

**MALCOLM
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**FOCUSED FEASIBILITY STUDY
FOR THE MARILLA STREET LANDFILL WETLANDS
ADDENDUM**

**LTV STEEL COMPANY
CLEVELAND, OHIO**

**NOVEMBER 1996
REVISED FEBRUARY 1997**

MALCOLM PIRNIE, INC.

**P.O. Box 1938
Buffalo, New York 14219**

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1.0 INTRODUCTION

1.1 GENERAL

The Marilla Street Landfill (the site) is approximately 80 acres in size and is located on approximately 110 acres of land along Marilla and Hopkins Streets in the City of Buffalo, New York. The site is owned by the LTV Steel Company. The New York State Department of Environmental Conservation (NYSDEC) determined that the Marilla Street landfill is an inactive hazardous waste site, as defined in ECL Section 27-1301(2). Consequently the site was listed in the Registry of Inactive Hazardous Waste Sites of New York (Site No. 915047) as "2a." The NYSDEC defines a 2a classification as a site that may pose a threat to the public health and the environment; however, insufficient data exists to make a final determination.

LTV Steel Company entered into an Order-on-Consent in October 1992 to undertake certain landfill closure activities. Specific requirements addressed by the Consent Order are:

- Prepare and implement a landfill closure plan pursuant to 6NYCRR Part 360 requirements (Complete).
- Plan and implement a Solid Waste Management Facility Investigation Program (SWMFIP) (Complete).
- Prepare and implement a post closure maintenance and monitoring plan for the site (pending completion of remedial activities, if necessary).

The investigations and reports completed as part of the SWMFIP have indicated potential impacts on the site groundwater quality (viz. elevated pH) and wetlands sediments (viz. primarily elevated metals concentrations). As a result, in November 1995, the site was reclassified by the NYSDEC to a Class "2" site. A Class 2 designation is defined as a site at which the presence of hazardous waste or hazardous waste constituents constitute a significant threat to the environment.

1.2 SITE DESCRIPTION AND HISTORY

1.2.1 Site Description

The approximate 110-acre parcel is bordered on the south by the South Park Recreational Facility operated by Erie County, on the west by railroad tracks, and on the north and east by railroad tracks and Hopkins Street. Approximately 29 acres of the site are comprised of wetlands, which are part of NYSDEC regulated wetland BU-1. Wetland BU-1 is considered one of the three largest wetlands in the City of Buffalo. As such, these wetlands provide valuable habitat for wildlife in the vicinity of the site.

The only sources of waste material disposed of at the Marilla Street Landfill are from the iron and steel operations at the former Buffalo plant of the LTV Steel Company (previously Republic Steel Corporation). A variety of wastes were disposed of at the site including: blast furnace and basic oxygen furnace (BOF) slag and precipitator dust, clarifier sludge, bricks, tool scale, scrap wood, railroad ties, and construction debris.

In addition to the Marilla Street site, there are nine other sites within one mile of the landfill which are presently listed as Class 2 or 2a on the New York State Registry of Inactive Hazardous Waste Sites. Those sites are described in the October 1993 SWMFIP report prepared by Malcolm Pirnie. Some of those sites are impacting ground and surface water quality both upgradient and downgradient of the Marilla Street Landfill.

1.2.2 Closure Activities

The landfill was operated as an above grade fill operation with minimal segregation of wastes prior to the effective date (viz. November 1980) of the Resource Conservation and Recovery Act (RCRA). In November 1980, some BOF precipitator dust generated at the Buffalo District Plant was analyzed and found to exceed the EP Toxic level for lead leachability and, therefore was placed in a segregated fill area from November 1980 until steel making operations were terminated at the Buffalo Plant in June/July 1981. The BOF Dust Area was subsequently closed under applicable state (Part 373) and federal (RCRA) hazardous waste regulations in September 1990. However, in a September 1989 determination, the NYSDEC acknowledged that BOF dust was excluded from hazardous

waste regulations, and the NYSDEC subsequently removed the site from the RCRA program.

NYSDEC approved final cover systems were constructed over the landfill site between August 1989 and October 1993. The work was performed under three separate contracts in accordance with NYSDEC-approved closure plans, design plans and specifications.

1.3 CLOSURE/REMEDIAL INVESTIGATIONS

The site has been investigated and closed under NYSDEC Solid Waste regulations (viz. 6NYCRR Part 360). In addition, the site is being investigated under the NYSDEC Inactive Hazardous Waste Site Remediation Program [viz. Title 6 of the New York State Code of Rules and Regulations, Part 375 (6NYCRR Part 375)].

1.3.1 Previous Investigations

A chronology of previous investigations and monitoring activities at the Marilla Street landfill along with details of the existing monitoring well network and site hydrogeologic conditions is presented in the October 1993 SWMFIP report prepared by Malcolm Pirnie, Inc.

The current groundwater and surface water monitoring program was developed by LTV Steel between 1979 and 1986 with input from the NYSDEC. Quarterly monitoring has been performed consistently since January 1987. The current monitoring program will remain in effect pending the results of the final SWMFIP investigation and closure activities.

1.3.2 SWMFIP

A Solid Waste Management Facility Investigation Program was conducted at the Marilla Street Landfill during the period of January 1993 to July 1993 (the 1993 SWMFIP). The SWMFIP report, submitted to the NYSDEC in November 1993, presented a physical and chemical characterization of the site based on a groundwater, surface water, sediment, and waste/fill sampling program. The SWMFIP also fulfilled requirements of a closure

investigation that will support preparation of a post-closure monitoring plan as defined in 6NYCRR Part 360-2.15.

The results of the SWMFIP indicated that waste/fill constituents have been released by dissolution of waste/fill material present in sediment and by the advection of landfill leachate via shallow groundwater flow. Low to moderate potential risks to fish and wildlife were identified as being associated with exposure to waste/fill constituents in surface water, pore water, and sediment of the wetland environment adjacent to the landfill.

The flow of shallow groundwater that is impacted by waste/fill constituents is intercepted by a discharge zone in the wetland directly contiguous to the landfill. However, shallow groundwater discharge is presently minimized by the landfill cover system which has reduced hydraulic gradients along the groundwater flow path. Estimated groundwater discharge to the wetland is minor compared to runoff from the landfill surface and off-site flows from the South Park ponds.

Supplemental field investigations were later conducted within Wetland BU-1 in the vicinity of the Marilla Street Landfill to help develop a wetland remediation program. The results of the Supplemental SWMFIP were presented in a report sent to the New York State Department of Environmental Conservation (NYSDEC) for review on September 15, 1995. The results and conclusions of the SWMFIP and Supplemental SWMFIP are summarized in Section 2.0.

On October 27, 1995, Malcolm Pirnie and LTV Steel Company met with the NYSDEC to discuss the results of the supplemental SWMFIP testing. LTV outlined a preferred remedial approach focusing on closure of the wetland sediments in place along with wetland enhancement and/or mitigation to improve wildlife habitat and wetland values. The NYSDEC indicated that closure of the sediments in place was not their preferred approach but that consideration would be given to this approach if adequate justification was provided. It was agreed that a focused feasibility study would be prepared to provide the requested justification.

A draft Focused Feasibility Study Report dated February 1996, describing closure/remediation alternatives for the Marilla Street Landfill was subsequently prepared and submitted to the NYSDEC for review in March 1996. The study identified site impacts

including the wetland sediment impacts and the elevated pH of the groundwater. Input from the NYSDEC Divisions of Hazardous Waste, Solid Waste and Fish and Wildlife, South District Council person, US Army Corps of Engineers, and the Coastal Zone Management Agency were factored into the various analyses and evaluations performed as part of the focused feasibility study. The scope of the February 1996 draft focused feasibility study included:

- Delineation of the wetlands immediately adjacent to the site.
- Providing a site map of the delineated wetland areas.
- Identification and detailed evaluation of closure/remedial alternatives.
- Performing a preliminary screening process of the closure/remedial alternative.
- Selection of the recommended closure/remedial alternative.

Various discussions and meetings between LTV Steel Company, Malcolm Pirnie and the NYSDEC followed regarding the recommended remedial approach described in the draft feasibility study report. Related project correspondence is included in Appendix A.

