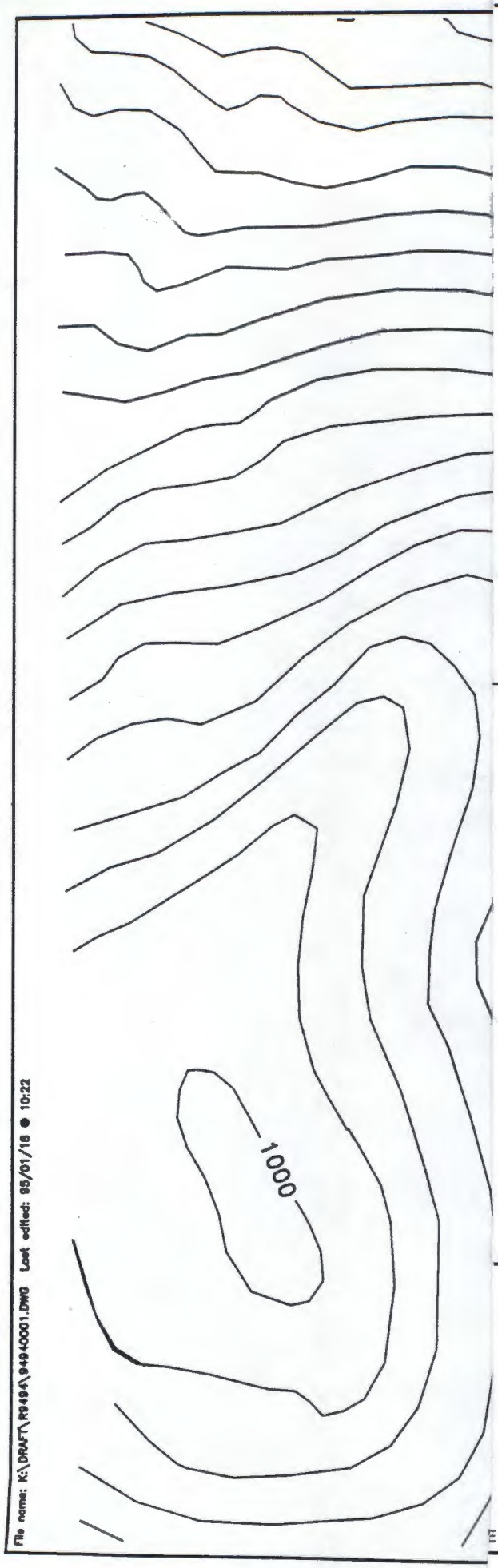
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

CAMP BUCKNER LOCATION MAP

SCALE AS NOTED

FIGURE 1-3b



N

MAP SOURCE:

USGS TOPOGRAPHIC MAPS; WEST POINT AND PEEKSKILL, N.Y. QUADRANGLE 1957, PHOTOREVISED 1981.

STREAM

MONITORING WELL LOCATION

GRANDSTANDS

APPROXIMATE LANDFILL LOCATION

NOTE:

WELL, LANDFILL AND GRANDSTAND LOCATIONS ARE APPROXIMATE.

SOURCE: WCFS, 1995 RFA

0 125 250 500

SCALE (FEET)

MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

VILLAGE FARM LANDFILL
WELL LOCATION MAP

E AS NOTED

FIGURE 2-1

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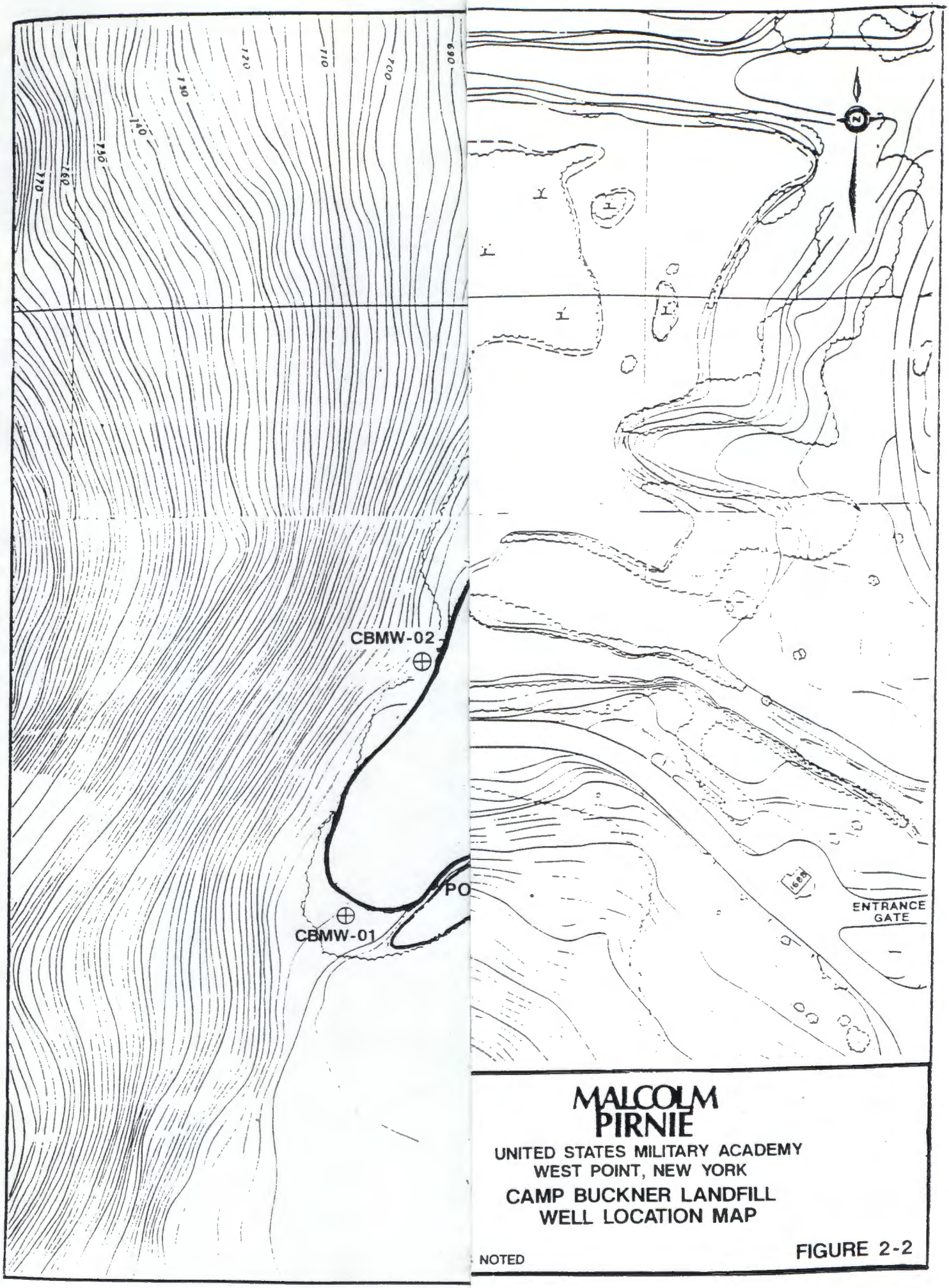

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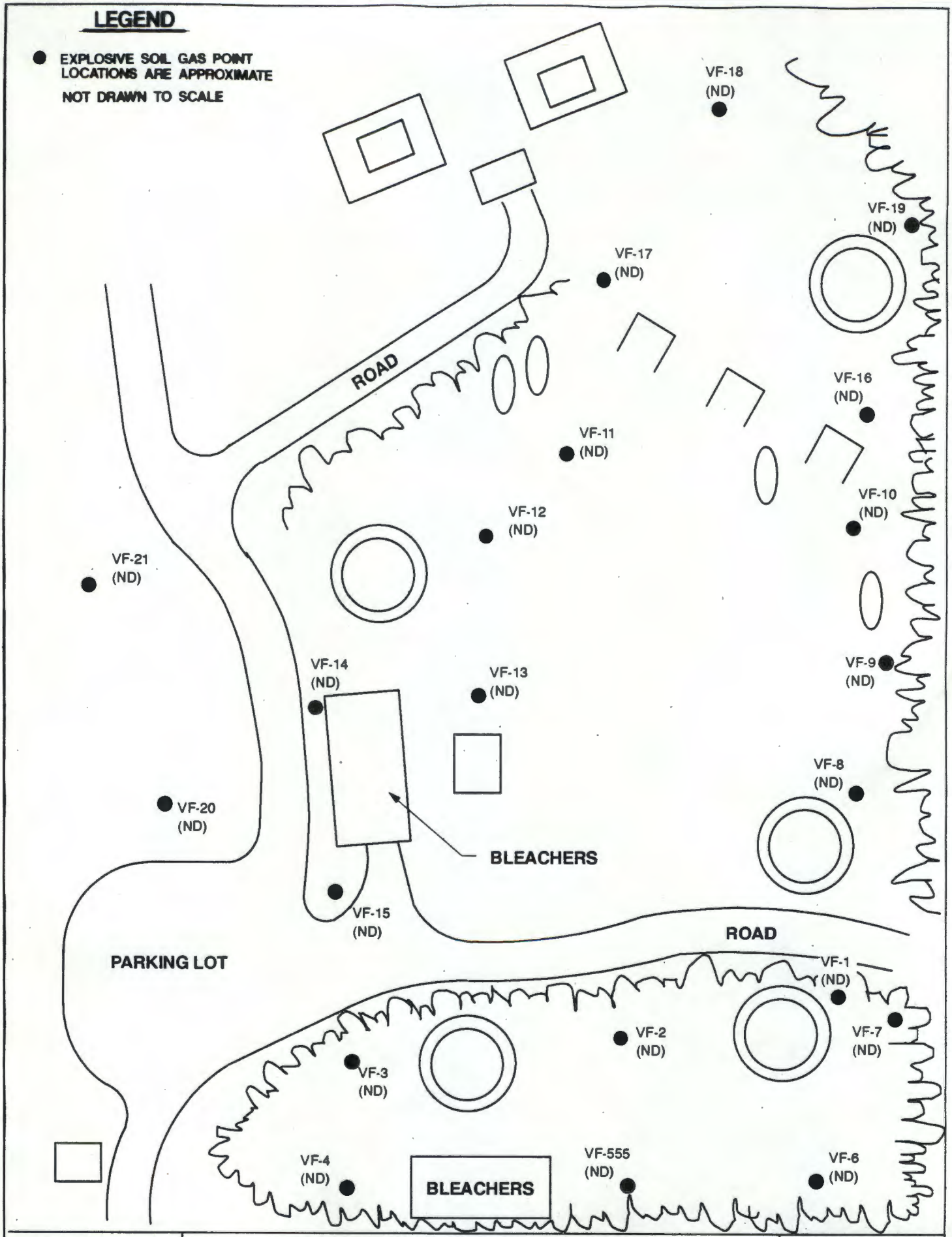
UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

CAMP BUCKNER LANDFILL
WELL LOCATION MAP

NOTED

FIGURE 2-2



MALCOLM PIRNIE

UNITED STATES MILITARY ADCADEMY
WEST POINT, NEW YORK
RESULTS OF EXPLOSIVE SOIL GAS SURVEY
VILLAGE FARM LANDFILL

MALCOLM PIRNIE, INC.

FIGURE 3-1

Source: WCFS, 1994 RFA

LEGEND

STREAM

ASSUMED EXTENT OF FILL AREA

EXPLOSIVE SOIL GAS POINT
LOCATIONS ARE APPROXIMATE

NOTE:
LOCATION OF TRACK IS APPROXIMATE.
CONTOUR INTERVAL IS 20 FEET

0 250 500 FT

SCALE

File name: K:\DRAFT\2091EOC\MORGAN.DWG Last edited: 94/01/31 @ 12:51

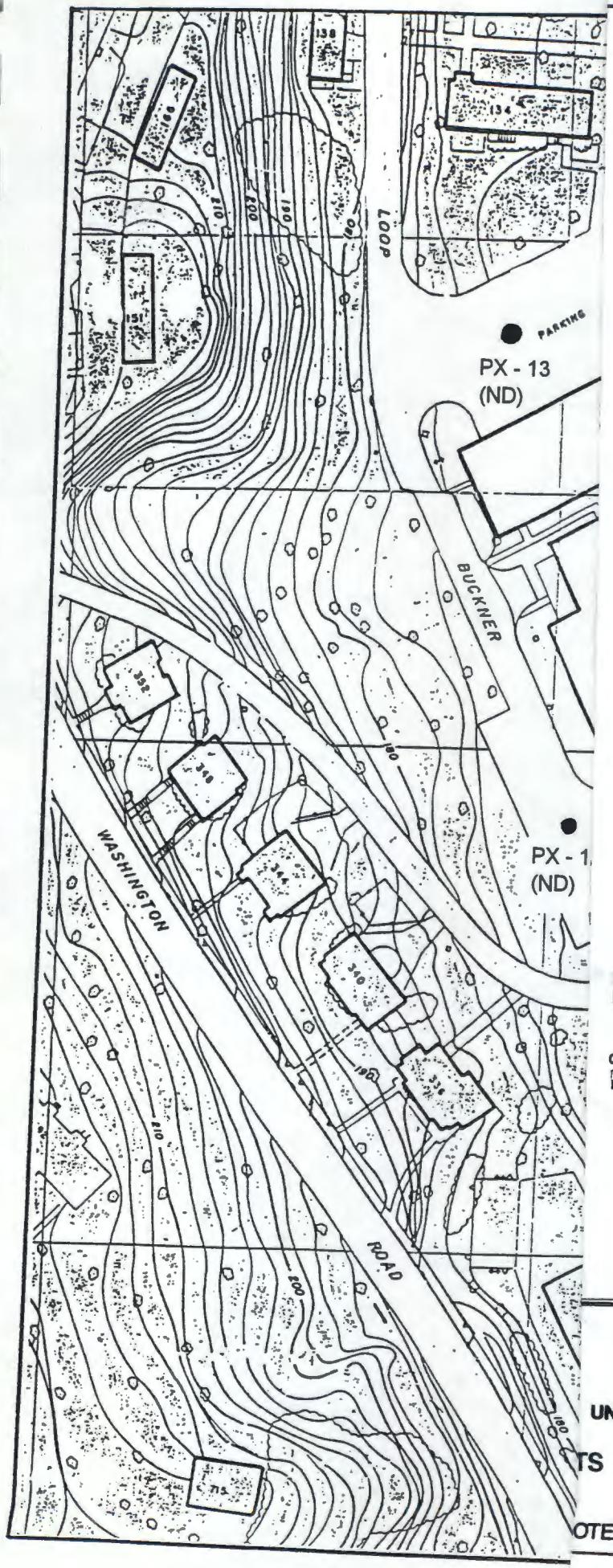
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