1.4 PURPOSE AND SCOPE

As a result of the project review process, a revised recommended remedial approach was developed which fulfills the project objectives and satisfies the concerns of LTV Steel, the NYSDEC and other involved parties. The purpose of this report is to summarize additional sediment sampling data which has recently been collected and describe the agreed upon remedial approach. This report also presents a detailed maintenance and monitoring plan which will be used to determine the effectiveness of remedial measures over time.

2.0 NATURE AND EXTENT OF IMPACTS

2.1 INTRODUCTION

A Solid Waste Management Facility Investigation Program (SWMFIP) was initiated in January 1993. The results and conclusions of the SWMFIP are presented in the SWMFIP report submitted to the NYSDEC in November 1993. Supplemental field investigations were conducted within Wetland BU-1 in the vicinity of the site between September 1994 and August 1995 to better characterize the wetlands and define the areal and vertical extent of sediment contamination. Refer to the August 1995 Supplemental SWMFIP report prepared by Malcolm Pirnie, Inc. for a detailed discussion of the investigation results.

Additional wetland delineations were performed in November 1995 to more fully define the edge of wetlands in the areas of concern. (Refer to Appendix B in the February 1996 Draft Focused Feasibility Study for the Wetland Delineation Report.)

Further sediment sampling was performed in the wetlands in October 1996 to better define "hot spot" concentrations of contamination. The results of the hot spot sampling are discussed in Section 2.3.4 of this report.

2.2 GROUNDWATER

Field measurements of pH at the Marilla Street Landfill made during the SWMFIP field investigation indicated that the shallow ground water is highly alkaline. Although hydraulic gradients along the groundwater flow path have been reduced by construction of the landfill cover system, some shallow groundwater flow is intercepted by a discharge zone in the adjacent wetland. Therefore, the potential for impacts on fish and wildlife exists.

2.3 WETLAND SEDIMENTS

2.3.1 Previous Wetland Sediment Characterizations

An assessment of the probable environmental risks posed by TCL parameters detected in wetland sediment was presented in the 1993 SWMFIP report. The assessment compared the sediment sampling results from six sediment sampling locations to results from a background sediment sampling location and various sediment criteria, including NOAA Effects Range-Low, NOAA Effects Range-Medium from Long and Morgan (1991), and NYSDEC Fish and Wildlife Division sediment criteria (NYSDEC, 1989). A short list of six metals and three PAH compounds were identified as compounds of potential interest based on frequency of detection, frequency and magnitude of criteria exceedance, and other properties of the compounds that may effect exposure and toxicity. Of the compounds of potential interest arsenic, chromium, mercury, and zinc were identified as posing a low potential risk to the environment. Iron, lead, benzo(a)anthracene, fluorene, and pyrene were identified as posing a probable risk to the environment.

A comparison of the sampling results from 45 samples analyzed during the Supplemental SWMFIP to the seven analyses performed during the 1993 SWMFIP indicated that wetland sediments adjacent to the landfill have been impacted by site activities.

2.3.2 WET Assessment

The Army Corps of Engineers Wetland Evaluation Technique (Version 2.0), also known as WET, was applied to wetlands on the Marilla Landfill site to identify existing wetland functions and values. (Refer to Attachment B in the August 1995, SWMFIP report prepared by Malcolm Pirnie for a complete explanation of the WET assessment.)

The WET data can be used in the development of wetland mitigation plans, if needed. The data provides guidance for the development of plans to restore or enhance existing wetlands functions and values. Functions are defined as the physical, chemical, and biological processes or characteristics of a wetland, and values as the wetland processes or characteristics that are valuable or benefit society.

Based on WET scores, it was concluded that the existing on-site wetlands have a high probability for effectively performing a number of functions. Although the features of the North and West Ditches were engineered, their extensive vegetative cover and the wetland features of the North and South Ponds provide some local flood flow control, stabilize sediments, and remove nutrients and waste constituents. The wetlands, however, provide minimal value for wildlife utilization for several reasons; the small size of the wetlands, the shallow depth of water, the presence of waste constituents in groundwater discharging to surface waters, and the presence of waste material/rubble in the wetland sediments.

Historically, these wetlands have been disturbed by landfill operations, the surrounding rail lines and reconstruction of the Tiff Street bridge, and as a result they are generally low quality wetlands. The functions they perform however can be enhanced. Future wetland mitigation will not only include features to restore existing wetland functional values, but the plan will also strive to enhance or create wildlife habitat for both aquatic and terrestrial biota. Site remediation efforts that would eliminate the migration of waste constituents discharging to surface waters and isolate waste material from the wetland environment would increase the effectiveness of the wetland functional values relative to wildlife utilization.

Mitigation plans will incorporate the features of the existing wetlands that would enable the system to limit sedimentation and export nutrients and toxicants, and to whatever extent practicable, provide flood flow/storm water abatement. Site remediation efforts that isolate waste constituents from the surface waters and wetlands will enhance wildlife habitat and increase the opportunity for wildlife utilization. Site features can be further enhanced by introduction of native plant species to attract wildlife.

Although the small size of the wetlands is a factor, aquatic habitat could be improved with placement of a suitable substrate material. Additionally, by creating the proper elevations and grades, revegetation of emergent wetlands would occur and provide enhanced wildlife habitat.

2.3.3 Wetland Delineation

On September 13 and 14, 1994, Malcolm Pirnie, Inc. (MPI) conducted a wetlands delineation as part of the Supplemental Solid Waste Management Facility Investigation Program (SWMFIP) to identify wetlands directly contiguous to the 80 acre Marilla Street landfill that were potentially impacted by landfill activities. This wetland delineation was conducted using the 1987 Corps of Engineers Wetland Delineation Manual and the 1992 Memorandum on "Clarification and Interpretation of the 1987 Manual". The wetland boundaries were identified, flagged, and surveyed. The results of this wetland delineation are presented in the Supplemental SWMFIP report.

Subsequently, MPI performed an on-site wetland delineation within the entire 110-acre LTV property limit shown on Sheet 1 in Appendix C of the Focused Feasibility Study. The delineation included the identification of freshwater wetlands on the land located on the east side of Hopkins Road as well as the land surrounding the landfill footprint. Details of the wetland delineation procedures are presented in the Focused Feasibility Study. The sizes of the individual wetland areas are summarized in Table 2-1 below.

TABLE 2-1	
LTV STEEL COMPANY	
MARILLA STREET LANDFILL WETLAND MITIGATION	
<i>MARILLA STREET LANDFILL WETLAND ACREAGE</i>	
Wetland Area	Size in Acres
South Pond Wetland Complex	10.82 (4.53)*
Wetland Complex East of Hopkins Street	5.77
North Ditch	0.86
North Pond West	3.64
North Pond East	4.27
West Ditch	4.2
Total	29.6
<i>* Number in parenthesis is the approximate acreage of the open water portion of the South Pond Wetland complex</i>	

A total of 29.6 acres of wetland areas exists on or contiguous to LTV's property. Of that total, 16.6 acres has been demonstrated through the SWMFIP testing to contain impacted sediments.