S OF EXPLOSIVE SOIL GAS SURVEY
HIGH SCHOOL LANDFILL

OTED

FIGURE 3-2



EXPLOSIVE SOIL GAS POINT
LOCATIONS ARE APPROXIMATE

0 100 200 FT
SCALE

Source: WCFS, 1994 RFA

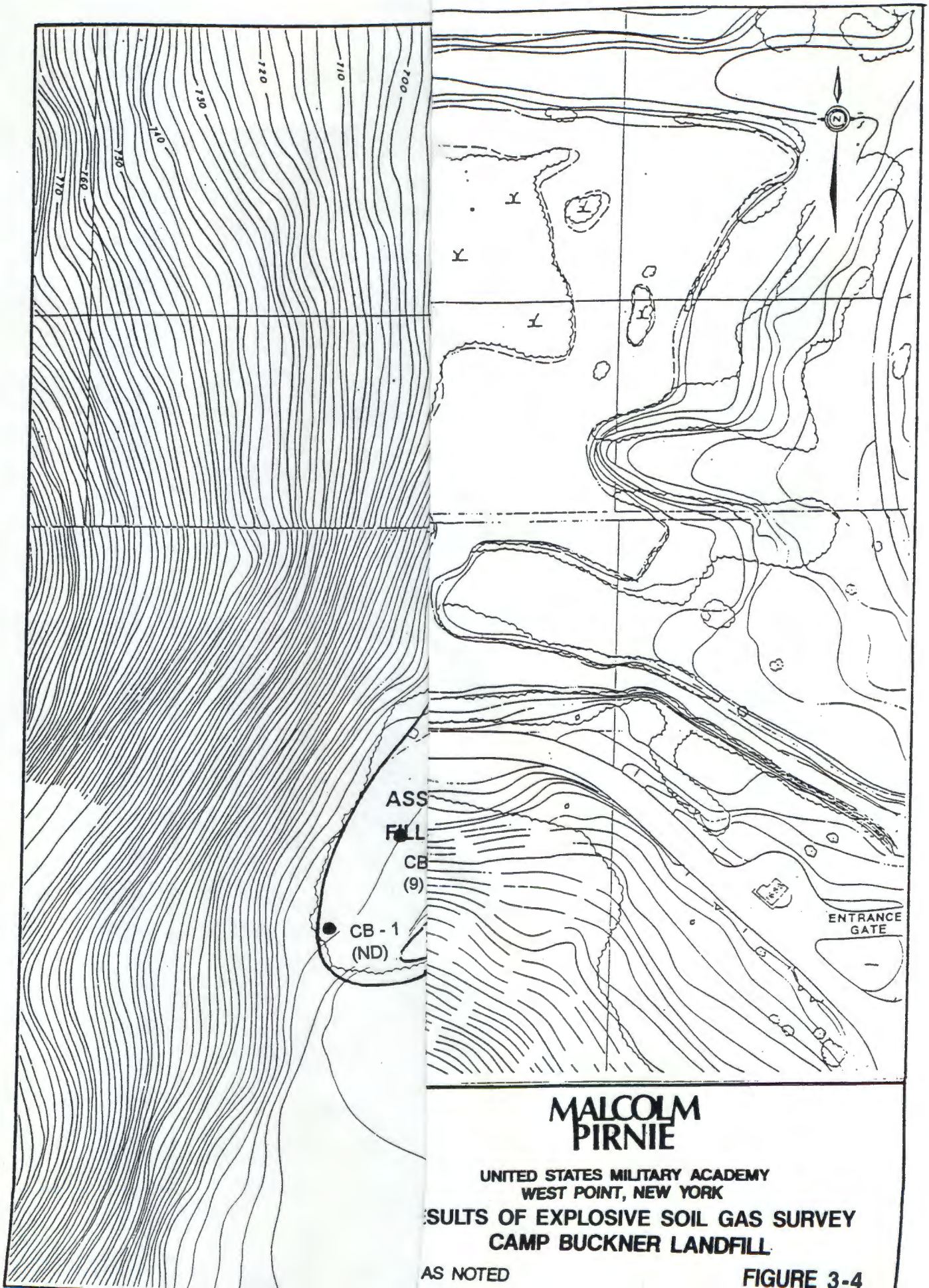
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

TS OF EXPLOSIVE SOIL GAS SURVEY
PX LANDFILL

OTED

FIGURE 3-3



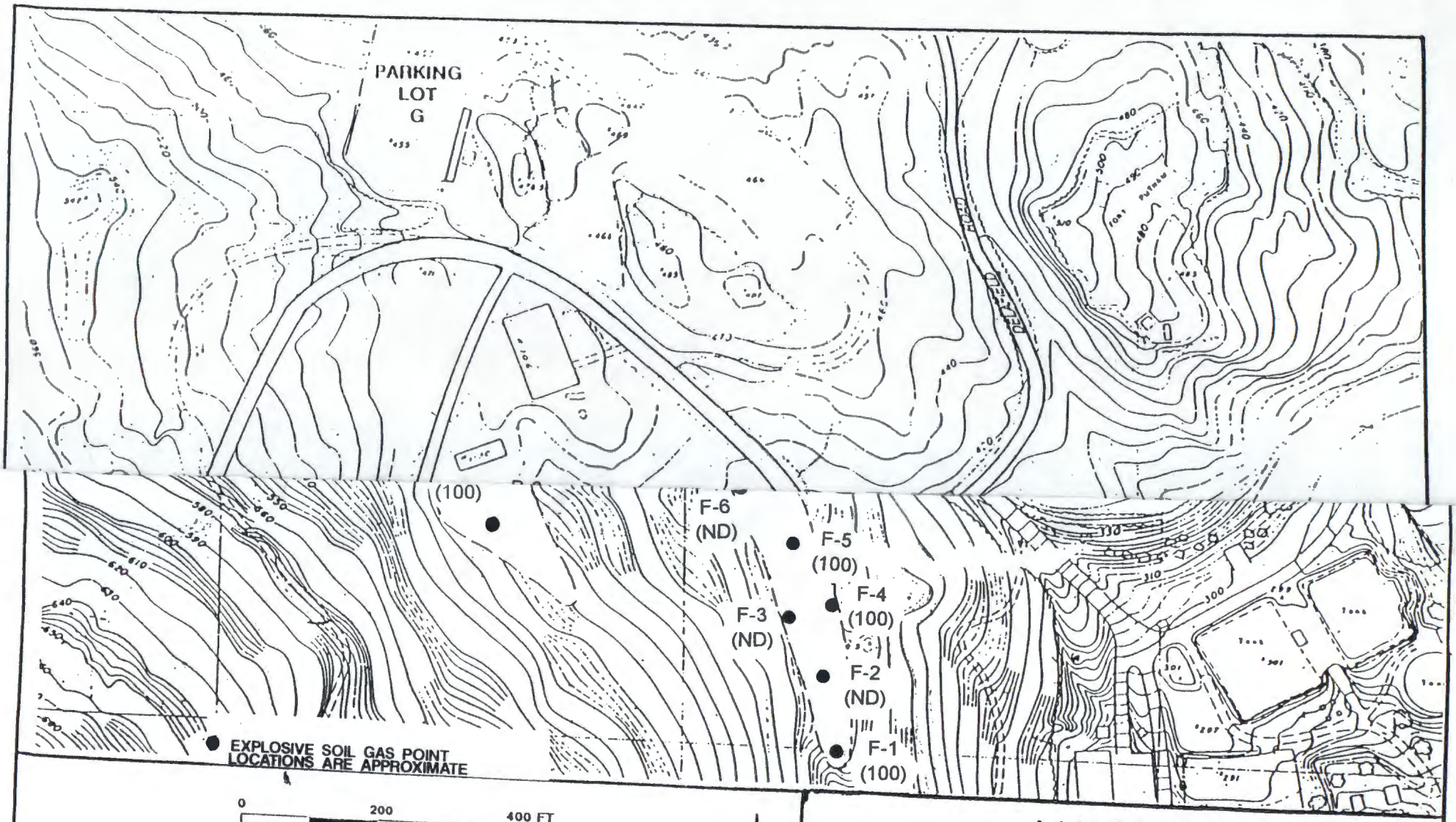
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

SULTS OF EXPLOSIVE SOIL GAS SURVEY
CAMP BUCKNER LANDFILL

AS NOTED

FIGURE 3-4



Source: WCFS, 1994 RFA

MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

RESULTS OF EXPLOSIVE SOIL GAS SURVEY
MICHIE STADIUM LOTS A, B, C, D, E AND F

SCALE AS NOTED

FIGURE 3-5

MAP SOURCE:
USGS TOPOGRAPHIC MAPS;
PEEKSKILL, N.Y. QUADRANGLE: 1957,
PHOTOREVISED 1981.

LEGEND

STREAM

ASSUMED EXTENT OF FILL AREA

NOTE:
LOCATION OF TRACK IS APPROXIMATE.
CONTOUR INTERVAL IS 20 FEET

0 250 500 FT

SCALE

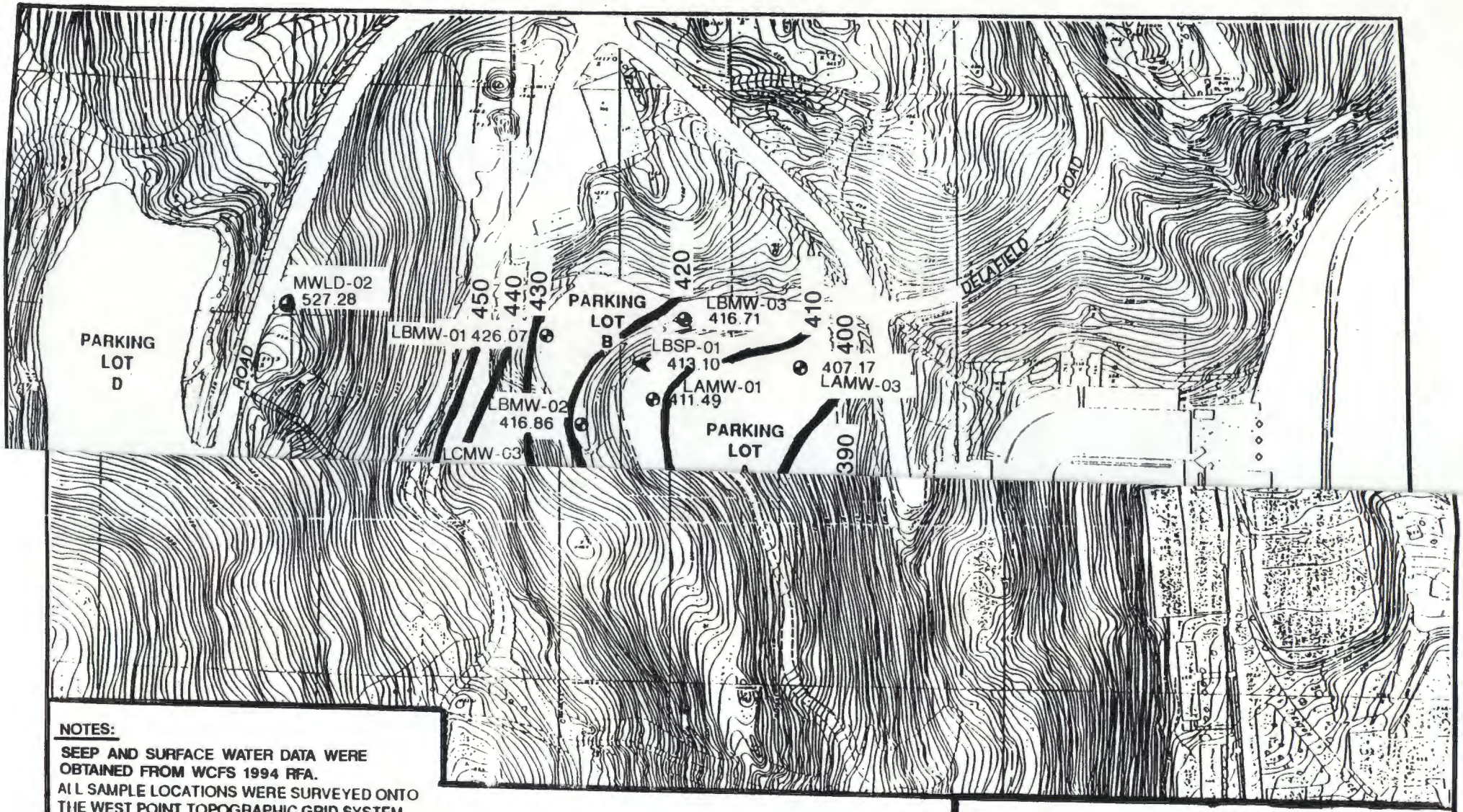
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

te Locations of Surface Water Samples
MORGAN FARM LANDFILL
TED

Figure 3-6

File name: K:\DRAFT\2091EDG\MORGAN.DWG Last edited: 94/01/31 @ 12:51



NOTES:

SEEP AND SURFACE WATER DATA WERE OBTAINED FROM WCFS 1994 RFA.

ALL SAMPLE LOCATIONS WERE SURVEYED ONTO THE WEST POINT TOPOGRAPHIC GRID SYSTEM BY J. W. DELANO SURVEYORS, WHITE PLAINS, N.Y. EXCEPT FOR LESP-02, LESP-03 AND LESB-06.

SOURCE: WCFS, 1994 RFA

MAP SOURCE:

TOPOGRAPHIC SURVEY MAPS BY DESIGN AND PLANNING ASSOCIATES AND AERIAL MAPPING SERVICES, INC., MIDDLETOWN, N.Y.; SHEETS J-25, J-26, K-25, K-26, L-25 AND L-26; JANUARY, 1976.

0 200 400 FT

SCALE

LEGEND:

- MONITORING WELL
- SEEP LOCATION
- SURFACE WATER LOCATION

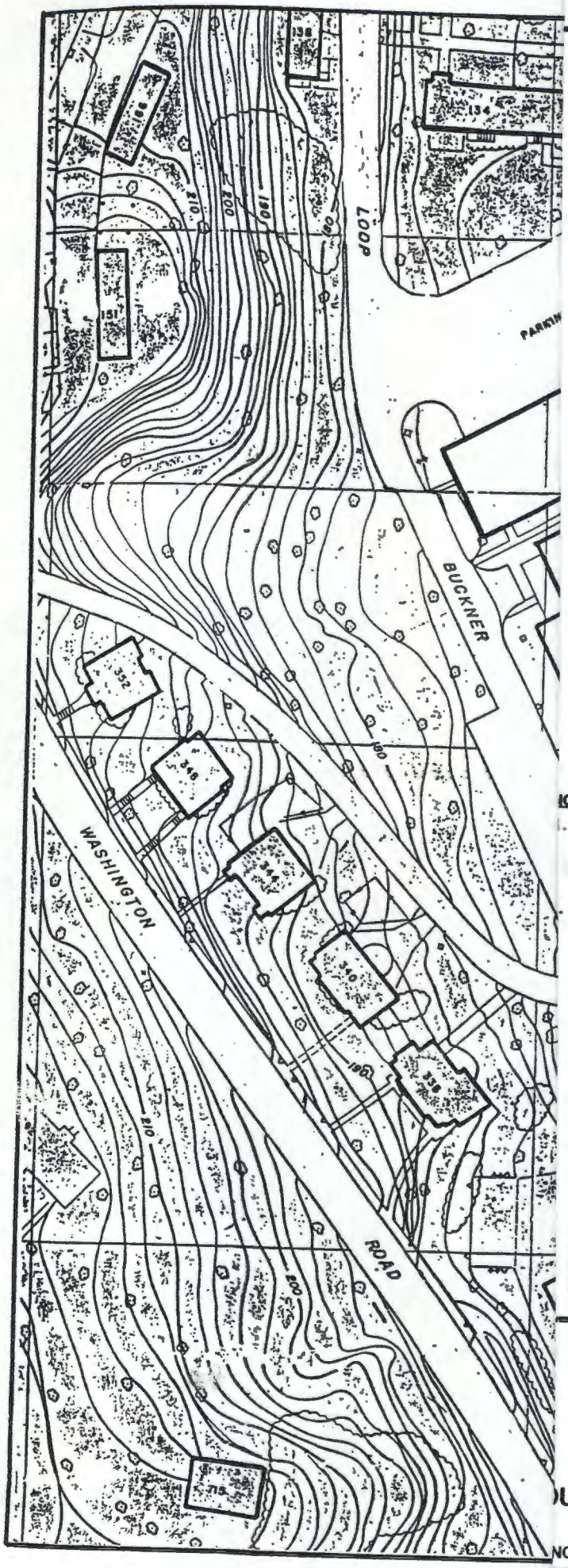
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

MICHIE STADIUM PARKING LOT LANDFILLS GROUNDWATER ELEVATION CONTOUR MAP

SCALE AS NOTED

FIGURE 3-7



LEGEND:

MONITORING WELL

NOTES:

1. LOCATIONS OF MONITORING WELLS WERE SURVEYED BY J. W. DELANO SURVEYORS, WHITE PLAINS, N.Y. ON TO THE WEST POINT TOPOGRAPHIC GRID SYSTEM.
2. PX LANDFILL AREA INCLUDES THE PARKING LOT, PX SERVICE STATION, AND POST EXCHANGE.

SOURCE: WCFS, 1994 RFA

0 100 200 FT.

SCALE

MAP SOURCE:
TOPOGRAPHIC SURVEY MAPS BY DESIGN AND PLANNING ASSOCIATES AND AERIAL MAPPING SERVICES, INC., MIDDLETOWN, NY; SHEETS E-25 AND F-25; JANUARY, 1976.

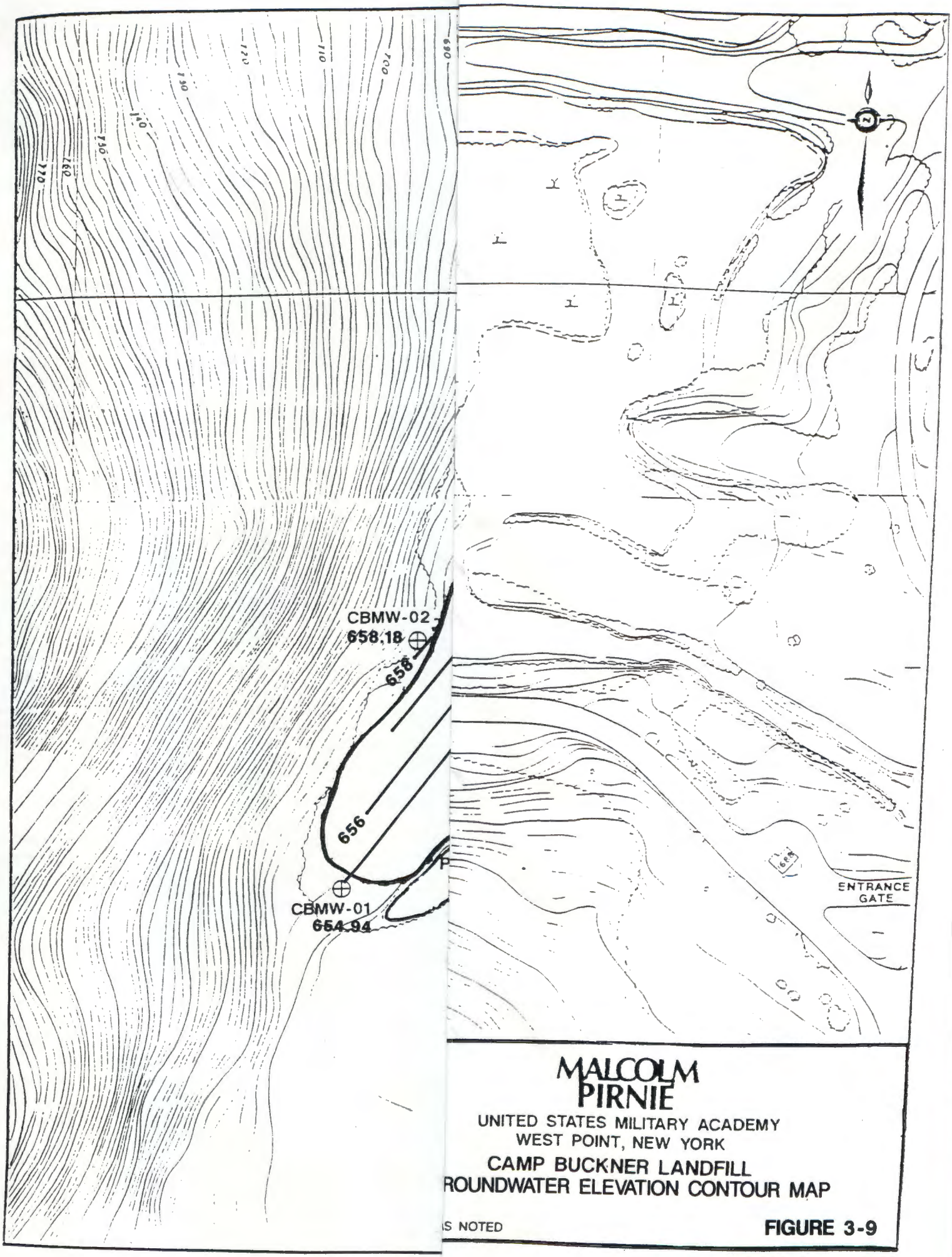
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

PX LANDFILL
GROUNDWATER ELEVATION CONTOUR MAP

NOTED

FIGURE 3-8



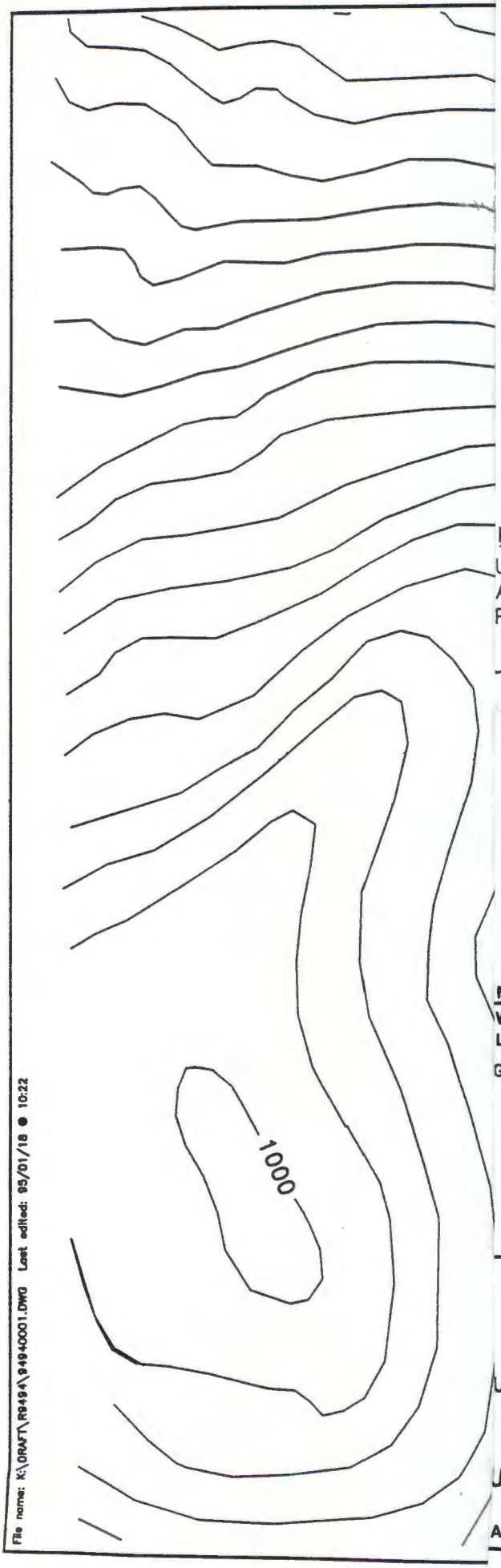
MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

CAMP BUCKNER LANDFILL
ROUNDWATER ELEVATION CONTOUR MAP

S NOTED

FIGURE 3-9



N

MAP SOURCE:
USGS TOPOGRAPHIC MAPS; WEST POINT AND PEEKSKILL, N.Y. QUADRANGLE 1957, PHOTOREVISED 1981.

STREAM

MONITORING WELL LOCATION

GRANDSTANDS

APPROXIMATE LANDFILL LOCATION

NOTE:
WELL, LANDFILL AND GRANDSTAND LOCATIONS ARE APPROXIMATE.

GROUNDWATER CONTOURS ARE APPROXIMATE

SOURCE: WCFS, 1995 RFA

0 125 250 500
SCALE (FEET)

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MALCOLM PIRNIE

UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK

VILLAGE FARM LANDFILL
UNDWATER ELEVATION CONTOUR MAP

AS NOTED

FIGURE 3-10

ATTACHMENT A

CORRESPONDENCE

ATTACHMENT A-1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York 12233

Michael D. Zagata
Commissioner

December 11, 1995

Mr. Bill Kavanagh
Environmental Manager
Department of the Army
United States Military Academy
West Point, New York 10996

Dear Mr. Kavanagh:

Re: RCRA Facility Assessment (RFA) - Ten Landfills Report,
United States Military Academy, West Point, New York.

The New York State Department of Environmental Conservation (Department) has completed a review of the "RCRA Facility Assessment (RFA) of Ten Landfills Report" dated June 1995. Based upon the groundwater data provided by the RFA, the Department believes that there is a need to further assess the following landfills for possible releases: PX, Michie Stadium, Village Farm, and Camp Buckner Landfills.

Therefore, the Department requires the United States Military Academy to submit a second round of groundwater samples from the landfills listed above within 120 days of the date of this letter. This will require at least three groundwater monitoring wells (one upgradient and two downgradient) at the Village Farm and Camp Buckner Landfills. In addition, soil samples shall be taken at 2 feet intervals during the monitoring well installation. The purpose of the groundwater/soil sampling is to confirm the presence of hazardous waste and/or constituents.

Department is also concerned that buried materials in the landfills may have the capacity to generate fugitive methane gas and therefore request that screening for explosives gases be

done at each of the landfill sites.

Finally, the Department would also like the Acadamey to take the necessary measures that will reduce the amount of surface water infiltrating into the Michie Stadium landfills, Lots C, E, and F (i.e., improvement on the asphalt cover and/or storm water catch basins).

The Department recognizes that interim corrective measures are presently on going at the Morgan Farm Landfill. However, the Department may ask for additional groundwater sampling after the ICM is completed.

Please be advised that at this time the Department makes no determination concerning any corrective measures which may be needed at the Four and Six Landfill projects pursuant to RCRA Subtitle C.

If you have any additional questions or concerns regarding these matters, please call me or my supervisor, Mr. Dennis Wolterding, at (518) 457-9361.

Sincerely,

James E. Yuchniewicz

James E. Yuchniewicz
Engineering Geologist
Bureau of Haz. Compliance & Land Management
Div. of Solid & Hazardous Materials

CC: E. Dassatti, Central Office
S. Kaminski, Central Office
D. Wolterding, Central Office
R. Aldrich, Reg. 3 Office
J. Petiet, Central Office

ATTACHMENT A-2

DEPARTMENT OF THE ARMY
UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK 10996

January 10, 1997

REPLY TO ATTENTION OF

Department of Housing and Public Works

SUBJECT: 10 Landfill Investigations

Mr. Keith H. Gronwald
New York State Department of
Environmental Conservation
50 Wolf Road, Room 460
Albany, New York 12233-7252

Dear Mr. Gronwald:

In pursuit of completing the 10 Landfill Investigation, the following information is enclosed which requires your input:

- Village Farm Landfill test pit survey

- Morgan Farm Landfill sampling results

The Village Farm Landfill test pit survey was performed to delineate the extent of fill in order to select monitoring well locations. We request your concurrence or recommendations with the location proposed in Figure 3.

The seep and surface water sampling at Morgan Farm Landfill was performed to evaluate the need for groundwater monitoring wells. Based on the analytical results, we don't believe monitoring wells are merited and we request your concurrence.

A well driller has tentatively been scheduled for Village Farm for the week of January 20,1997 and we would appreciate your input prior to mobilization. Please respond at your earliest convenience to Bill Kavanagh at (914) 938-4459.

Sincerely,

E Rood

Eugene E. Rood, P.E.
C, Environmental Management Division

Enclosures

Project Summary

This summary presents activities performed during the United States Military Academy (USMA), Village Farm Landfill Test Pit Survey. Contract Number DACW45-94-D-0054, Delivery Order Number 19, at West Point, New York, for the period of December 18-19, 1996.

This project was performed in response to previous investigations which were conducted at the Village Farm Landfill to determine the extent of the fill area.

IT Corporation (IT) was contracted to execute this Rapid Response Landfill project to address this site. The following were IT's objectives for the project:

- Determine the extent of the landfill.
- Determine the volume of the landfill, and
- Characterize the contents of the landfill.

Intrusive activities began on December 18, 1996 at the Village Farm Landfill. A total of nineteen test pits were excavated to assist in determining the extent of the landfill. The landfill is estimated to be 66 feet long by 58 feet and 38 feet wide at the west and east ends, respectively. The limits of the landfill extend beyond this area, but in small quantities, just below the ground surface. The depth of the landfill is approximately 12 feet throughout. Given the assumed area and depth of fill material, a volume of approximately 2,000 cubic yards was estimated. A summary of the Test Pit survey is presented below. Note: small to large boulders were encountered throughout the entire area of the Test Pit Survey.

Test Pit 01:
1) Location - 55 feet east of the outside corners of the #1 and #3 fire range three sided structures.
2) Depth of the test pit - 8 feet.
3) Groundwater seeping in at 4-6 feet.
4) No landfill material encountered.

Test Pit 02:
1) Location - 75 and 95 feet east of the outside corners of the #1 and #3 fire range three sided structures, respectively.
2) Depth of the test pit - 6 feet.
3) No landfill material encountered.

Test Pit 03:
1) Location - 116 and 110 feet northwest of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 8 feet.
3) Groundwater seeping in at 2 feet.
4) No landfill material encountered in the test pit, however, minor fill material on eastern edge of the test pit, just below the ground surface.

Test Pit 04:
1) Depth of the test pit - 10 feet.
2) Groundwater seeping in at 6 feet.
3) No landfill material encountered in the test pit, however, minor fill material on northeast edge of the test pit, just below the ground surface.

Test Pit 05:
1) Location - 100 and 94 feet southwest of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 8 feet.
3) Groundwater seeping in rapidly at 2 feet.
4) Landfill material encountered in the test pit down to a depth of 8 feet, however, higher percentage of soil.

Test Pit 06A:
1) Depth of the test pit - 4 feet.
2) No landfill material encountered.

Test Pit 06B:
1) Depth of the test pit - 4 feet.
2) No landfill material encountered.

Test Pit 06:
1) Location - 81 and 92 feet northwest of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 6 feet.
3) Groundwater seeping in at 4 feet.
4) Landfill material encountered in the test pit down to a depth of 6 feet.

Test Pit 07A:
1) Depth of the test pit - 4 feet.
2) No landfill material encountered.

Test Pit 07B:
1) Depth of the test pit - 4 feet.
2) No landfill material encountered.

Test Pit 07C:
1) Depth of the test pit - 4 feet.
2) No landfill material encountered.

Test Pit 07:
1) Location - 23 feet north of the northwest corner of the grandstand.
2) Depth of the test pit - 6 feet.
3) Groundwater seeping in at 4 feet.
4) A 2 foot layer of landfill material encountered in the test pit 2 feet below the ground surface.