2.3.4 1996 Sediment Characterization

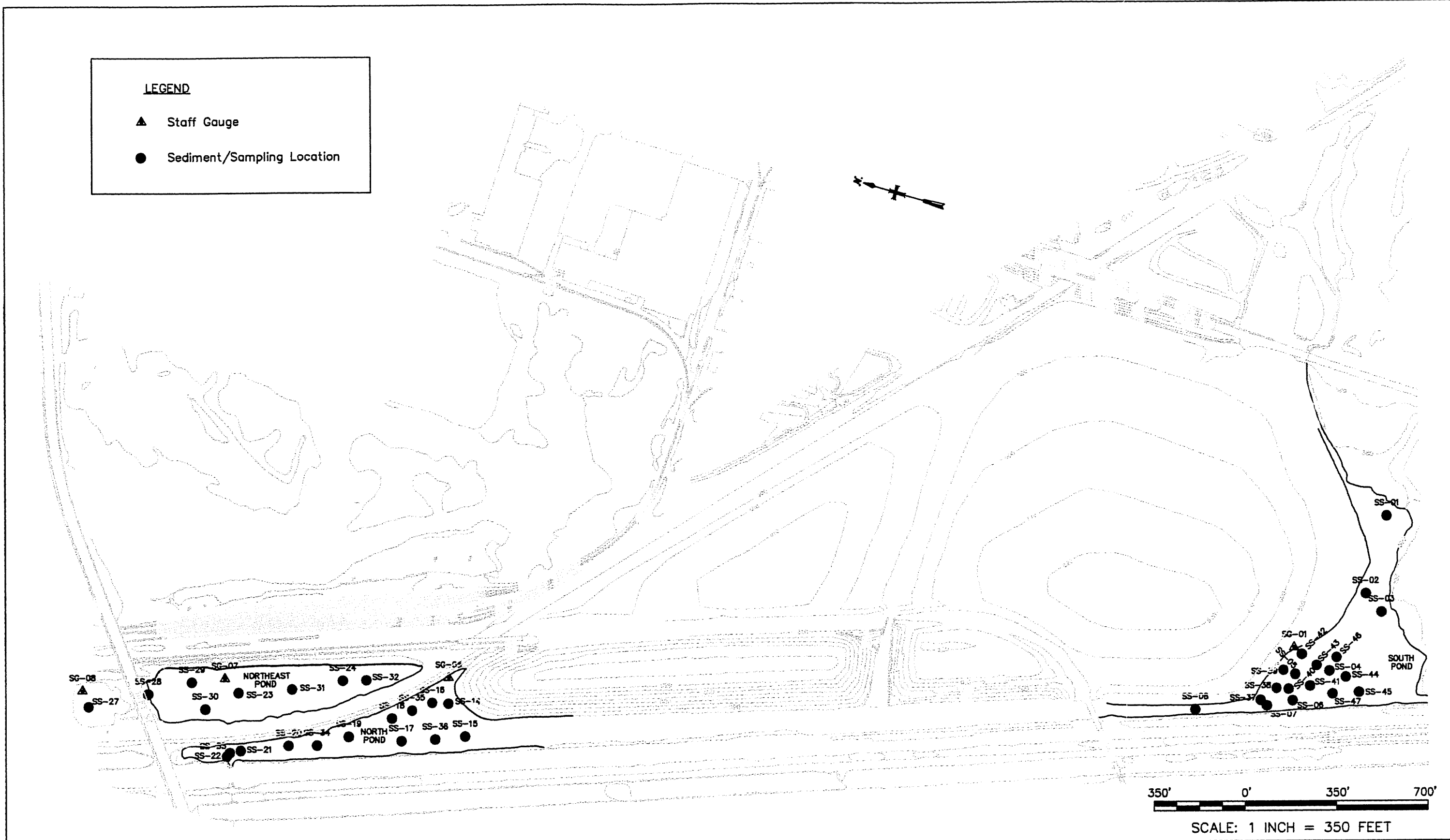
A sediment and subsurface soil characterization program was conducted at the LTV Marilla Street landfill wetland areas during the period of September 23 to 26, 1996. The purpose of the investigation was to delineate areas in the wetlands (viz., North Pond, Northeast Pond, and South Pond) where elevated concentrations of inorganic parameters (metals) were determined to exceed sediment guidance criteria established by the NYSDEC. Analyses of sediment and native soil samples collected during the investigation were used to further delineate the vertical and areal extent of metals contamination in each wetland area that previously had been identified during the preliminary wetlands investigation reported in the Supplemental Solid Waste Management Facility Investigation Program (SWMFIP) dated August 1995. A volume estimate for sediment exceeding NYSDEC criteria was calculated for each pond based upon the information collected from this investigation.

2.3.4.1 Sampling Locations

The boring program involved advancing a total of 21 boreholes in the ponded wetlands that border the northern and southern perimeter of the landfill. To maintain sample numerical continuity with the previous investigation, sampling locations were designated SS-27 through SS-47. A total of six borehole sampling locations, identified as SS-27 through SS-32, were advanced in the Northeast Pond. Borehole SS-28 was advanced through construction and demolition debris that had been backfilled into the northern portion of the Northeast Pond located immediately south of the Tiffit street bridge. Boreholes SS-33 through SS-36 were advanced in the North pond. A total of 11 boreholes were advanced at locations SS-37 through SS-47 in the South pond. Borehole sample locations for this investigation, as well as, the previous wetland investigation are identified on Figure 2-1.

As shown on Figure 2-1, the ponded wetland areas are differentiated from each other by physical boundaries such as railroad tracks situated on fill material and the drainage ditch

FIGURE 2-1



located along the western perimeter of the landfill. Construction and demolition fill material is present in the northern portion of the Northeast Pond (see Appendix A for further discussion). As a result, borehole locations SS-27 and SS-28 are geographically isolated from the southern portion of the Northeast pond. However, these boreholes are referenced in this report as locations that characterize the formerly contiguous Northeast Pond wetland area.

2.3.4.2 Sampling Procedures

Prior to drilling, water depths were measured at each sampling location. These depths were referenced to the nearest surveyed staff gauge to determine surface water and bottom sediment elevations. Drilling and sampling activities were conducted from a boat mounted tripod drilling apparatus using a Vibra-Core™ sampling system to advance a sample core barrel into sediment and native soil at twenty (20) locations in the Northeast, North, and South Ponds. Borehole location SS-28 was inaccessible by boat and was manually advanced using a hand auger. At each borehole location, the borehole was advanced to sampler refusal which generally occurred below the sediment, several feet into native soil. Boreholes SS-28, SS-30, and SS-34 could not be advanced into native soil.

Sample collection was initiated at the 2 to 3 foot interval in the North and Northeast Ponds due to the elevated concentrations of metals, especially iron, in the sediments of these wetland areas determined during the 1995 Supplemental SWMFIP sampling. Sediment/soil samples were described on borehole logs by the on-site geologist to characterize the overburden sediments at each sampling location. Stratigraphic borehole logs for all borings are attached in Appendix B.

Below the dredge sample interval, a Vibra-Core™ sample barrel was used to collect subsurface sediment and native soil samples. Prior to each use, the sample barrel was decontaminated in accordance with procedures identified in the workplan. The sample barrel utilized standard NQ diameter drilling rods in 5 foot lengths to collect 2 3/8-inch diameter sediment/soil samples within an acetate plastic sleeve inserted into the barrel. A new acetate plastic sleeve of appropriate length and diameter was inserted into the sampler barrel at each borehole location as an additional precaution to prevent cross-contamination of sediment/soil

samples. The drill string was then lowered into the bottom sediment and rapidly vibrated using a pneumatic hammer in 5-foot increments. The sampler was advanced to refusal at each borehole location. The depth of refusal at each location was caused by texture and density changes that occurred in the underlying stratigraphic units. Generally, the depth of refusal occurred approximately four feet below the top of sediment, terminating in dense native soil.

At each borehole location, a representative soil sample was collected at one-foot increments and submitted to Columbia Analytical Laboratory for metals analysis. A maximum of five sample increments were submitted to the laboratory from each borehole location.

2.3.4.3 Subsurface Conditions

Subsurface conditions and sequence of geologic units identified during this sampling program were consistent with the conditions and stratigraphic units identified in the Supplemental SWMFIP Report dated August 1995. These units included:

- Pond sediment containing fill and/or peat (decayed vegetative matter on the pond bottoms) typically containing greater than 50% moisture; and
- Native soil consisting of glaciolacustrine deposits composed of sandy silt or clayey silt or till composed of well graded gravel, sand, silt and clay.

Geologic units encountered in the wetland areas during the Supplemental SWMFIP in boreholes (SS-1 through SS-26) and during this investigation (SS-27 through SS-47) are summarized in Table 2-2. Each of the geologic units encountered during this investigation are described in the borehole logs presented in Appendix B. Cross-sections presenting a graphic description of the geologic units encountered in the ponds are presented the Supplemental SWMFIP Report dated August 1995. A typical cross-section of sediments and native soil encountered in the ponds is presented in Figure 2-2 and 2-3.