Test Pit 08:
1) Location - 48 and 37 feet southeast of the north and south, east corners of the grandstand, respectively.
2) Depth of the test pit - 7 feet.
3) Groundwater seeping in at 4 feet.
4) A 3 foot layer of landfill material encountered in the test pit 2 feet below the ground surface.

Test Pit 09:
1) Location - 43 and 24 feet southwest of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 7 feet.
3) Groundwater seeping in at 7 feet.
4) Landfill material encountered in the test pit down to a depth of 7 feet, however, higher percentage of soil.

Test Pit 10:
1) Location - 48 and 54 feet west of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 12 feet.
3) Groundwater at 6 feet.
4) Landfill material encountered in the test pit down to a depth of 12 feet.

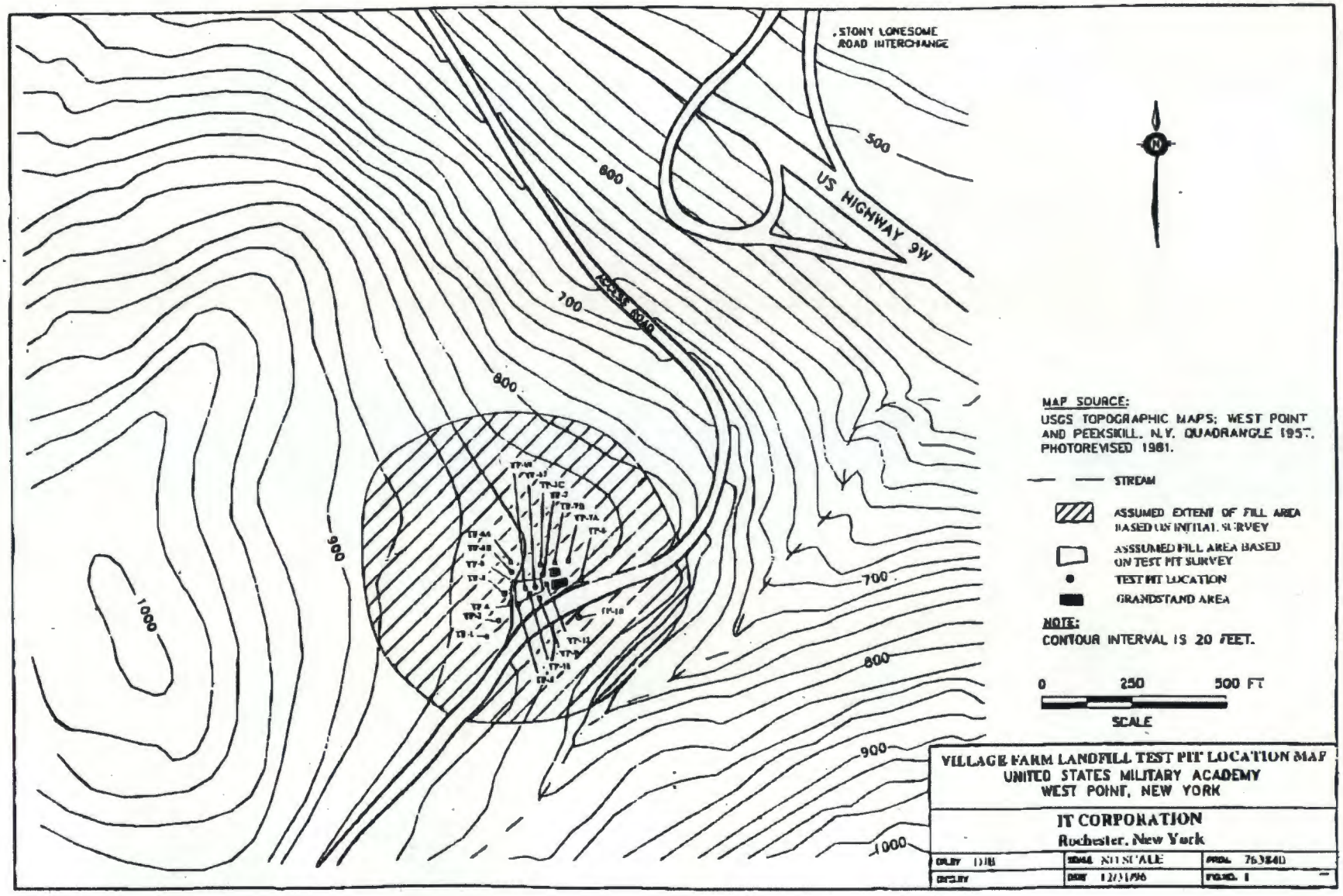
Test Pit 11:
1) Location - 69 and 68 feet west of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 12 feet.
3) Groundwater at 7.5 feet.
4) Landfill material encountered in the test pit down to a depth of 12 feet.

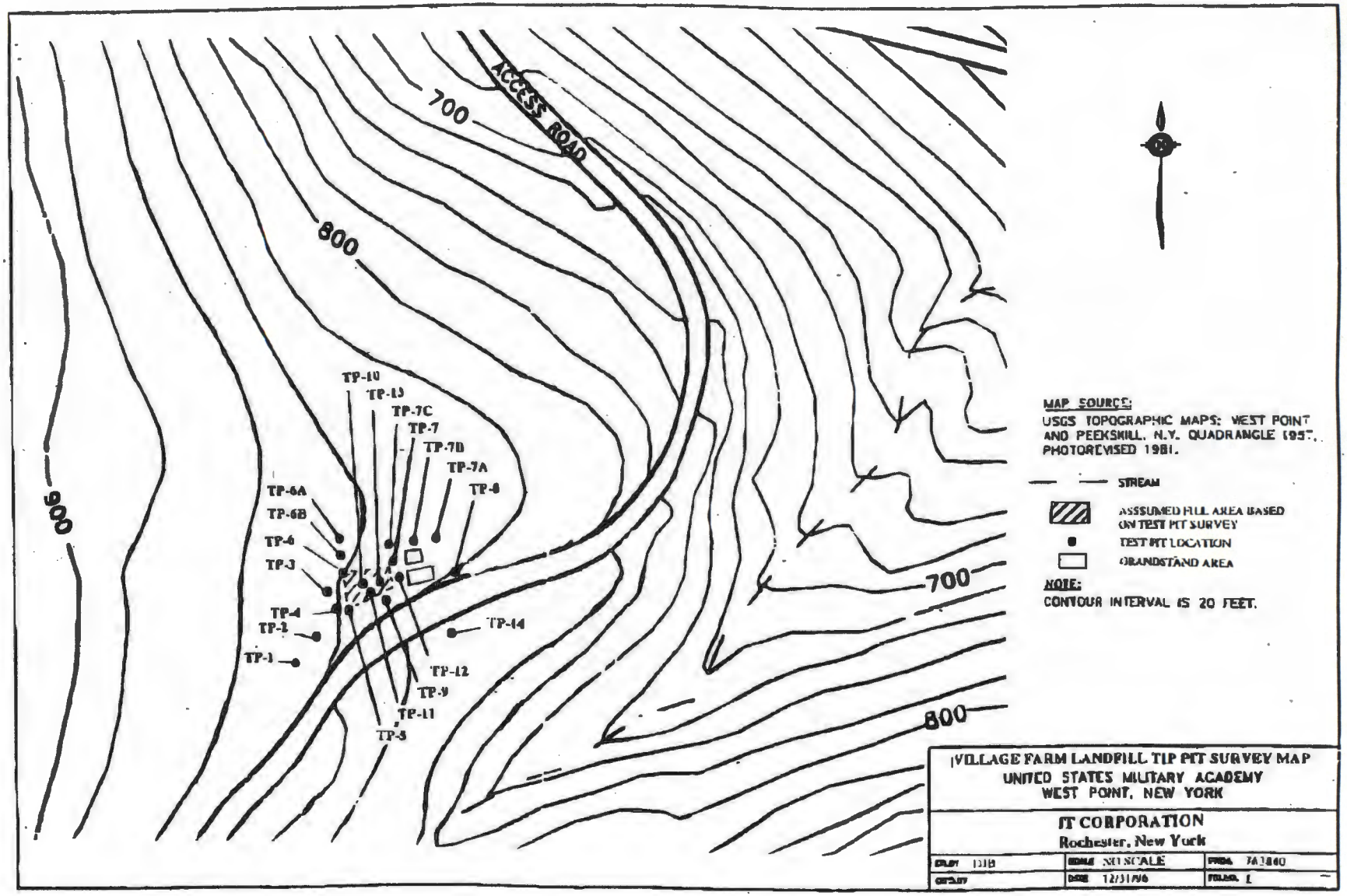
Test Pit 12:
1) Location - 7 and 16 feet west of the north and south, west corners of the grandstand, respectively.
2) Depth of the test pit - 5.5 feet.
3) Groundwater at 3.5 feet.
4) A 2.5 foot layer of landfill material encountered in the test pit from 3 to 5.5 feet.

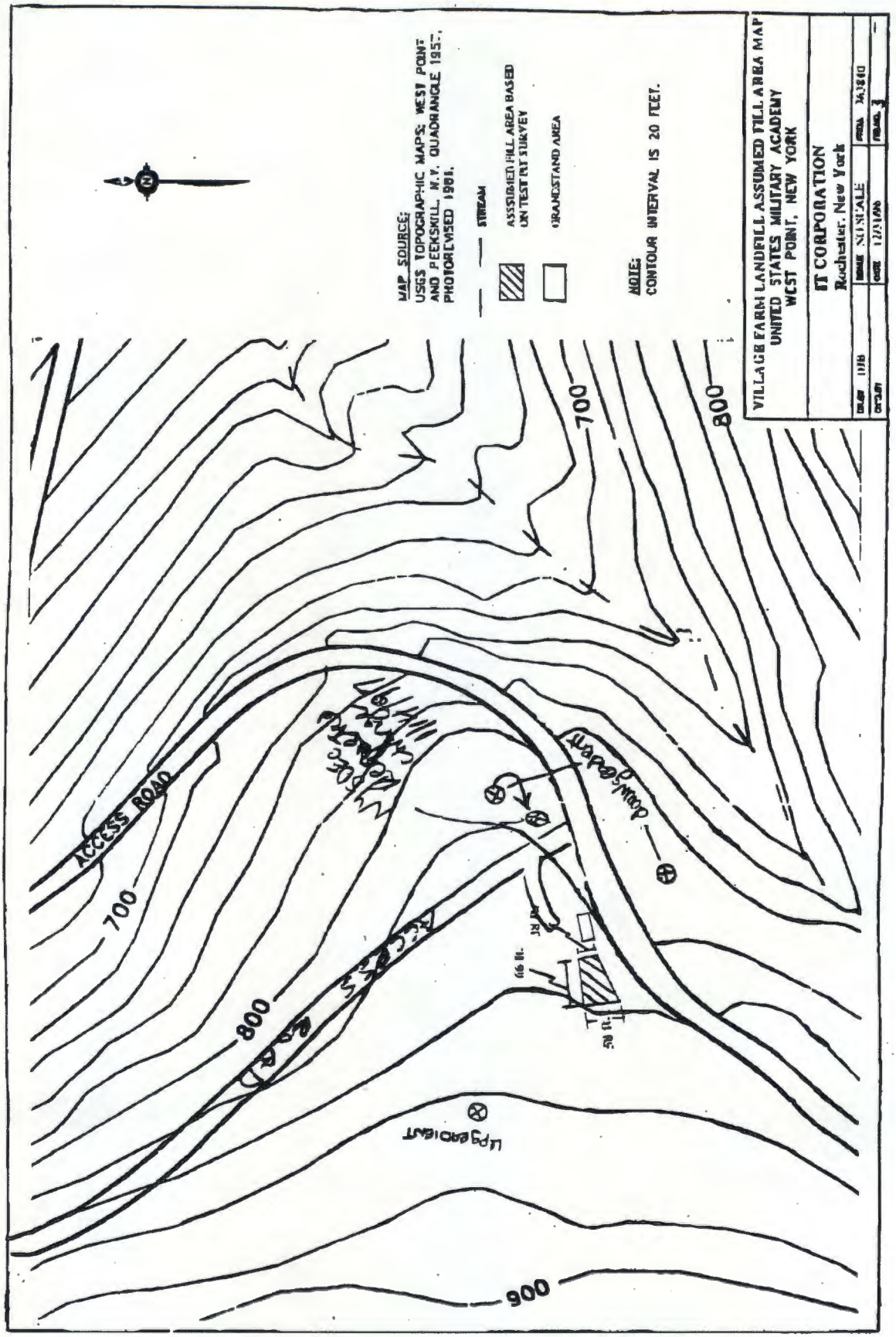
Test Pit 13:
1) Location - 24 and 35 feet west of the north and south, west corners of the grandstand. respectively.
2) Depth of the test pit - 12 feet.
3) Groundwater at 3 feet.
4) Landfill material encountered in the test pit down to a depth of 12 feet.

Test Pit 14:
1) Location - southwest of the grandstand. across the access road.
2) Depth of the test pit - 8 feet.
3) Groundwater at 5 feet.
4) No landfill material encountered.

The landfill debris consisted of plastic, cloth, tires, wood and scrap metal. Percentages of each waste stream was inconsistent between each test pit and could not be determined. The volume of scrap metal did not appear to be sufficient to warrant refuse at a recycling facility if the landfill is removed. The majority of the landfill debris was discovered in an area 68 feet long and 58 and 38 feet wide (see Figure 3 - Assumed Fill Area Map). Fill material was recorded from just below the ground surface down to a depth of 12 feet. A high percentage of the material removed from this area was landfill debris with little soil and boulders mixed throughout. The volume calculations estimated the landfill contents to be approximately 1,400 cubic yards. The landfill extended beyond this area, but in small quantities relative to the fill area. This area was broken down into two sections. The first section, located just west of the grandstand, measured 85 feet wide on the eastern end and 80 feet at the western end and 110 feet long at the southern end and 72 feet on the northern end. The second section, located just south of the grandstand measured 30 feet wide on the eastern end and 40 feet at the western end and 100 feet long at the southern and northern ends. Volume calculations from this area (based on a two foot layer of fill material) totaled approximately 600 cubic yards. It is estimated that 2,000 cubic yards of fill material exists in the Village Farm Landfill. At the conclusion of each test pit the material was placed back into the excavation, with the cover soil placed on top. Field activities were completed December 19, 1996.


STONY LONESOME ROAD INTERCHANGE
US HIGHWAY 9W
500
600
700
800
900
1000
MAP SOURCE:
USGS TOPOGRAPHIC MAPS; WEST POINT AND PEEKSKILL, N.Y. QUADRANGLE 1957, PHOTOREVISED 1981.
STREAM
ASSUMED EXTENT OF FILL AREA BASED ON INITIAL SURVEY
ASSSUMED FILL AREA BASED ON TEST PIT SURVEY
TEST PIT LOCATION
GRANDSTAND AREA
NOTE:
CONTOUR INTERVAL IS 20 FEET.
0 250 500 FT
SCALE
VILLAGE FARM LANDFILL TEST PIT LOCATION MAP
UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK
IT CORPORATION
Rochester, New York
DRAWN DJB
SCALE NO SCALE
PROJ. 763840
DATE 12/31/96
FIGURE 1




MAP SOURCE:
USGS TOPOGRAPHIC MAPS: WEST POINT AND PEEKSKILL, N.Y. QUADRANGLE 1957. PHOTOREVISED 1981.
STREAM
ASSUMED FILL AREA BASED ON TEST PIT SURVEY
GRANDSTAND AREA
NOTE:
CONTOUR INTERVAL IS 20 FEET.
VILLAGE FARM LANDFILL ASSUMED FILL AREA MAP
UNITED STATES MILITARY ACADEMY
WEST POINT, NEW YORK
IT CORPORATION
Rochester, New York
SCALE: NTS
700
800
900
ACCESS ROAD
LPG PLANT
66 ft.
50 ft.

New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
Bureau of Hazardous Waste Facilities
50 Wolf Road, Albany, New York 12233-7252
518-457-9236 FAX 518-457-9240

January 15, 1997

John P. Cahill
Acting Commissioner

Mr. William Kavanagh
Environmental Management Branch
Department of Housing and Public Works
United States Military Academy
West Point, New York 10996

Dear Mr. Kavanagh:

Re: 10 Landfills Investigation (Village Farm & Morgan Farm Landfills)

The following is to confirm discussions during our telephone conversation of January 14, 1997 relating to your faxed letter of January 10, 1997 on the proposed monitoring well locations for the Village Farm Landfill and stream and seep sampling results for the Morgan Farm Landfill.

Regarding the proposed monitoring well locations for the Village Farm Landfill, I recommended moving the northernmost downgradient well southwest such that it would be located near the intersection of the two access roads (map attached). The reason for this change is to bring the well into a location which is more likely to be in the flowpath of any potential plume from the facility and to bring the well closer to the waste mass. If during drilling of any of the monitoring wells, waste is encountered, the hole should be abandoned and the well moved to a more appropriate location. If this condition occurs, please make an attempt to contact me immediately to discuss alternate locations for the well. With this change, the well installation anticipated for the week of January 20, 1997 is approved.

The sampling results for the Morgan Farm Landfill have been reviewed and a determination has been made that monitoring wells are not necessary at this time for this particular site. Monitoring of the stream and the seep however will be needed to evaluate any impacts which this remediated site may still have upon the environment. This information will also be forwarded to the Division of Water for their concurrence.

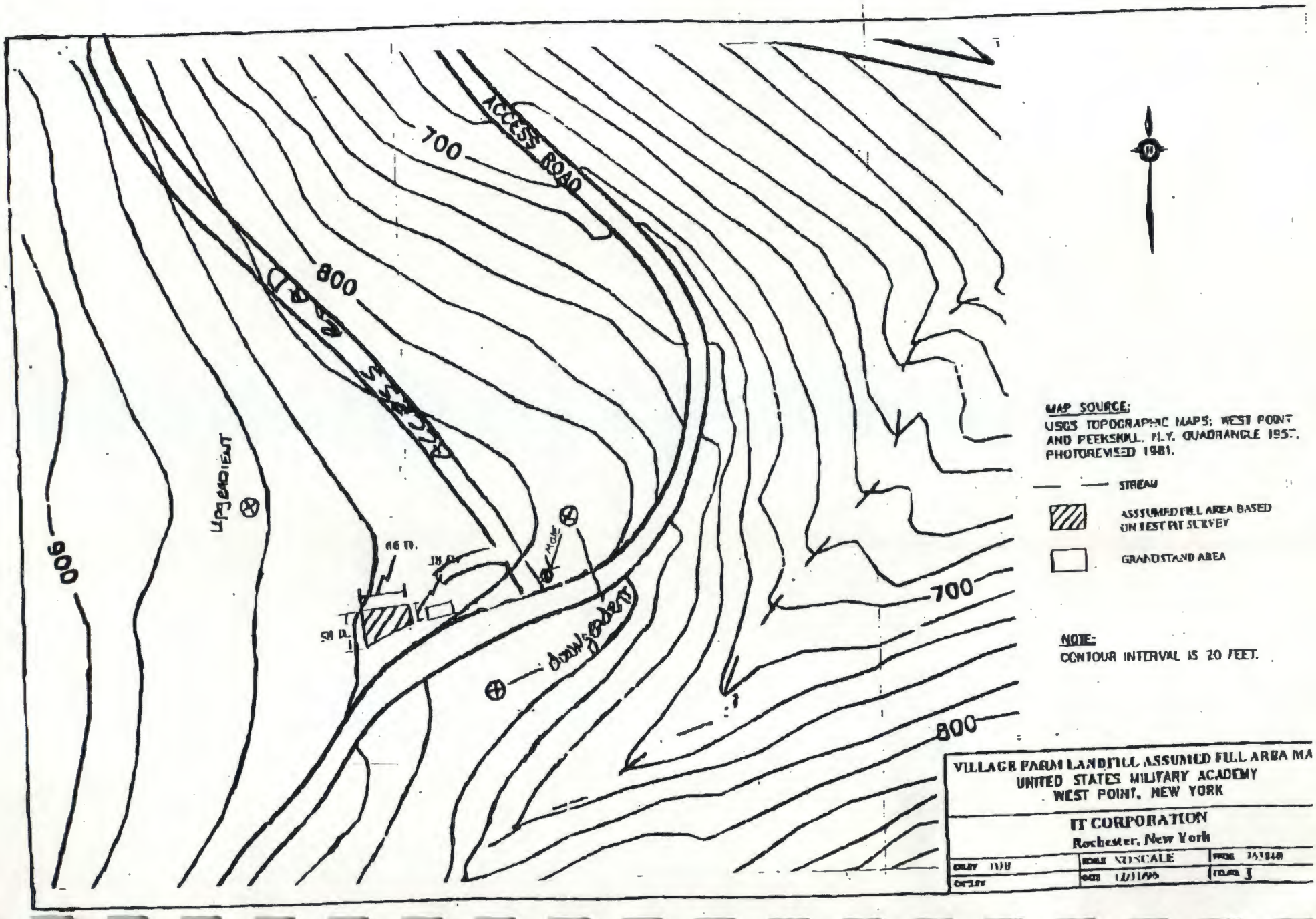
If you have any questions, or need further clarification please feel free to call me at (518) 457-9253.

Sincerely,

Keith H. Gronwald
Sr. Engineering Geologist

Attachment

cc: Eugene Rood, West Point



ATTACHMENT B

BORING LOGS AND WELL CONSTRUCTION LOGS

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

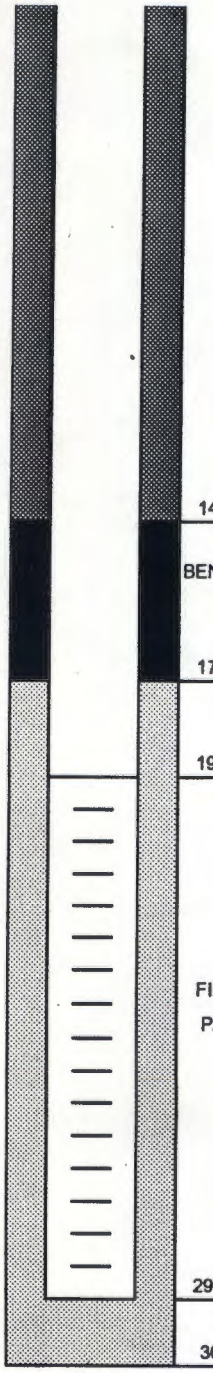
BORING: CBMW-1

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	July 1 - 3, 1996
JOB NUMBER:	0285-659-100	LOCATION:	Camp Buckner Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Partly Cloudy, 85f
DRILLING METHOD:	8 1/4" Hollow Stem Augers	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Eric Johnson

SAMPLE INFORMATION										
No.	Depth	Rec	Blows per 6"				Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
S-1	0 - 2 ft	6"	6	3	50/1	--		Brown-tan F - M SAND with Silt & Clay; trace (+) F - VC Gravel		PID = 0.0 ppm Cement Collar = 0 - 2 ft below ground
S-2	2 - 4 ft	10"	9	13	8	6	2	Same As Above		PID = 0.0 ppm Moist at approximately 4 ft.
S-3	4 - 6 ft	10"	2	3	3	4	4	Same As Above with concrete, wood and aluminum fragments		PID = 0.0 ppm Cement/Bentonite Grout = 2 - 14.5 ft below ground
S-4	6 - 8 ft	12"	2	2	5	7	6	Same As Above with organic Peat/Mulch Gray F SAND & Silt with VC Gravel		PID = 0.0 ppm
S-5	8 - 10 ft	10"	4	4	8	10	8	Gray SILT and Gravel		PID = 0.0 ppm Saturated - water at 8 ft below ground surface
S-6	10 - 12 ft	12"	2	2	3	3	10	Gray SILT and Clay with VC Gravel and Rock Fragments (Fill)		PID = 0.0 ppm Well Riser = 2" I.D. Sch 40 PVC
S-7	12 - 14 ft	10"	8	10	13	13	12	Same As Above		PID = 0.0 ppm
S-8	14 - 16 ft	10"	3	5	9	12	14	Same As Above		PID = 0.0 ppm Bentonite Pellet Seal = 14.5 - 17.5 ft below ground
S-9	16 - 18 ft	18"	25	26	9	10	16	10" Same As Above 8" Gray CLAY with F - VC Gravel (Fill)		PID = 0.0 ppm
S-10	18 - 20 ft	18"	6	5	4	4	18	10" Same As Above 8" Gray CLAY with little Silt (material is very cohesive)		PID = 0.0 ppm #1 Sand Filter Pack = 17.5 - 30 ft below ground
S-11	20 - 22 ft	20"	8	14	22	33	20	Same As Above with weathered Gneiss fragments Silt noted in tip of split spoon.		PID = 0.0 ppm Well Screen = 2" I.D. Sch 40 PVC 10 Slot
S-12	22 - 24 ft	22"	30	32	50/5	--	22	Gray SILT/CLAY grading to Tan - Brown with VC Gravel		PID = 0.0 ppm
S-13	24 - 26 ft	20"	9	21	17	15	24	Same As Above with some F - M Sand		PID = 0.0 ppm
S-14	26 - 28 ft	18"	14	14	7	20	26	Same As Above		PID = 0.0 ppm
S-15	28 - 30 ft	6"	36	50/4	--	--	28	Same As Above with Rock Fragments in tip split spoon		PID = 0.0 ppm
							30	END OF BORING AT 30 FT BELOW GROUND		

MALCOLM PIRNIE, INC.
ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG



- [X] LOCKING PROTECTIVE CASING
- [ ] FLUSHMOUNT
- [ ] OTHER
- [ ] BENTONITE GROUT
- [X] BENTONITE/CEMENT GROUT
- [ ] BACKFILL

14.5 FT — BENTONITE SEAL

- [ ] SLURRY
- [X] PELLETS
- [ ] HOLEPLUG

17.5 FT

19.5 FT

FILTER PACK

- [ ] GRAVEL PACK
- [X] SAND PACK
- [ ] FORMATION COLLAPSE

29.5 FT

30 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	CBMW-1
LOCATION	Camp Buckner Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	7.20 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	8 1/4 inch Hollow Stem Augers
DRILLING FLUID	None
DRILLING DATE	July 1, 1996
COMPLETION DATE	July 3, 1996
DEVELOPMENT DATE	July 8, 1996
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC [ ] STAINLESS STEEL

REMARKS

HYDROGEOLOGIST Eric Johnson

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

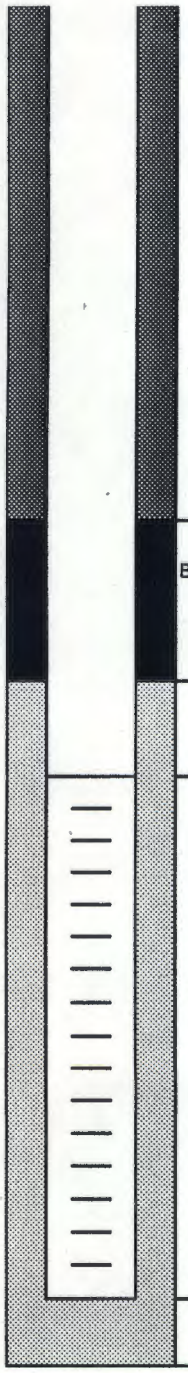
BORING: CBMW-2

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	July 2 & 9, 1996
JOB NUMBER:	0285-659-100	LOCATION:	Camp Buckner Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Partly Cloudy, 85F
DRILLING METHOD:	8 1/4" Holllow Stem Augers/6" Air Percussion Hammer	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Eric Johnson

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"							
S-1	0 - 2 ft	20"	3	4	7	7		Brownish - tan F SAND & Silt; trace (+) Clay; some (-) F - VC Gravel		PID = 0.0 ppm
S-2	2 - 4 ft	18"	6	16	14	12	2	Same As Above with Grayish color		PID = 0.0 ppm
S-3	4 - 6 ft	12"	7	10	20	23	4	6" Same As Above (Saturated) 6" Gray-Tan-Brown VF SAND & Silt; trace (+) F - C Gravel		PID = 0.0 ppm Water at approximately 4 ft. below ground
S-4	6 - 8 ft	18"	16	27	31	50/5	6	Same As Above with Brownish Tan color		PID = 0.0 ppm
							8	No samples collected from 8 ft to end of boring. Drilling in bedrock with 6" Air Percussion Hammer		
							10			
							12			
							14	END OF BORING AT 13 FT BELOW GROUND ENCOUNTERED BEDROCK AT 8 FT.		Well construction was compressed because of depth from ground surface to top of screen. Well Screen = 2" I.D. Sch 40 PVC 10 Slot Well Riser = 2" I.D. Sch 40 PVC #1 Sand Pack = 1.5 - 13 ft. below ground Bentonite Pellet Seal = 0.5 - 1.5 ft. below ground Cement/Bentonite Grout = 0 - 0.5 ft. below ground

MALCOLM PIRNIE, INC.
ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG



[X] LOCKING PROTECTIVE CASING
[ ] FLUSHMOUNT
[ ] OTHER

[ ] BENTONITE GROUT
[X] BENTONITE/CEMENT GROUT
[ ] BACKFILL

0.5 FT
BENTONITE SEAL
[ ] SLURRY
[X] PELLETS
1.5 FT
[ ] HOLEPLUG

2.5 FT

[ ] GRAVEL PACK
FILTER PACK
[X] SAND PACK
[ ] FORMATION COLLAPSE

12.5 FT
13 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	CBMW-2
LOCATION	Camp Buckner Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	5.61 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	8 1/4 inch Hollow Stem Augers/6 inch Air Percussion
DRILLING FLUID	None
DRILLING DATE	July 2, 1996
COMPLETION DATE	July 9, 1996
DEVELOPMENT DATE	July 8, 1996
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC [ ] STAINLESS STEEL

REMARKS: Well construction was compressed because of screen depth below ground surface.