TABLE 2-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL
FEASIBILITY STUDY - ADDENDUM

STRATIGRAPHIC SUMMARY⁽¹⁾

Sample Location	SEDIMENT				NATIVE SOIL						Borehole Depth Elevation
	Fill & Loose Sediment		Layered Vegetation		Lacustrine Sandy Silt		Lacustrine Clayey Silt		Till		
	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	
Northeast Pond:											
SS-23	577.53	1.0	576.53	1.0*	575.53	>0.4	—	—	—	—	574.53
SS-24	576.88	0.5	576.38	>1.3*	—	—	—	—	—	—	573.88
SS-27	577.55	1.9	575.65	1.2	574.45	1.3	573.15	>1.6	—	—	571.55
SS-28	580.11	>2.0	—	—	—	—	—	—	—	—	578.11
SS-29	578.01	2.6	575.51	0.8	574.71	>2.6	—	—	—	—	573.01
SS-30	577.51	3.2	574.31	0.6	573.71	>2.2	—	—	—	—	571.51
SS-31	576.76	2.5	574.26	1.0	573.26	0.5	572.76	1.0	—	—	571.76
SS-32	576.7	2.4	574.3	1.2	573.1	3.8	569.3	>0.8	—	—	568.7
North Pond:											
SS-14	577.83	4.0	—	—	573.83	>1.3	—	—	—	—	571.83
SS-15	577.74	2.0	575.74	1.8	573.94	>2.2	—	—	—	—	571.74
SS-16	577.61	1.5	576.11	5.0	571.11	3.5	567.61	>1.9	—	—	565.61
SS-17	577.51	1.0	576.51	8.7	567.81	>1.2	—	—	—	—	565.51
SS-18	577.36	1.0	576.36	4.9	571.46	0.4	571.06	0.7	—	—	570.36
SS-19	577.46	1.3	576.16	0.3	575.86	>4.6	—	—	—	—	571.46
SS-20	576.86	2.0	574.86	0.5	574.36	>3.5	—	—	—	—	570.86

TABLE 2-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL
FEASIBILITY STUDY - ADDENDUM

STRATIGRAPHIC SUMMARY¹⁾

Sample Location	SEDIMENT						NATIVE SOIL						Borehole Depth Elevation
	Fill & Loose Sediment		Layered Vegetation		Lacustrine Sandy Silt		Lacustrine Clayey Silt		Till				
	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness			
SS-21	577.66	1.5	576.16	0.5	575.66	12.9	562.76	>0.6	—	—	561.16		
SS-22	577.06	4.2	—	—	572.86	>0.7	—	—	—	—	571.06		
SS-33	577.8	2.6	575.2	0.6	574.6	>3.5	--	--	--	--	570.3		
SS-34	576.7	3.0	573.7	0.4	573.3	>1.6	--	--	--	--	571.5		
SS-35	577.2	2.5	574.7	1.4	573.3	>1.1	--	--	--	--	570.7		
SS-36	577.0	3.8	573.2	0.8	572.4	>3.0	--	--	--	--	570.0		
South Pond:													
SS-1	579.9	0.0	577.9	0.8	—	—	—	—	579.1	>0.7	576.1		
SS-2	578.8	1.7	577.1	0.8	576.3	1.5	574.8	>0.8	—	—	573.8		
SS-3	578.5	1.3	—	—	577.2	0.7	576.5	>2.8	—	—	573.5		
SS-4	578.45	1.8	—	—	576.65	0.2	576.45	2.2	574.25	>0.4	573.45		
SS-5	577.35	2.2	—	—	575.15	0.8	574.35	>1.6	—	—	572.35		
SS-6	577.45	2.3	—	—	575.15	0.8	574.35	>3.5	—	—	570.45		
SS-7	577.95	3.0	—	—	574.95	>1.6	—	—	—	—	572.95		
SS-37	576.8	1.2	575.6	0.4	575.2	0.4	574.8	>0.8	—	—	572.3		
SS-38	575.4	1.0	574.4	1.0	573.4	1.4	572.0	>0.6	—	—	571.4		
SS-39	575.4	2.0	—	--	573.4	0.9	572.5	>0.6	—	—	571.4		

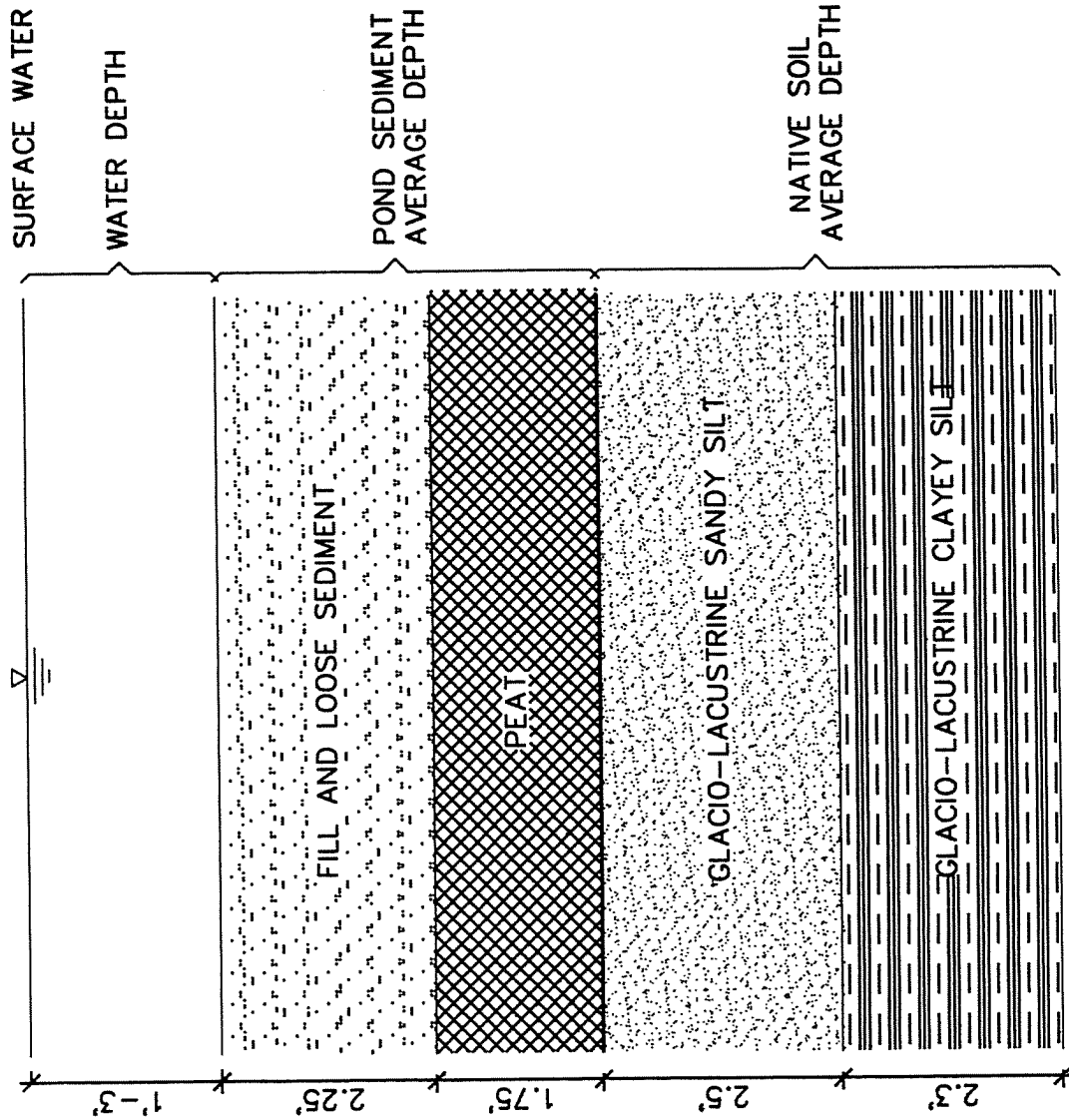
TABLE 2-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL
FEASIBILITY STUDY - ADDENDUM

STRATIGRAPHIC SUMMARY⁽¹⁾

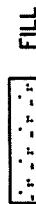
Sample Location	SEDIMENT				NATIVE SOIL						Borehole Depth Elevation
	Fill & Loose Sediment		Layered Vegetation		Lacustrine Sandy Silt		Lacustrine Clayey Silt		Till		
	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	Elevation	Thickness	
SS-40	575.8	1.2	574.6	0.4	574.2	1.0	573.2	>0.8	--	--	572.4
SS-41	576.5	1.1	575.4	0.5	574.9	0.9	574.0	>1.0	--	--	573.0
SS-42	576.3	1.0	575.3	0.6	574.7	0.2	574.5	>1.3	--	--	572.3
SS-43	576.3	1.8	574.5	0.2	574.3	0.4	573.9	>1.2	--	--	572.3
SS-44	577.1	1.0	576.1	0.4	575.7	0.7	575.0	>2.3	--	--	572.6
SS-45	575.7	1.3	--	--	574.4	0.7	573.7	>0.6	--	--	572.2
SS-46	577.3	1.3	--	--	576.0	0.7	575.3	0.9	574.4	>0.8	572.8
SS-47	575.5	1.4	--	--	574.1	0.5	573.6	>1.2	--	--	572.4

Notes:
(-) Interval not sampled or unit absent.
(1) All elevations are in feet and were referenced to surveyed staff gauges and were determined from the measured depth of water to the top of bottom sediment.
(*) Estimated based on observations, generally +/- 1.0 ft.