HYDROGEOLOGIST: Eric Johnson

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

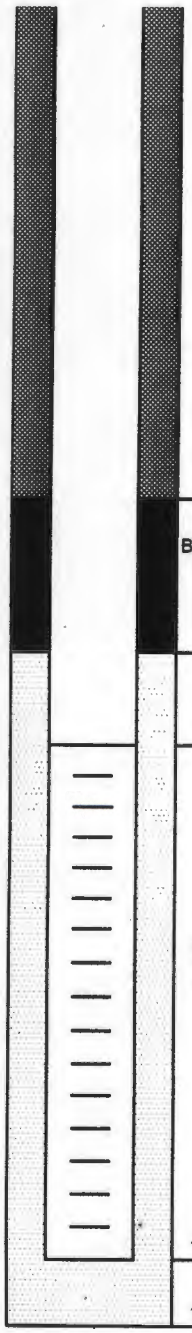
BORING: CBMW-3

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	July 2 - 3, 1996
JOB NUMBER:	0265-659-100	LOCATION:	Camp Buckner Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Partly Cloudy, 85F
DRILLING METHOD:	8 1/4" Hollow Stem Augers/6" Air Percussion Hammer	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Eric Johnson

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"							
S-1	0 - 2 ft	6"	6	50/2	--	--		Brownish tan SILT/SAND Encountered refusal on cobbles		PID = 0.0 ppm
							2	No samples collected to 5 ft. Drilling through cobbles		
							4			
S-2	5 - 7 ft	10"	4	7	13	16		Brownish Tan SILT/SAND with Mulch/Peat		PID = 0.0 ppm
							6			
S-3	7 - 9 ft	4"	6	9	50/2	--		Same As Above Encountered boulder at 8 ft.		PID = 0.0 ppm Boring was moved ~15 ft to the south because of auger refusal.
							8			
S-4	9 - 11 ft	18"	1	1	1	1		8" PEAT with organic matter		PID = 0.0 ppm
							10	10" Gray SILT with Clay (Saturated)		
S-5	11 - 13 ft	12"	2	2	3	4		Same As Above		PID = 0.0 ppm
							12			
S-6	13 - 15 ft	14"	50/5	--	--	--		Gray Silty F - VC SAND; trace F - VC Gravel		PID = 0.0 ppm
							14			
							16	END OF BORING AT 14 FT BELOW GROUND ENCOUNTERED AUGER REFUSAL		Well construction was compressed because of depth from ground surface to top of screen. Well Screen = 2" I.D. Sch 40 PVC 10 Slot Well Riser = 2" I.D. Sch 40 PVC #1 Sand Pack = 2 - 14 ft. below ground Bentonite Pellet Seal = 0.5 - 2 ft. below ground Cement/Bentonite Grout= 0 - 0.5 ft. below ground

MALCOLM PIRNIE, INC.
ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG



[X] LOCKING PROTECTIVE CASING
[ ] FLUSHMOUNT
[ ] OTHER

[ ] BENTONITE GROUT
[X] BENTONITE/CEMENT GROUT
[ ] BACKFILL

0.5 FT
BENTONITE SEAL
[ ] SLURRY
[X] PELLETS
2.0 FT
[ ] HOLEPLUG

3.5 FT

[ ] GRAVEL PACK
FILTER PACK
[X] SAND PACK
[ ] FORMATION COLLAPSE

13.5 FT
14.0 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	CBMW-3
LOCATION	Camp Buckner Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	7.22 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	8 1/4 inch hollow Stem Augers
DRILLING FLUID	None
DRILLING DATE	July 2, 1996
COMPLETION DATE	July 3, 1996
DEVELOPMENT DATE	July 8, 1996
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC

[ ] STAINLESS STEEL

REMARKS

HYDROGEOLOGIST Eric Johnson

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MWVF-01

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	1/24/1997
JOB NUMBER:	0285-659-100	LOCATION:	Village Farm Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Overcast, 20F's
DRILLING METHOD:	6 1/4" Hollow Stem Augers	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 -2 ft	9"	11	9	8	6		Dark Brown F - M Sandy SILT; some Gravel; trace Clay		HNu = 0 ppm Frost in sample.
2	2 - 4 ft	6"	3	2	3	3	2	Brown F - M Sandy SILT;some Gravel; trace Clay		HNu = 0 ppm
3	4 - 6 ft	11"	6	7	16	45	4	Same As Above		HNu = 0 ppm
4	6 - 8 ft	18"	11	8	6	12	6	Same As Above		HNu = 0 ppm Bottom 9" of sample is wet.
5	8 - 10 ft	20"	11	14	17	22	8	Same As Above with rock fragments in nose of split spoon.		HNu = 0 ppm Sample is saturated.
6	10 - 12 ft	17"	9	37	26	24	10	Same As Above		HNu = 0 ppm Sample is saturated. DTW in borehole is 7 ft. below the ground surface.
							12	No sample collected from 12 - 14 ft. because of difficult drilling.		
							14	END OF BORING AT 14 FT. BELOW GROUND ENCOUNTERED AUGER REFUSAL		Total Well Depth = 16.19 ft. below top of casing Depth to Water = 8.96 ft. below top of casing Well construction was compressed because of depth from ground surface to top of screen. Well Screen = 2" I.D. Sch 40 PVC 10 Slot Well Riser = 2" I.D. Sch 40 PVC #1 Sand Filter Pack = 3 - 14 ft. below ground Bentonite Pellet Seal = 2 - 3 ft. below ground Cement/Bentonite Grout = 0 - 2 ft, below ground

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG

[X] LOCKING PROTECTIVE CASING
[ ] FLUSHMOUNT
[ ] OTHER

[ ] BENTONITE GROUT
[X] BENTONITE/CEMENT GROUT
[ ] BACKFILL

2 FT
BENTONITE SEAL
3 FT

[ ] SLURRY
[X] PELLETS
[ ] HOLEPLUG

4 FT

[ ] GRAVEL PACK
[X] SAND PACK
[ ] FORMATION COLLAPSE

FILTER PACK

14 FT
14 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA West Point Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	MWVF - 01
LOCATION	Village Farm Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	8.96 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	6 1/4 inch Hollow Stem Augers
DRILLING FLUID	None
DRILLING DATE	1/24/1997
COMPLETION DATE	1/24/1997
DEVELOPMENT DATE	1/28/1997
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC [ ] STAINLESS STEEL

REMARKS: Well construction was compressed because of screen depth below ground surface.

HYDROGEOLOGIST: Joe Caragine

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MWVF-02

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	1/22 - 23/1997
JOB NUMBER:	0285-659-100	LOCATION:	Village Farm Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, 30F's
DRILLING METHOD:	6 1/4" Hollow Stem Augers/6" Air Percussion	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 -2 ft	22"	21	18	8	5		11" Dark brown F - M Sandy SILT 11" Grayish Brown F - M Sandy SILT; trace Gravel & Clay		HNu = 0 ppm Frost in sample. Drilled through cobbles.
2	2 - 4 ft	23"	10	17	19	20	2	Grayish Brown F - M Sandy SILT; some Gravel; trace Clay		HNu = 0 ppm
3	4 - 6 ft	24"	16	19	20	24	4	Same As Above		HNu = 0 ppm
4	6 - 8 ft	24"	18	23	26	50/5	6	Brown F - M Sandy SILT; some Gravel; trace Clay		HNu = 1.5 ppm
5	8 - 10 ft	22"	11	17	26	50/5	8	Same As Above with rock fragments in nose of split spoon.		HNu = 1.2 ppm
							10	No sample collected from 10 - 12 ft. Drilled through cobbles.		
6	12 - 14 ft	9"	12	24	26	36	12	Brown F - M SAND; some Silt and Gravel		HNu = 0 ppm
7	14 - 16 ft	21"	16	23	18	23	14	Same As Above		HNu = 0 ppm
							16	No sample collected from 16 - 18 ft. Drilled through cobbles.		
8	18 - 20 ft	0"	50/1	--	--	--	18	No Recovery		
9	20 - 22 ft	0"	50/2	--	--	--	20	No Recovery Some rock fragments in nose of split spoon.		
							22			Change drilling to air percussion. Appear to be in weathered rock.
							24	Cuttings are brown weathered rock.		
							26	Cuttings change to grayish color at ~27 ft.		

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MWVF-02

PROJECT NAME:	USMA West Point Ten Landfills	DATE:	1/22 - 23/1997
JOB NUMBER:	0265-659-300	LOCATION:	Village Farm Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, 30F's
DRILLING METHOD:	6 1/4" Hollow Stem Augers/6" Air Percussion	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION				Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"				
				28			
				30			DTW in borehole is 31.5 ft. below ground surface.
				32	Appear to be in competent bedrock at ~32 ft.		
				34			
				36	Appear to encounter a fracture at ~37 ft. Cuttings become saturated.		
				38			
				40			
				42			
				44	END OF BORING AT 44 FT. BELOW GROUND BORING IS INTO COMPETENT BEDROCK		Total Well Depth = 46.05 ft below top of casing Depth to Water = 34.05 ft below top of casing Well Screen = 2" I.D. Sch 40 PVC 10 Slot 15 Feet Well Riser = 2" I.D. Sch 40 PVC #1 Sand Filter Pack = 27 - 44 ft. below ground Bentonite Pellet Seal = 24 - 27 ft. below ground Cement/Bentonite Grout = 0 - 24 ft. below ground
				46			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG

[X] LOCKING PROTECTIVE CASING
[ ] FLUSHMOUNT
[ ] OTHER

[ ] BENTONITE GROUT
[X] BENTONITE/CEMENT GROUT
[ ] BACKFILL

24 FT
BENTONITE SEAL
[ ] SLURRY
[X] PELLETS
27 FT
[ ] HOLEPLUG

29 FT

[ ] GRAVEL PACK
FILTER PACK
[X] SAND PACK
[ ] FORMATION COLLAPSE

44 FT
44 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA West Point Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	MWVF - 02
LOCATION	Village Farm Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	34.05 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	6 1/4 Inch Hollow Stem Augers/6 inch Air Percussion
DRILLING FLUID	None
DRILLING DATE	1/22 - 23/1997
COMPLETION DATE	1/23/1997
DEVELOPMENT DATE	1/28/1997
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC [ ] STAINLESS STEEL

REMARKS

HYDROGEOLOGIST Joe Caragine

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MWVF-03

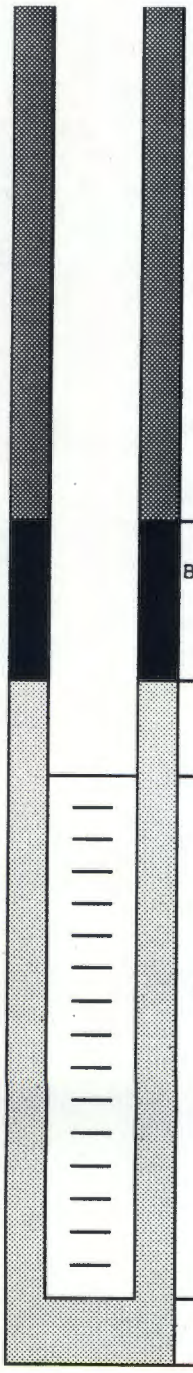
PROJECT NAME:	USMA West Point Ten Landfills	DATE:	1/23/1997
JOB NUMBER:	0285-659-100	LOCATION:	Village Farm Landfill
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Partly Sunny, 40F's
DRILLING METHOD:	6" Air Percussion	ELEVATION:	N/A
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	WELL CONS	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 -2 ft	8"	21	20	12	11		3" Reddish Brown F - M Sandy SILT 5" Brown F - M Silty SAND; some Gravel		HNu = 0 ppm
2	2 - 4 ft	11"	7	5	5	7	2	3" Same As Above 8" Brown F - M Sandy SILT; trace Gravel & Clay		HNu = 2.1 ppm
3	4 - 6 ft	18"	17	21	17	17	4	Same As Above with some Gravel		HNu = 0 ppm
4	6 - 8 ft	16"	17	26	36	50/4	6	Same As Above		HNu = 0 ppm
							8	No sample collected from 8 - 10 ft. Drilled through cobbles.		
5	10 - 12 ft	15"	6	8	16	16	10	6" Brown F - M Sandy SILT; some Gravel 9" Brown F - M SAND; some Silt & Gravel		HNu = 0 ppm Sample is moist.
6	12 - 14 ft	11"	46	50/2	--	--	12	3" Same As Above 8" Brown F - C SAND with rock fragments		HNu = 0 ppm Sample is saturated. DTW in borehole is 8.2 ft. below the ground surface.
							14	No sample collected from 14 - 16 ft. Drilling in bedrock.		
							16	END OF BORING AT 16 FT. BELOW GROUND ENCOUNTERED BEDROCK AT 13 FT.		Total Well Depth = 17.74 ft. below top of casing Depth to Water = 10.30 ft. below top of casing Well construction was compressed because of depth from the ground surface to top of screen. Well Screen = 2" I.D. Sch 40 PVC 10 Slot Well Riser = 2" I.D. Sch 40 PVC #1 Sand Filter Pack = 4 - 16 ft. below ground Bentonite Pellet Seal = 2 - 4 ft. below ground Cement/Bentonite Grout = 0 - 2 ft. below ground

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BLVD.
MAHWAH, NJ 07495 - 0018

WELL CONSTRUCTION LOG



[X] LOCKING PROTECTIVE CASING
[ ] FLUSHMOUNT
[ ] OTHER

[ ] BENTONITE GROUT
[X] BENTONITE/CEMENT GROUT
[ ] BACKFILL

2 FT
BENTONITE SEAL
4 FT
6 FT

[ ] SLURRY
[X] PELLETS
[ ] HOLEPLUG

[ ] GRAVEL PACK
FILTER PACK
[X] SAND PACK
[ ] FORMATION COLLAPSE

16 FT
16 FT

TOTAL DRILLED DEPTH

ALL MEASUREMENTS ARE FROM GROUND SURFACE UNLESS OTHERWISE NOTED

PROJECT NAME	USMA West Point Ten Landfills
PROJECT #	0285-659-100
WELL I.D.	MWVF - 03
LOCATION	Village Farm Landfill
TOP OF CASING ELEVATION	
GROUND ELEVATION	
DEPTH TO WATER	10.30 feet below top of casing
DRILLING CONTRACTOR	Advanced Drilling, Inc.
DRILLER	Rick Empson
DRILLING METHOD	6" Air Percussion
DRILLING FLUID	None
DRILLING DATE	1/23/1997
COMPLETION DATE	1/23/1997
DEVELOPMENT DATE	1/28/1997
WELL PURPOSE	Groundwater Monitoring Program

CASING JOINTS: [X] FLUSH JOINT [ ] COUPLING JOINT

CASING 2 INCH (I.D.) [ ] STAINLESS STEEL [X] PVC

SCREEN 2 INCH (I.D.) 10 SLOT [X] PVC [ ] STAINLESS STEEL

REMARKS: Well construction was compressed because of screen depth below ground surface.