LEGEND

SEDIMENT:



FILL
LOOSE, VARIABLE BOTTOM SEDIMENT COMPOSED OF THIN BLACK CARBONACEOUS LAYERS, CRUSHED STONE, SILT, AND INDUSTRIAL FILL



PEAT
LAYERED VEGETATION, PEAT WITH SILT, CLAY AND VERY FINE SAND WITHIN MATRIX AND AS PARTINGS

NATIVE SOIL:

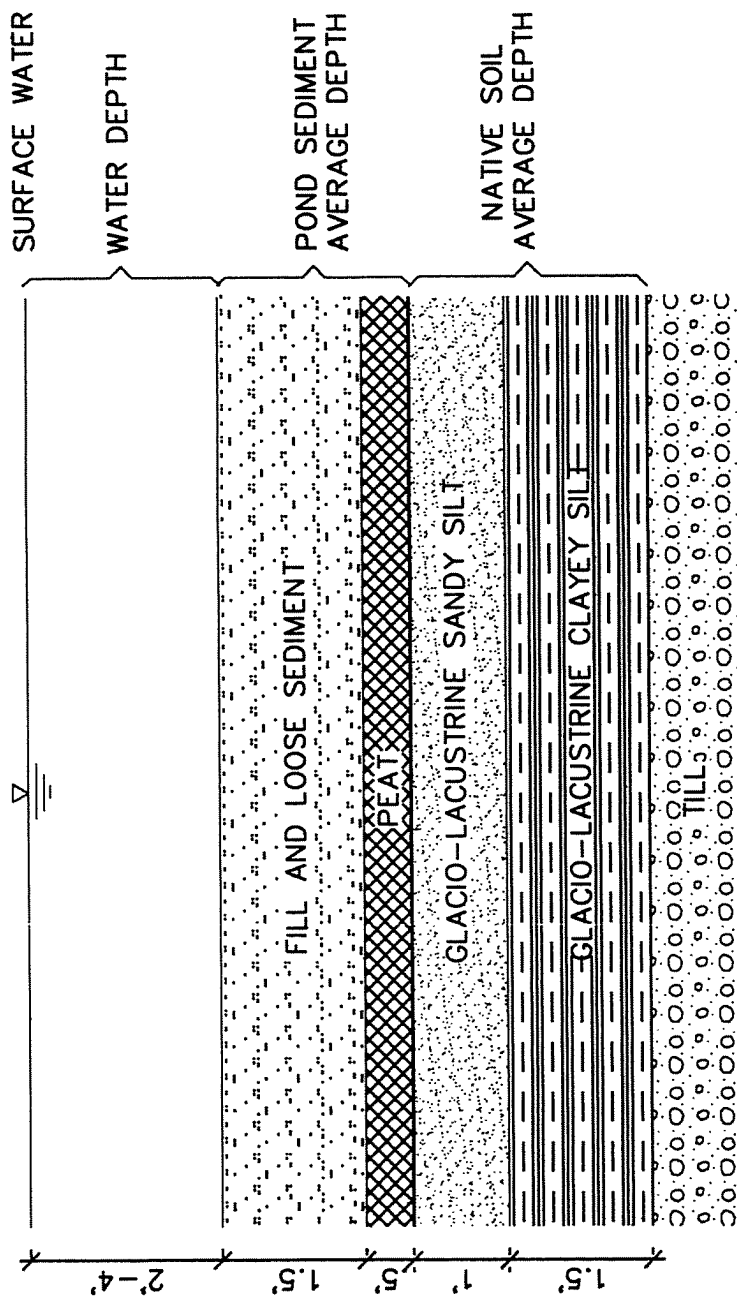
GLACIO-LACUSTRINE:



GL
STRATIFIED SILT AND VERY FINE SAND WITH TRACE CLAY, DISCONTINUOUS FINE SAND LENSES



GL
CLAYEY SILT WITH TRACE TO LITTLE SILT AND VERY FINE SAND LAMINAE, SOME PLASTICITY



LEGEND

SEDIMENT:

- FILL
- PEAT

NATIVE SOIL:

GLACIO-LACUSTRINE:

- LOOSE, VARIABLE BOTTOM SEDIMENT COMPOSED OF THIN BLACK CARBONACEOUS LAYERS, CRUSHED STONE, SILT, AND INDUSTRIAL FILL
- LAYERED VEGETATION, PEAT WITH SILT, CLAY AND VERY FINE SAND WITHIN MATRIX AND AS PARTINGS
- STRATIFIED SILT AND VERY FINE SAND WITH TRACE CLAY, DISCONTINUOUS FINE SAND LENSES
- CLAYEY SILT WITH TRACE TO LITTLE SILT AND VERY FINE SAND LAMINAE, SOME PLASTICITY
- UNDIFFERENTIATED GLACIAL TILL:
 - TILL
 - POORLY SORTED VERY FINE SAND WITH LITTLE-SOME FINE TO COARSE SUBROUNDED GRAVEL, TRACE SILT, TRACE CLAY WITHIN MATRIX AND AS PARTINGS.

0848-258

FOCUSED FEASIBILITY STUDY REPORT ADDENDUM FOR THE
MARILLA ST. LANDFILL SITE

MALCOLM PIRNIE, INC.



TYPICAL PROFILE OF SEDIMENT/NATIVE SOIL AT SOUTH POND

2.3.4.4 Sediment Sampling Results

This section discusses the results of sediment/native soil analyses performed during this wetland investigation program and includes the results of 1995 wetland investigation presented in the SWMFIP Report. Analytical results for the metals analysis of samples collected the Northeast Pond, North Pond, and South Pond are summarized on tables presented in Appendix C. Based upon a review of laboratory quality control (QC) data with included a review of contract-required detection limit standards for ICP and AA, laboratory control samples, ICP interference check samples, ICP serial dilution analysis, and furnace AA QC analysis the data were usable for the data objectives established for the project. Because many of the sediment samples had a high water content (low percent solids), the detection limit for the inorganic parameters were often between two and five times greater than the laboratory practical quantitation limit (PQL). As a result, mercury detection limits often exceeded the site-specific sediment criteria established for the wetland areas. The percent solids analyzed in SS-32 at 4 to 5 feet and SS-36 at 4 to 5 feet were anomalously low for soil (viz., 29.2% and 25.8%). Typically, soils at the Marilla Street Site range from 75 to 85% solids. The laboratory was contacted regarding this discrepancy and recalculated the inorganic concentrations using a percent solids of 80%. Data validation is presented in Appendix D.

Inorganic parameters considered metals of concern during this investigation included: antimony; arsenic; cadmium; chromium; copper; iron; lead; manganese; mercury; nickel; and zinc. The distribution of selected parameters in each of the wetland areas at specific sampling depths were evaluated using GIS mapping analysis. GIS mapping is presented in Appendix E. The figures are color contoured to map areas of sediment having concentrations that fall below, within, or above the Lowest Effect Level, NYSDEC site-specified sediment level (see Appendix F), and the Severe Effect Level presented in NYSDEC Technical Guidance for Screening Contaminated Sediments (November 1993). The color code for GIS mapping is as follows:

COLOR CODE CONTOUR	SEDIMENT CRITERIA
Dark Blue	Concentration below low effect level.
Light Blue	Concentration between low effect level and NYSDEC established criteria.
Light Red	Concentration above NYSDEC site-specific criteria.
Dark Red	Concentration above severe effect level.

GIS mapping occurs between sample points having inorganic concentration values. Interpretation of the mapping should infer extrapolation of the contours to the perimeter of the ponds. The lateral and vertical distribution of inorganic parameters in each wetland area is discussed below:

Northeast Pond: Figures E-1 through E-16 in Appendix E show the distribution of select inorganic parameters detected in the Northeast Pond at one foot increments. Iron and cadmium concentrations are generally the highest and deepest in samples collected in the southern portion of the pond closest to the landfill site. Arsenic and lead concentrations are highest in samples collected from the northeastern portion of the pond closest to the Alltft inactive hazardous waste site located immediately east of the pond (see October 1993 SWMFIP Report or information concerning the Alltft site). In general, analysis of samples collected from the upper 2 feet of sediment in the northern portion of the pond and upper 3 feet of sediment/native soil in the southern portion of the pond indicated the presence of several inorganic parameters with concentrations exceeding NYSDEC site-specific sediment criteria. Only two of the five boreholes sampled to five feet (viz., samples SS-29 and SS-32) detected inorganic parameters at a depth of 3 to 4 feet above NYSDEC site-specified sediment criteria. Samples below this depth did not contain elevated inorganic parameter concentrations.

A summary of inorganic parameters detected at concentrations that exceed NYSDEC site-specified sediment criteria at each borehole location with depth is presented in Table 2-3. Since iron is the most frequently detected inorganic parameter to exceed NYSDEC site-specified sediment criteria, iron concentrations have been used to determine the volume of sediment required to be removed based on sediment criteria established by the NYSDEC. The distribution of iron in the Northeast Pond from the top of sediment to a depth of five feet is presented on Figures 2-4 through 2-7.

Northwest Pond: Figures E-17 through E-32 in Appendix E show the distribution of select inorganic parameters detected in the North Pond at one foot increments. The distribution pattern of inorganic parameters exceeding NYSDEC site-specified sediment criteria are similar for the majority of inorganic parameters. Samples collected and analyzed from the sediment and upper native soils (upper 3 feet) have inorganic concentrations that exceed NYSDEC site-specified sediment criteria. In general, arsenic, chromium, iron, and lead concentrations decrease with depth toward the northern portion of the pond. At a depth of 4 to 5 feet (native soil), only iron was detected at concentrations that exceed NYSDEC site-specific sediment criteria. Samples collected below depths of 3 feet in the northern portion of the pond are below NYSDEC site-specific sediment criteria.

A summary of inorganic parameters detected at concentrations that exceed NYSDEC site-specified sediment criteria at each borehole location in the North Pond with depth is presented in Table 2-3. Since iron is the most frequently detected inorganic parameter to exceed NYSDEC site-specified sediment criteria, iron concentrations have been used to determine the volume of sediment required to be removed based on sediment criteria established by the NYSDEC. Iron is a common constituent of native soils in Western New York. Consequently, where iron is present as the only inorganic parameter detected above sediment criteria in native soil (i.e. SS-36 at 4 to 5 feet), it was not used as the basis for native soil removal if the iron concentrations were within the range of naturally occurring iron concentrations in the Eastern U.S. defined by Shackletter and Boerngen (1984) (viz., iron - 100 to 100,000 mg/kg). The distribution of iron in the Northwest Pond is presented on Figures 2-8 through 2-11.