HYDROGEOLOGIST: Joe Caragine

ATTACHMENT C

GROUNDWATER SAMPLE COLLECTION LOGS

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/12/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Eric Johnson

WELL ID # HSMW-1

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1030	TIME START: 1115
	TIME FINISH: 1045	TIME FINISH: 1503
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: disposable bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 25.1

DEPTH TO WATER (FT. FROM TOC) = 23.12 TIME 1025

HEIGHT OF WATER IN WELL = 1.98

ONE WELL VOLUME (GALLONS) = 1.3

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 4 RATE ~2½ gpm

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		½ gal	2 gal	↑		
Temperature(°C)		13.5°C	13.5°C	Drg		
Specific Conductivity		295	295			
pH		6.83	6.83			
NTU		9.6	12.3	↓		

WEATHER CONDITIONS: (Today) cloudy, overcast 80°F

(Previous 2 Days) same

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851.59200 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY John Ifkovits

WELL ID # LAMW-01

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1125	TIME START: 1114
	TIME FINISH: 1133	TIME FINISH: 1148
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 5.56

DEPTH TO WATER (FT. FROM TOC) = 1.0 TIME 1125

HEIGHT OF WATER IN WELL = 4.56

ONE WELL VOLUME (GALLONS) = 2.9

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 9 RATE < 1/2 GPM

SAMPLE APPEARANCE: Slightly turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		2 gal	6 gal	9 gal		
Temperature(°C)		25.5°C	23°C.	23°C.		
Specific Conductivity		100x10	100x10	100x10		
pH		6.22	6.16	6.13		
		96	252	46		

WEATHER CONDITIONS: (Today) sunny 85°F

(Previous 2 Days) partly, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): collar filled with bentonite

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY John Iskarits

WELL ID # LAmw-02

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1204	TIME START: 1225
TIME FINISH: 1213	TIME FINISH: 1228
RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" Submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 24.46

DEPTH TO WATER (FT. FROM TOC) = 15.95 TIME 1204

HEIGHT OF WATER IN WELL = ~~24.46~~ 8.51

ONE WELL VOLUME (GALLONS) = 5.5

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 10 RATE 2 1/2 GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		5gal	10gal	Dry		
Temperature(°C)		22°C	17°C	↓		
Specific Conductivity		140x10	120x10			
pH		5.69	5.73			
NTU		067	053	↓		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY John Ifkovits

WELL ID # LAMW-03

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1245	TIME START: 1310
	TIME FINISH: 1300	TIME FINISH: 1315
HEADSPACE N/A (ppm)	RECOVERY TIME: 15 min	

WELL EVACUATION DEVICE: 2" ~~cent~~ submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 19.64

DEPTH TO WATER (FT. FROM TOC) = ~~5.32~~ 5.32 TIME 1245

HEIGHT OF WATER IN WELL = 14.32

ONE WELL VOLUME (GALLONS) = 8.58

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 24 RATE ~1 1/2 GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		8gal	15gal	24gal		
Temperature(°C)		24°C	20°C	19°C		
Specific Conductivity		120x10	115x10	100x10		
pH		5.71	5.56	5.68		
NTU		28	24	25		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY John Ifkovits

WELL ID # LBMW-01

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 0955	TIME START: 1011
	TIME FINISH: 1003	TIME FINISH: 1015
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" Submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 12.72

DEPTH TO WATER (FT. FROM TOC) = 4.28 TIME 0955

HEIGHT OF WATER IN WELL = 8.44

ONE WELL VOLUME (GALLONS) = 5.4

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 15 RATE 2 1/2 GPM

SAMPLE APPEARANCE: Sl. cloudy turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		5gal	10gal	15gal		
Temperature(°C)		17°C	18°C	18°C		
Specific Conductivity		50x10	40x10	40x10		
pH		5.96	5.92	5.80		
NTU		85.8	50.9	53.7		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p.cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): Needs compression cap & curb box

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851.59200 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY John Ipkovits

WELL ID # LBMW-02

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1035	TIME START: 1101
	TIME FINISH: 1053	TIME FINISH: 1105
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" Submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 18.61

DEPTH TO WATER (FT. FROM TOC) = 7.59 TIME 1035

HEIGHT OF WATER IN WELL = 11.02

ONE WELL VOLUME (GALLONS) = 7.1

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 21 RATE ~2½ GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		7 gal	14 gal	21 gal		
Temperature(°C)		15°C	14°C	14°C		
Specific Conductivity		130x10	85x10	65x10		
pH		5.84	6.07	6.10		
NTU		263	37	17		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) P. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/18/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY John Ifkovits

WELL ID # LBMW-03

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 0920	TIME START: 0950
	TIME FINISH: 0938	TIME FINISH: 0955
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: m-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 11.05

DEPTH TO WATER (FT. FROM TOC) = 4.33 TIME 0920

HEIGHT OF WATER IN WELL = 6.72

ONE WELL VOLUME (GALLONS) = 4.3

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 12 RATE 1 1/2 GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		4 gal	8 gal	12 gal		
Temperature(°C)		19°C	21°C	21°C		
Specific Conductivity		270x10	190x10	230x10		
pH		6.17	6.11	6.16		
NTU		124x1000	39.8	30.0		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): Needs new cover box

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Jen D'Angelo

WELL ID # LCMW01

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1433	TIME START: 1447
	TIME FINISH: 1446	TIME FINISH: 1450
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 12.28

DEPTH TO WATER (FT. FROM TOC) = 7.52 TIME 1436

HEIGHT OF WATER IN WELL = 4.76

ONE WELL VOLUME (GALLONS) = 3.09

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 9 RATE 2 1/2 GPM

SAMPLE APPEARANCE: Slightly turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		3 gal	6 gal	9 gal		
Temperature(°C)		20	19	19		
Specific Conductivity		60 x10	60 x10	60 x10		
pH		5.85	5.92	5.92		
		700	430	218		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) P. cloudy, rainy

WELL CONDITION (CASING, COLLAR, LOCK): Needs curb box covers missing

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851.59200 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Jen D'Angelo

WELL ID # LCMW-02 PURGING 1350 SAMPLING

UPGRADIENT / DOWNGRADIENT (Circle one) TIME START: ~~1415~~ TIME START: 1423

TIME FINISH: 1407 TIME FINISH: 1426

HEADSPACE N/A (ppm) RECOVERY TIME:

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 22.74

DEPTH TO WATER (FT. FROM TOC) = 15.93 TIME ~~1415~~ 1350

HEIGHT OF WATER IN WELL = 6.81

ONE WELL VOLUME (GALLONS) = 4.43

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = ~~4.43~~ 12 RATE ~1½ GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		4gal	8gal	12gal		
Temperature(°C)		20°C	17°C	17.5°C		
Specific Conductivity		60X10	60X10	60X10		
pH		5.61	5.88	5.91		
NTU		77.8X100	38.1X100	28.3X100		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) P. Cloudy

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Jon D'Angelo

WELL ID # LCMW-03

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1344	TIME START: 1403
TIME FINISH: 1356	TIME FINISH: 1405
RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: m-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 30.22

DEPTH TO WATER (FT. FROM TOC) = 23.64 TIME 13:44

HEIGHT OF WATER IN WELL = 6.58

ONE WELL VOLUME (GALLONS) = 1.05

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = ~~1.05~~ 4 RATE ~2½ GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1 gal	2½ gal	4 gal		
Temperature(°C)		18°C	15°C	15°C		
Specific Conductivity		110X10	110X10	110X10		
pH		5.89	6.01	6.05		
		45.3	~~47~~ 106	110		

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): Needs new cover bar, cover missing

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/16/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY John Ifkovits

WELL ID # MWLD-2

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 0850	TIME START: 1447
	TIME FINISH: 0905	TIME FINISH: 1450
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 23.52

DEPTH TO WATER (FT. FROM TOC) = 17.68 TIME 0850

HEIGHT OF WATER IN WELL = 5.84

ONE WELL VOLUME (GALLONS) = 3.8

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 8 RATE ~½ GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		4 gal	8 gal	Dry		
Temperature(°C)		18°C	15°C			
Specific Conductivity		130 x 100	260 x 100			
pH		7.95	8.14			
NTU		90 x 1000	33 x 1000			

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, rainy, Sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kawalek
Jen D'Angelo

SITE LOCATION West Point, NY

WELL ID # LEMW01

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1128	TIME START: 1208
TIME FINISH: 1150	TIME FINISH: 1210
RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" Submersible pump

SAMPLE COLLECTION DEVICE: ~~M-S~~ bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 21.42

DEPTH TO WATER (FT. FROM TOC) = 9.14 TIME 1148

HEIGHT OF WATER IN WELL = 12.28

ONE WELL VOLUME (GALLONS) = 1.98

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 24 RATE ~1/2 GPM

SAMPLE APPEARANCE: clear

First Second Third

FIELD PARAMETERS	~~CALIBRATION~~	~~FIRST~~	~~SECOND~~	THIRD	FOURTH	FIFTH
Volume Purged (gal)	8 gal	16 gal	24 gal			
Temperature(°C)	16	15°C	14°C			
Specific Conductivity	110	110	110			
pH	5.85	6.02	6.00			
NTU	044	014	014			

WEATHER CONDITIONS: (Today) sunny 85°F

(Previous 2 Days) p. cloudy, sunny, rainy

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Jon D'Angelo

WELL ID # LEMW-02

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 0847	TIME START: 1020
TIME FINISH: 0930	TIME FINISH: 1030
RECOVERY TIME:	

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 29.29

DEPTH TO WATER (FT. FROM TOC) = 6.92 TIME 0845

HEIGHT OF WATER IN WELL = 22.37

ONE WELL VOLUME (GALLONS) = 14.54

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 20 RATE ~1½ GPM

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		15 gal	20 gal			
Temperature(°C)		15°C	17°C			
Specific Conductivity		450	450	DRY		
pH		5.68	5.51			
		100	87			

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, sunny, raining

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY Jon D'Angelo

WELL ID # LEMW-03 PURGING 7/17/96 SAMPLING 7/18/96

UPGRADIENT / DOWNGRADIENT (Circle one) TIME START: 1116 TIME START: 0835

TIME FINISH: 1130 TIME FINISH: 0838

HEADSPACE N/A (ppm) RECOVERY TIME:

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 42.80

DEPTH TO WATER (FT. FROM TOC) = 39.60 TIME 1116

HEIGHT OF WATER IN WELL = 3.20

ONE WELL VOLUME (GALLONS) = 2.08

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 3 RATE ~1½ GPM

SAMPLE APPEARANCE: turbid - grey

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		2 gal	Dry			
Temperature(°C)		17°	↓			
Specific Conductivity		180				
pH		5.19				
NTU		536	↓			

WEATHER CONDITIONS: (Today) Sunny 85°F

(Previous 2 Days) p. cloudy, rainy, Sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY Jen D'Angelo

WELL ID # LEMW-04

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1030	TIME START: 1058
TIME FINISH: 1047	TIME FINISH: 1100
RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" Submersible Pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 20.30

DEPTH TO WATER (FT. FROM TOC) = 13.33 TIME 1030

HEIGHT OF WATER IN WELL = 6.97

ONE WELL VOLUME (GALLONS) = 4.53

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 12 RATE ~1½ GPM

SAMPLE APPEARANCE: Slightly turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		4 gal	8 gal	12 gal		
Temperature(°C)		16°C	16°C	16°C		
Specific Conductivity		145	148	140		
pH		6.06	6.08	6.00		
NTU		375	502	156		

WEATHER CONDITIONS: (Today) sunny 85°F

(Previous 2 Days) p. cloudy, sunny, rainy

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 7/17/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY Jen D'Angelo

WELL ID # LEMW-05 PURGING 7/17/96 SAMPLING 7/18/96

UPGRADIENT / DOWNGRADIENT (Circle one) TIME START: 0930 TIME START: 0817

TIME FINISH: ~~0~~ 0947 TIME FINISH: 0820

HEADSPACE N/A (ppm) RECOVERY TIME:

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 36.28

DEPTH TO WATER (FT. FROM TOC) = 24.18 TIME 0930

HEIGHT OF WATER IN WELL = 12.10

ONE WELL VOLUME (GALLONS) = 7.8

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 12 RATE < ½ GPM

SAMPLE APPEARANCE: Slightly turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		7 gal	12 gal	Dry		
Temperature(°C)		20°C	22°C	↓		
Specific Conductivity		100 x10	100x10	↓		
pH		5.61	5.68	↓		
NTU		113	130	↓		

WEATHER CONDITIONS: (Today) sunny 85°F

(Previous 2 Days) p cloudy, rainy sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Eric Johnson

WELL ID # PXMW-01

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1320	TIME START: 1545
TIME FINISH: 1345	TIME FINISH: 1550
RECOVERY TIME:	

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 9.82

DEPTH TO WATER (FT. FROM TOC) = 3.48 TIME 1317

HEIGHT OF WATER IN WELL = 6.34

ONE WELL VOLUME (GALLONS) = 4.1

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 4.7@ RATE < 1GPM

SAMPLE APPEARANCE: black

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1gal	Dry			
Temperature(°C)		25	↓			
Specific Conductivity		670	↓			
pH		7.06	↓			
NTU's		>1000	↓			

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy raining sunny

WELL CONDITION (CASING, COLLAR, LOCK): OK Note: Strong Organic Odor, extremely turbid, black in color

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point NY Eric Johnson

WELL ID # PXMW-02

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 1230	TIME START: 1530
TIME FINISH: 1300	TIME FINISH: 1535
RECOVERY TIME:	

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: m-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 61.40

DEPTH TO WATER (FT. FROM TOC) = 60.48 TIME 1225

HEIGHT OF WATER IN WELL = 0.92

ONE WELL VOLUME (GALLONS) = 0.15

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 1.0 RATE < 1/2 GPM

SAMPLE APPEARANCE: Clear to Cloudy

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		0.5	1.0	Dry		
Temperature(°C)		13.0	13.2	↓		
Specific Conductivity		1190	1200			
pH		6.76	6.72			
NTU's		36.4	49.6	↓		

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): ~~good~~ Flush mount and cover box missing - only PVC cap and compression cap present

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 mL	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY Eric Johnson

WELL ID # DXMW-03 PURGING SAMPLING

UPGRADIENT / DOWNGRADIENT (Circle one) TIME START: 1440 TIME START: 1608

TIME FINISH: 1500 TIME FINISH: 1615

HEADSPACE N/A (ppm) RECOVERY TIME:

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: m-scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 60.40

DEPTH TO WATER (FT. FROM TOC) = 53.05 TIME 1435

HEIGHT OF WATER IN WELL = 7.35

ONE WELL VOLUME (GALLONS) = 4.8

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 5 gal RATE ~2½ GPM

SAMPLE APPEARANCE: Light Cloudy to clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		2 gal	5 gal	Dry		
Temperature(°C)		15.9	16.1	↓		
Specific Conductivity		3500	3220			
pH		6.53	6.52			
NTU's		62.1	36.6	↓		

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) p. cloudy, rainy, Sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Eric Johnson

WELL ID # PXMW-04

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 1400	TIME START: 1555
	TIME FINISH: 1423	TIME FINISH: 1600
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 53.60

DEPTH TO WATER (FT. FROM TOC) = 44.50 TIME 1353

HEIGHT OF WATER IN WELL = 9.10

ONE WELL VOLUME (GALLONS) = 1.5

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 1.5 RATE < 1/2 GPM

SAMPLE APPEARANCE: sl. ghdy turb.d

Initial 1st

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1.0	1.5	DRY		
Temperature(°C)		18.0	18.0			
Specific Conductivity		1500	1500			
pH		6.79	6.96			
NTU's		76.2	104			

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy, rainy, Sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Eric Johnson

WELL ID # CBMW-3

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 0930	TIME START: 1110
TIME FINISH: 1006	TIME FINISH: 1115
RECOVERY TIME:	

WELL EVACUATION DEVICE: 2" submersible pump

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: m-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 32.10

DEPTH TO WATER (FT. FROM TOC) = 7.26 TIME 0925

HEIGHT OF WATER IN WELL = 24.84

ONE WELL VOLUME (GALLONS) = 4

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 12 gal RATE < 1 GPM

SAMPLE APPEARANCE: Clear w/ light Green tint

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1 gal	5 gal	9 gal	12 gal	
Temperature(°C)		16.8°C	14.3°C	14.5°C	14.8°C	
Specific Conductivity		300	220	200	210	
pH		7.49	7.56	7.32	7.35	
NTU's		462	76.9	39.6	40.6	

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02851592.00 DATE 8/5/96

PROJECT NAME U.S.M.A. West Point SAMPLERS Hope Kowalski

SITE LOCATION West Point, NY Eric Johnson

WELL ID # CBMW-2

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 0815	TIME START: 1040
TIME FINISH: 0840	TIME FINISH: 1045
RECOVERY TIME:	