TABLE 2-3
LTV STEEL CORPORATION
MARILLA STREET LANDFILL
FEASIBILITY STUDY ADDENDUM

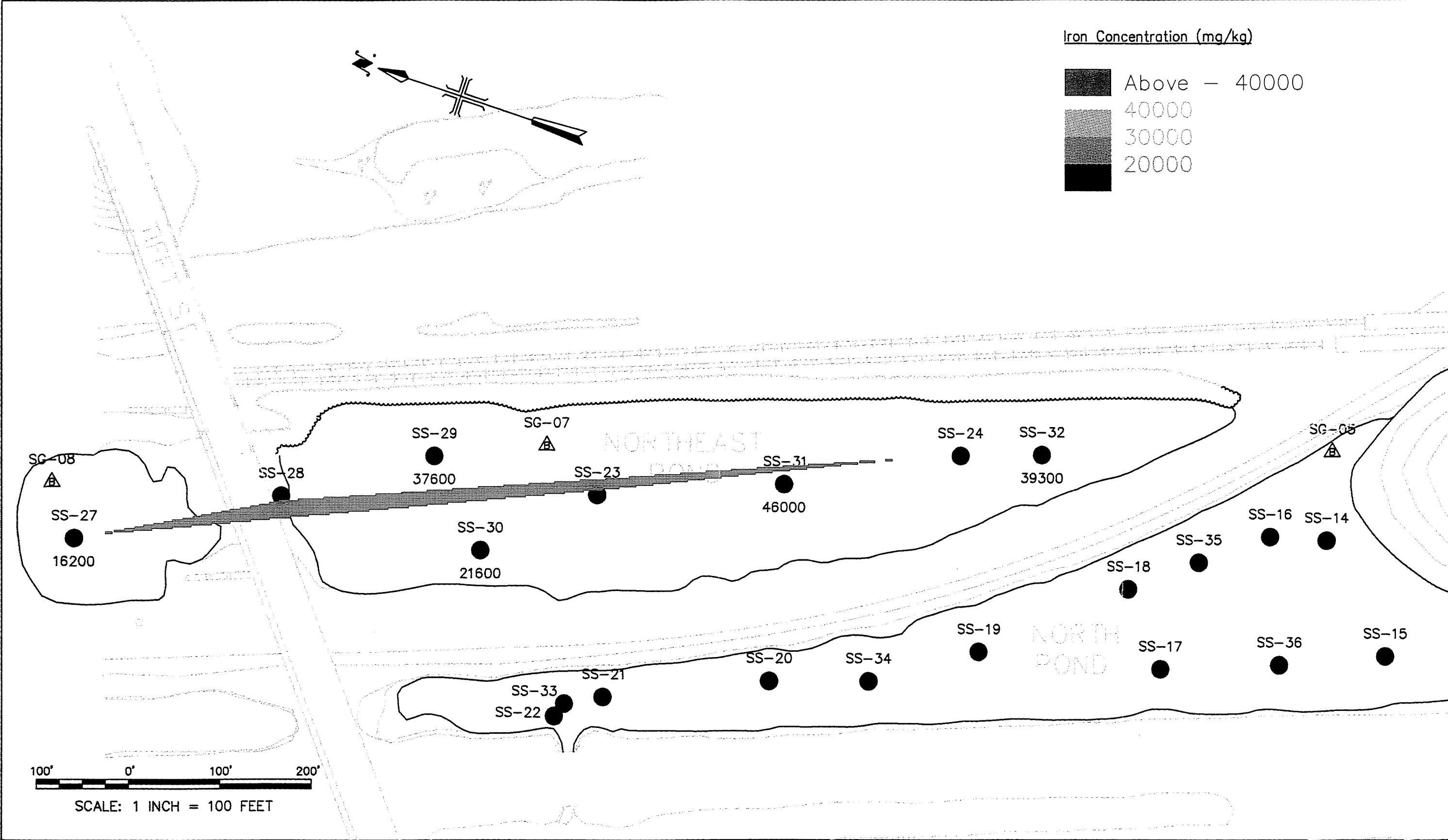
SUMMARY OF INORGANIC PARAMETER EXCEEDANCES OF NYSDEC SEDIMENT CRITERIA

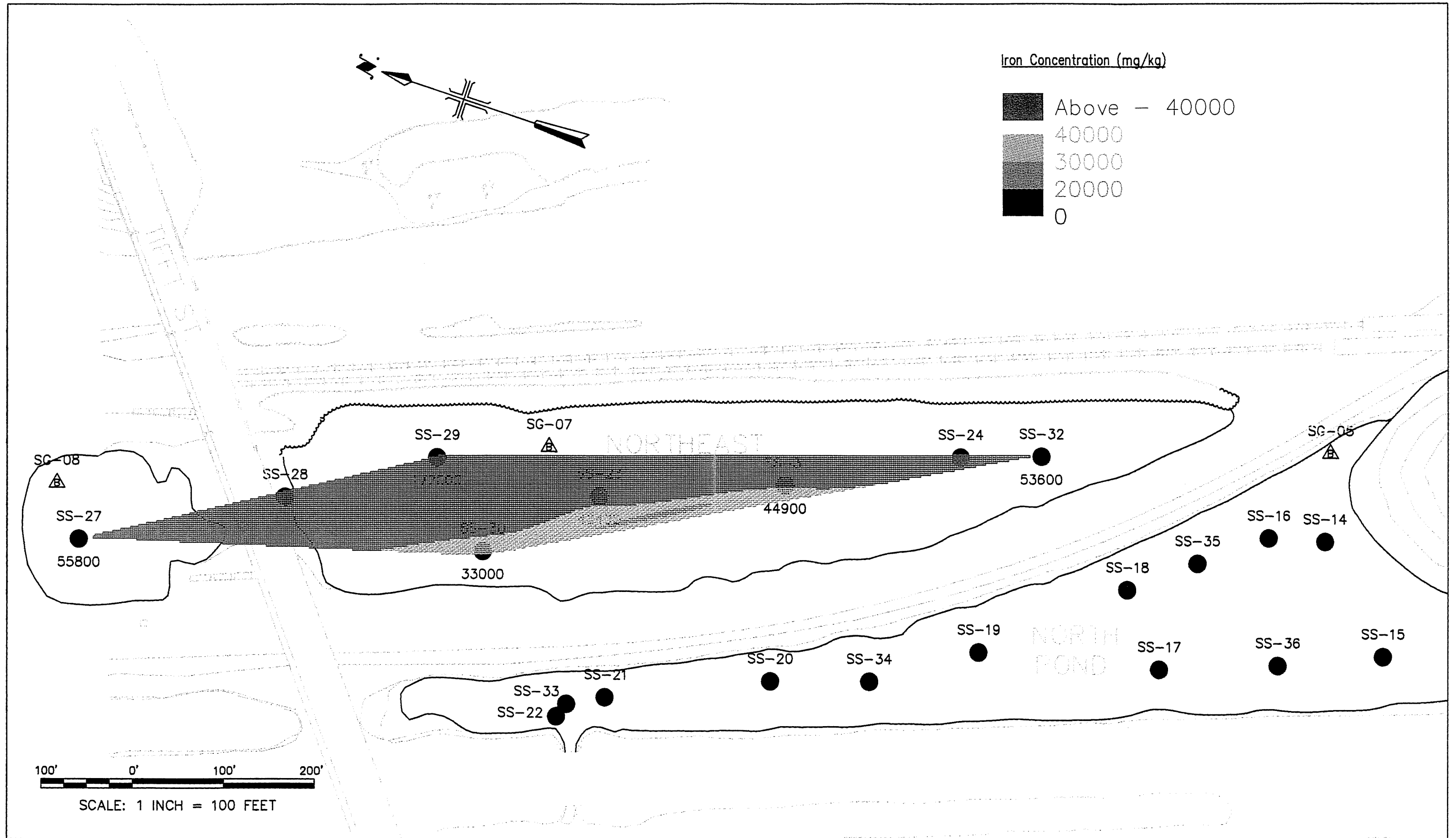
Northeast Pond			
Borehole	Depth	Stratigraphic Unit	Inorganic Parameters Exceeding NYSDEC Specified Sediment Criteria
SS-23	0-1	Sediment ⁽¹⁾	Sb, As, Cd, Cr, Cu, Fe, Pb, Hg
	2-2.4	Sediment ⁽²⁾ Native Soil ⁽³⁾	Cu, Fe, Ni, Zn
SS-24	0-1	Sediment ⁽¹⁾	As, Cd, Fe, Pb
	4-5	Native Soil ⁽⁴⁾	-
SS-27	0-1	Sediment ⁽¹⁾	As, Cu, Fe, Pb, Hg, Zn
	1-2	Sediment ^{(1) (2)}	As, Cr, Cu, Fe, Pb, Hg, Zn
	2-3	Sediment ⁽²⁾ / Native Soil ⁽³⁾	Fe
	3-4	Native Soil ⁽³⁾⁽⁴⁾	-
SS-28	0-1	Sediment ⁽¹⁾	Cu, Fe, Pb, Zn
	1-2	Sediment ⁽¹⁾	Cu, Fe, Pb, Ni, Zn
SS-29	2-3	Sediment ^{(1) (2)}	As, Cr, Cu, Fe, Pb, Hg, Ni
	3-4	Native Soil ⁽³⁾	Cu, Hg
	4-5	Native Soil ⁽³⁾⁽⁴⁾	-
SS-30	2-3	Sediment ⁽¹⁾	Fe
	3-4	Sediment ⁽²⁾ / Native Soil ⁽³⁾	-
	4-5	Native Soil ⁽³⁾⁽⁴⁾	-
SS-31	2-3	Sediment ⁽¹⁾	Fe
	3-4	Sediment ⁽²⁾ / Native Soil ⁽³⁾	Cu, Fe
	4-5	Native Soil	-
SS-32	2-3	Sediment ⁽¹⁾	As, Cd, Cr, Cu, Fe, Pb, Ni, Zn
	3-4	Sediment ⁽²⁾ / Native Soil ⁽³⁾	Cu, Fe, Ni
	4-5	Native Soil ^{(3) (4)}	-
North Pond			
SS-14	0-1	Sediment ⁽¹⁾	Fe
SS-15	0-1	Sediment ⁽¹⁾	As, Cr, Cu, Fe, Pb, Ni, Zn
SS-15A	0-1	Sediment ⁽¹⁾	As, Cr, Fe, Pb, Ni, Zn
SS-16	0-1	Sediment ⁽¹⁾	As, Cr, Fe, Pb, Zn
	2-4	Sediment ⁽²⁾ / Native Soil ^{(3) (4)}	As, Fe, Pb
SS-17	0-1	Sediment ⁽¹⁾	As, Cr, Fe, Pb, Zn
SS-18	0-1	Sediment ⁽¹⁾	As, Cr, Fe, Pb, Zn
SS-19	0-1	Sediment ⁽¹⁾	Fe, Pb, Ni
SS-20	0-1	Sediment ⁽¹⁾	Cr, Fe, Pb, Zn
	2-2.5	Sediment ⁽²⁾ / Native Soil ⁽³⁾	Cr, Fe, Ni, Zn
SS-21	0-1	Sediment ⁽¹⁾	As, Cr, Fe, Pb
	1.9-2.5	Sediment ⁽²⁾ Native Soil ⁽³⁾	Fe, Pb, Ni, Zn
SS-22	0-1	Sediment ⁽¹⁾	-
SS-33	2-3	Sediment ⁽¹⁾	As, Cr, Cu, Fe, Ni
	3-4	Sediment ⁽²⁾⁽³⁾ / Native Soil ⁽³⁾	-
	4-5	Native Soil ⁽³⁾	-
SS-34	2-3	Sediment ⁽¹⁾	As, Cr, Cu, Fe, Pb, Ni, Zn
	3-4	Sediment ^{(1) (2)}	Cu, Ni
	4-5	Native Soil	-
SS-35	2-3	Sediment ⁽¹⁾	As, Cr, Cu, Fe, Pb, Ni, Zn
	3-4	Sediment ⁽²⁾ / Native Soil ⁽³⁾	As, Cu, Fe, Ni
	4-5	Native ⁽³⁾	-
SS-36	2-3	Sediment ⁽¹⁾	As, Cr, Cu, Fe, Pb, Mn
	3-4	Sediment ^{(1) (2)}	As, Cr, Cu, Fe, Pb, Ni, Zn
	4-5	Native Soil ⁽³⁾	Fe
Notes:			Sb-Antimony As-Arsenic Cd-Cadmium Cr-Chromium Cu-Copper Fe-Iron Pb-Lead Hg-Mercury Ni-Nickel Zn-Zinc
(1) Fill and Loose Sediment (2) Layered Vegetation (Peat) (3) Sandy Silt (4) Clayey Silt (5) Till			