WELL EVACUATION DEVICE: bailers

SAMPLE COLLECTION DEVICE: bailers

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 13.72

DEPTH TO WATER (FT. FROM TOC) = 7.22 TIME 0805

HEIGHT OF WATER IN WELL = 6.50

ONE WELL VOLUME (GALLONS) = 1.00

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 1.5 RATE <1 GPM

SAMPLE APPEARANCE: Grey to tan tint/Clear

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		0.5 gal	1.5 gal	DRY		
Temperature(°C)		18°C	17.5°C	|		
Specific Conductivity		655	595	|		
pH		5.89	5.31	|		
NTu's		79.9	46.3	V		

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy, rainy, sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 02551.59200 DATE 8/5/96

PROJECT NAME U.S.M.A West Point SAMPLERS Hope Kowalik

SITE LOCATION West Point, NY Eric Johnson

WELL ID # CBMW-3

	PURGING	SAMPLING
UPGRADIENT / DOWNGRADIENT (Circle one)	TIME START: 0850	TIME START: 1055
	TIME FINISH: 0925	TIME FINISH: 1100
HEADSPACE N/A (ppm)	RECOVERY TIME:	

WELL EVACUATION DEVICE: bailer

SAMPLE COLLECTION DEVICE: bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 15.99

DEPTH TO WATER (FT. FROM TOC) = 7.24 TIME 0847

HEIGHT OF WATER IN WELL = 8.75

ONE WELL VOLUME (GALLONS) = 1.4

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 5gal RATE ~ ½ GPM

SAMPLE APPEARANCE: turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		0.5 gal	2.5	4.5		
Temperature(°C)		16.°C	15°C	15°C		
Specific Conductivity		690	610	570		
pH		7.18	7.09	7.12		
NTU's		>1000	>1000	>1000		

WEATHER CONDITIONS: (Today) Sunny 85-90°F

(Previous 2 Days) P. cloudy, rainy, Sunny

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL Metals	1000 ml	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 12856592.00 DATE 2/12/97

PROJECT NAME USMA West Point SAMPLERS H. Kowalski

SITE LOCATION West Point, NY C. Irvine

WELL ID # MWVF-01 PURGING SAMPLING

UPGRADIENT / DOWNGRADIENT (Circle one) TIME START: 0935 TIME START: 0945

TIME FINISH: 0940 TIME FINISH: 0950

HEADSPACE N/A (ppm) RECOVERY TIME: 3 minutes

WELL EVACUATION DEVICE: Centrifugal pump, poly pipe w/ check valve

SAMPLE COLLECTION DEVICE: disposable bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 16.18

DEPTH TO WATER (FT. FROM TOC) = 7.24 TIME 0930

HEIGHT OF WATER IN WELL = 8.94

ONE WELL VOLUME (GALLONS) = 1.43

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = ~5 RATE

SAMPLE APPEARANCE: brownish turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1½	3	4½		
Temperature(°C)		6.3	6.6	6.6		
Specific Conductivity		0.08	0.09	0.05		
pH		8.01	7.81	7.72		
NTU		>1000	>1000	837		

WEATHER CONDITIONS: (Today) cold, cloudy, windy ~25°F

(Previous 2 Days) p. cloudy ~40°F

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL metals	1 L	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 12856592E0 DATE 2/12/97

PROJECT NAME USMA West Point SAMPLERS H. Kawalek

SITE LOCATION West Point, NY C. Trivane

WELL ID # MWF-02

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 0900	TIME START: 0915
TIME FINISH: 0916	TIME FINISH: 0920
RECOVERY TIME: 5 minutes	

WELL EVACUATION DEVICE: poly tubing w/ check valve

SAMPLE COLLECTION DEVICE: disposable bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 46.12

DEPTH TO WATER (FT. FROM TOC) = 33.54 TIME 0900

HEIGHT OF WATER IN WELL = 12.58

ONE WELL VOLUME (GALLONS) = 2.01

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = 6 RATE

SAMPLE APPEARANCE: Brown turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		2	4	6		
Temperature(°C)		8.4	9.2	9.4		
Specific Conductivity		0.53	0.23	0.22		
pH		7.20	7.46	7.42		
NTU		>1000	>1000	>1000		

WEATHER CONDITIONS: (Today) p cloudy & very cold, windy ~25°F

(Previous 2 Days) p cloudy ~40°F

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL metals	1L	HNO_3

MALCOLM PIRNIE

SAMPLE COLLECTION LOG

PROJECT # 285659200 DATE 2/12/97

PROJECT NAME USMA West Point SAMPLERS H. Kowalski

SITE LOCATION West Point, NY C. Trione

WELL ID # MWVF-03

UPGRADIENT / DOWNGRADIENT (Circle one)

HEADSPACE N/A (ppm)

PURGING	SAMPLING
TIME START: 0815	TIME START: 0845
TIME FINISH: 0820	TIME FINISH: 0850
RECOVERY TIME: 15 min.	

WELL EVACUATION DEVICE: poly pipe w/ check valve

SAMPLE COLLECTION DEVICE: disposable bailer

WATER LEVEL MEASUREMENT DEVICE: M-Scope

HEADSPACE MEASUREMENT DEVICE: N/A

WELL DEPTH (FT. FROM TOC) = 18.0

DEPTH TO WATER (FT. FROM TOC) = 9.05 TIME 0815

HEIGHT OF WATER IN WELL = 8.95

ONE WELL VOLUME (GALLONS) = 1.43

(.16 g/ft in 2" diameter well, .65 g/ft in 4" diameter well)

VOLUME WATER REMOVED (GALLONS) = ~5 RATE

SAMPLE APPEARANCE: brownish turbid

FIELD PARAMETERS	CALIBRATION	FIRST	SECOND	THIRD	FOURTH	FIFTH
Volume Purged (gal)		1½	3	4½		
Temperature(°C)		6.1	6.2	6.4		
Specific Conductivity		0.24	0.08	0.09		
pH		6.63	6.89	6.78		
NTU		>1000	>1000	>1000		

WEATHER CONDITIONS: (Today) cloudy & very cold 25°F windy

(Previous 2 Days) p.cloudy ~40°F

WELL CONDITION (CASING, COLLAR, LOCK): good

ANALYTICAL PARAMETERS	CONTAINERS	PRESERVATIVES
TAL metals	1 L	HNO3

ATTACHMENT D

DATA VALIDATION ASSESSMENT

To: Terri Haelen/Hope Kowalski Date: February 10,1997

From: Luisa S. McGinn

Re: Validation of Waste Samples Collected at West Point, NY

This data package consisted of twenty-six (26) water samples collected at West Point, New York on July 12, 1996 through August 5, 1996. These samples were analyzed for TAL metals. This validation report is a review of the following samples:

Client Description	Lab ID
SW-1	96-01032-N
SW-2	96-01033-N
SW-3	96-O1034-N
HSMW-01	96-01035-N
LEMW-02	96-01049-N
LEMW-04	96-01050-N
LEMW-01	96-01051-N
LCMW-03	96-01052-N
LCMW-02	96-01053-N
LCMW-01	96-01054-N
LEMW-5	96-01059-N
LEMW-3	96-01060-N
LBMW-3	96-01061-N
LBMW-1	96-01062-N
LBMW-2	96-01063-N
LAMW-2	96-01064-N
LAMW-3	96-01065-N
LAMW-1	96-01066-N
MWLD-2	96-01067-N
CBMW-01	96-01280-N
CBMW-02	96-01281-N
CBMW-03	96-01282-N
PXMW-01	96-01283-N
PXMW-02	96-01284-N
PXMW-03	96-01285-N
PXMW-04	96-01286-N

The analysis performed by Malcolm Pirnie was in accordance with the Scope of Work, Sampling and Analysis for West Point, New York. Samples in this data package were qualified based upon the following guidelines:

1. Sample Integrity
2. Holding Times
3. Initial and Continuing Calibration
4. Blank Contamination
5. Laboratory Control Sample
6. Matrix Spike and Matrix Spike Duplicate
7. Duplicate Sample Analysis

The data was reviewed for contractual and technical compliance. Qualifications were applied following the intent of the National Functional Guidelines with Region II modifications.

Sample Integrity: Sample condition upon receipt was satisfactory. A pH of <2 was recorded for all samples. Sample temperature upon receipt was recorded for samples received on 7/16/96 at 8.6C, outside the control limit of 4C$\pm$2C. All samples received on 7/16/96 were qualified for all analytes as estimated.

J----> all analytes in samples SW-1, SW-2, SW-3 & HSMW-01

Holding times: All samples were digested and analyzed within 28 days for Mercury and 6 months for all other analytes.

Initial and Continuing Calibration: The following continuing calibration verification standards were outside the control limits of 90-110%: Co-CCV1 (89.4%), As-CCV2 (89.4%), Se-CCV7 (88.4%), Tl-CCV1 (110.8%), Tl-CCV2 (111.0%), Tl-CCV1 (111.8%) and Tl-CCV2 (112.0%). Based on professional judgement, no action was taken for Co-CCV1 (89.4%), As-CCV2 (89.4%), Tl-CCV1 (110.8%), and Tl-CCV2 (111.0%). Action was taken for Se-CCV7 (88.4%), Tl-CCV1 (111.8%) and Tl-CCV2 (112.0%), and the following data results were qualified as estimated:

J----> Se in LBMW-01 and MWLD-02.
J----> Tl in LAMW-01, MWLD-02, LAMW-03, and LBMW-02.

Blank Contamination: Method blank met QC criteria.

Matrix Spike Analysis: The matrix spike recoveries for Fe (73.0%), Ni (59.8%), Se (71.5%) and Tl (45.0%) were outside the control limits of 75-125%. All associated data results >IDL were qualified as estimated "J" and all data results <IDL were qualified as estimated "UJ" for Fe, Ni, Se and Tl

J----> Fe in CBMW-01, CBMW-02, CBMW-03, PXMW-01, PXMW-02, PXMW-03 & PXMW-04.

J----> Ni, Se and Tl in SW-1, SW-2, SW-3, HSMW-01, LEMW-02, LEMW-04, LEMW-01, LCMW-03, LCMW-02, LCMW-01, LEMW-5, LEMW-3,

LBMW-3, LBMW-1, LBMW-2, LAMW-2, LAMW-3, LAMW-1 & MWLD-2

Matrix Spike and Matrix Spike Duplicate Analysis: Percent RPD for Fe (28.1%) was high. However, no further action was taken since all associated samples were already qualified as estimated "J" due to matrix spike recovery criteria.

It should be noted that for all analytes except silver and mercury, a post-digestion spike is required if the matrix spike recovery does not meet criteria. A post-digestion spike was analyzed for associated analytes, and the recoveries were within 75-125%, indicating a matrix related problem associated with the samples.

To: Terri Haelen/Hope Kowalski Date: February 10,1997

From: Luisa S. McGinn

Re: Validation of Waste Samples Collected at West Point, NY

This data package consisted of two (2) soil samples collected at Camp Buchner Landfill, West Point, New York on July 2, 1996. These samples were analyzed for TAL metals. This validation report is a review of the following samples:

Client Description	Lab ID
CB-TP-1-1	96-01029-N
CB-TP-1-1	96-01030-N

The analysis performed by Malcolm Pirnie was in accordance with the Scope of Work, Sampling and Analysis for West Point, New York. Samples in this data package were qualified based upon the following guidelines:

1. Sample Integrity
2. Holding Times
3. Initial and Continuing Calibration
4. Blank Contamination
5. Laboratory Control Sample
6. Matrix Spike and Matrix Spike Duplicate
7. Duplicate Sample Analysis

The data was reviewed for contractual and technical compliance. Qualifications were applied following the intent of the National Functional Guidelines with Region II modifications.

Sample Integrity: Sample condition upon receipt was satisfactory. Sample temperature upon receipt was not recorded.

Holding times: All samples were digested and analyzed within 28 days for Mercury and 6 months for all other analytes.

Initial and Continuing Calibration: The continuing calibration verification standards (CCV2) for Tl, analysis date 8/4/96 and Se, analysis date 8/6/96 were 111.8% and 88.4% respectively. These were outside the control limits of 90-110%. Therefore, all associated data results were qualified as estimated "J".

J----> Se and Tl in samples CB-TP-1-1 & CB-TP-2-1

Blank Contamination: Method blank met QC criteria.

Matrix Spike Analysis: The matrix spike recoveries for Pb (69.9%), Sb (66.0%) and Hg (126.0%) were outside the control limits of 75-125%. All associated positive data results for Hg were qualified as estimated "J". All associated data results >IDL were qualified as estimated "J" and data results <IDL were qualified as estimated "UJ" for Pb and Sb.

J----> Hg in samples CB-TP-1-1 & CB-TP-2-1
J----> Pb and Sb in samples CB-TP-1-1 & CB-TP-2-1

Matrix Spike and Matrix Spike Duplicate Analysis: Percent RPD's for Mn (37.6%) and Pb (66.2%) were high; therefore, the following samples were qualified as estimated "J":

J----> Mn in samples CB-TP-1-1 & CB-TP-2-1

Note: Pb was previously qualified due to spike recovery criteria; no further action was taken.

It should be noted that for all analytes except silver and mercury, a post-digestion spike is required if the matrix spike recovery does not meet criteria. A post-digestion spike was analyzed for associated analytes, and the recoveries were within 75-125%, indicating a matrix related problem associated with the samples.

To: Terri Haelen/Hope Kowalski Date: April 10,1997

From: Lisa Greco Lisa Greco

Re: Validation of Waste Samples Collected at West Point, NY

This data package consisted of three (3) aqueous samples collected at U.S.M.A. West Point Landfill, West Point, New York on February 12, 1997. These samples were analyzed for TAL metals. This validation report is a review of the following samples:

Client Description	Lab ID
MWVF-01	97-00371-N
MWVF-02	97-00372-N
MWVF-03	97-00373-N

This analysis was performed by the Malcolm Pirnie, Inc. Tarrytown Laboratory in accordance with the Scope of Work, Sampling and Analysis for West Point, New York. Samples in this data package were qualified based upon the following guidelines:

1. Sample Integrity
2. Holding Times
3. Initial and Continuing Calibration
4. Blank Contamination
5. Laboratory Control Sample
6. Matrix Spike and Matrix Spike Duplicate
7. Duplicate Sample Analysis

The data was reviewed for contractual and technical compliance. Qualifications were applied following the intent of the National Functional Guidelines with Region II modifications.

Sample Integrity: The sample temperature upon receipt was 16°C. Therefore, all analytes in all three samples were qualified as estimated "J".

Holding times: All samples were digested and analyzed within 28 days for Mercury and 6 months for all other analytes.

Initial and Continuing Calibration: The initial and continuing calibration verification standards met the QC criteria.

Blank Contamination: All method blanks met the QC criteria.

Matrix Spike Analysis: The matrix spike recoveries for antimony (35.0%) and silver (48.0%) were outside the control limits of 75-125%. All associated data results were qualified as estimated "J". It should be noted that these analytes were previously qualified as estimated "J" due to sample integrity criteria. It should be noted that a post-digestion spike was analyzed for antimony and silver, and the results were acceptable (i.e, %R between 75 - 125%).

J----> Ag and Sb in samples MWVF-01, MWVF-02, and MWVF-03.

Matrix Spike and Matrix Spike Duplicate Analysis: The percent RPD's met the QC criteria.

LCS Analysis: All LCS recoveries met the QC criteria.