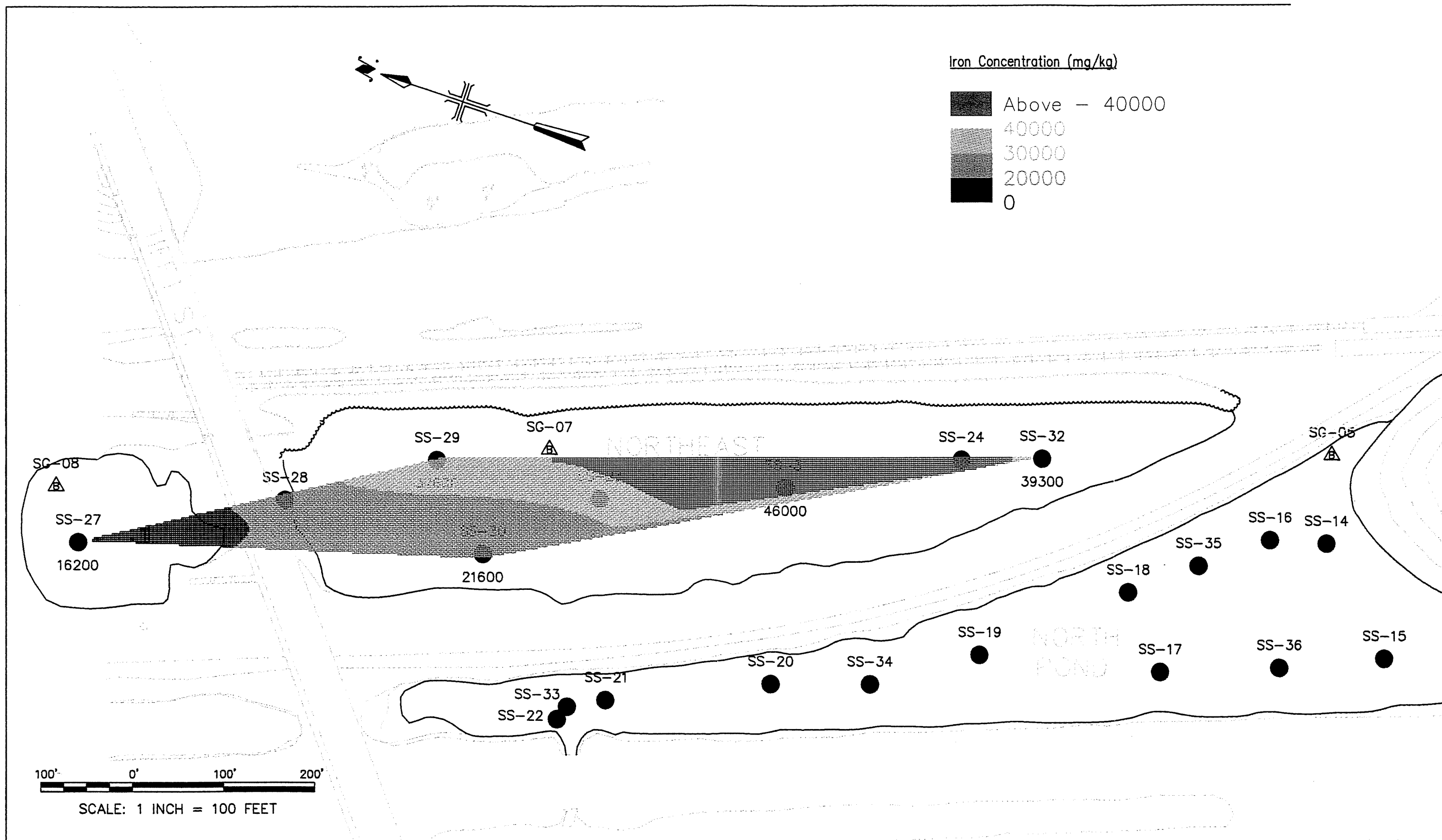
TABLE 2-3 (cont'd)
LTV STEEL CORPORATION
MARILLA STREET LANDFILL
FEASIBILITY STUDY ADDENDUM

SUMMARY OF INORGANIC PARAMETER EXCEEDANCES OF NYSDEC SEDIMENT CRITERIA

South Pond			
Borehole	Depth	Stratigraphic Unit	Inorganic Parameters Exceeding NYSDEC Specified Sediment Criteria
SS-1	0-1	Sediment ⁽¹⁾	Fe, Ni
SS-2	0-1	Sediment ⁽¹⁾	Fe, Ni
SS-3	0-1	Sediment ⁽¹⁾	Ni
SS-4	0-1	Sediment ⁽¹⁾	Cd, Fe, Pb
SS-5	0-1	Sediment ⁽¹⁾	Pb
SS-6	0-1	Sediment ⁽¹⁾	Pb
SS-7	0-1	Sediment ⁽¹⁾	Pb
SS-8	0-1	Sediment ⁽¹⁾	Pb
SS-37	0-1	Sediment ⁽¹⁾	Mn
	1-2	Sediment ⁽¹⁾⁽²⁾ /Native Soil ⁽³⁾	As, Cd, Fe, Pb, Mn, Zn
	2-3	Native Soil ⁽⁴⁾	-
	3-4	Native Soil ⁽⁴⁾	Fe, Ni
SS-38	0-1	Sediment ⁽¹⁾	Pb, Mn, Zn
	1-2	Sediment ⁽²⁾	Cu, Fe, Ni
	2-3	Native Soil ⁽³⁾	-
	3-4	Native Soil ^(3,4)	Fe, Ni
SS-39	0-1	Sediment ⁽¹⁾	Pb, Mn, Zn
	1-2	Sediment ⁽¹⁾	As, Fe, Pb, Zn
	2-3	Native Soil ⁽³⁾	-
	3-4	Native Soil ⁽⁴⁾	Fe, Ni
SS-40	0-1	Sediment ⁽¹⁾	Pb, Mn, Zn
	1-2	Sediment ⁽¹⁾⁽²⁾	Fe, Zn
	2-3	Native Soil ⁽³⁾	Fe, Zn
SS-41	0-1	Sediment ⁽¹⁾	Cd, Pb, Mn
	1-2	Sediment ⁽¹⁾⁽²⁾	Fe, Zn
	2-3	Native Soil ⁽³⁾	Fe, Ni
	3-4	Native Soil ⁽⁴⁾	Fe, Ni
SS-42	0-1	Sediment ⁽¹⁾	Fe, Mn, Ni
	1-2	Sediment ⁽²⁾ /Native Soil ⁽³⁾	-
	2-3	Native Soil ⁽³⁾	Ni
	3-4	Native Soil ⁽⁴⁾	Fe, Ni
SS-43	0-1	Sediment ⁽¹⁾	Fe, Mn, Zn
	1-2	Sediment ⁽¹⁾⁽²⁾	Cd, Mn, Pb, Zn
	2-3	Native Soil ⁽³⁾	-
	3-4	Native Soil ⁽⁴⁾	Fe
SS-44	0-1	Sediment ⁽¹⁾	As, Cd, Cu, Fe, Pb, Ni, Zn
	1-2	Sediment ⁽²⁾	-
	2-3	Native Soil ⁽³⁾	Fe, Ni
	3-4	Native Soil ⁽⁴⁾	Ni
	4-5	Native Soil ⁽⁴⁾	-
SS-45	0-1	Sediment ⁽¹⁾	As, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Zn
	1-2	Sediment ⁽¹⁾ /Native Soil ⁽³⁾	Fe, Ni
SS-46	0-1	Sediment ⁽¹⁾	As, Cd, Cr, Fe, Pb, Zn
	1-2	Sediment ⁽¹⁾ /Native Soil ⁽³⁾	-
	2-3	Native Soil ⁽⁴⁾	Fe, Ni
SS-47	0-1	Sediment ⁽¹⁾	As, Fe, Pb, Mn, Zn
	1-2	Sediment ⁽¹⁾ /Native Soil ⁽³⁾	-
	2-3	Native Soil ⁽⁴⁾	Fe, Ni
Notes:			Sb-Antimony As-Arsenic Cd-Cadmium Cr-Chromium Cu-Copper
(1) Fill and Loose Sediment (2) Layered Vegetation (Peat) (3) Sandy Silt (4) Clayey Silt (5) Till			Fe-Iron Pb-Lead Hg-Mercury Ni-Nickel Zn-Zinc







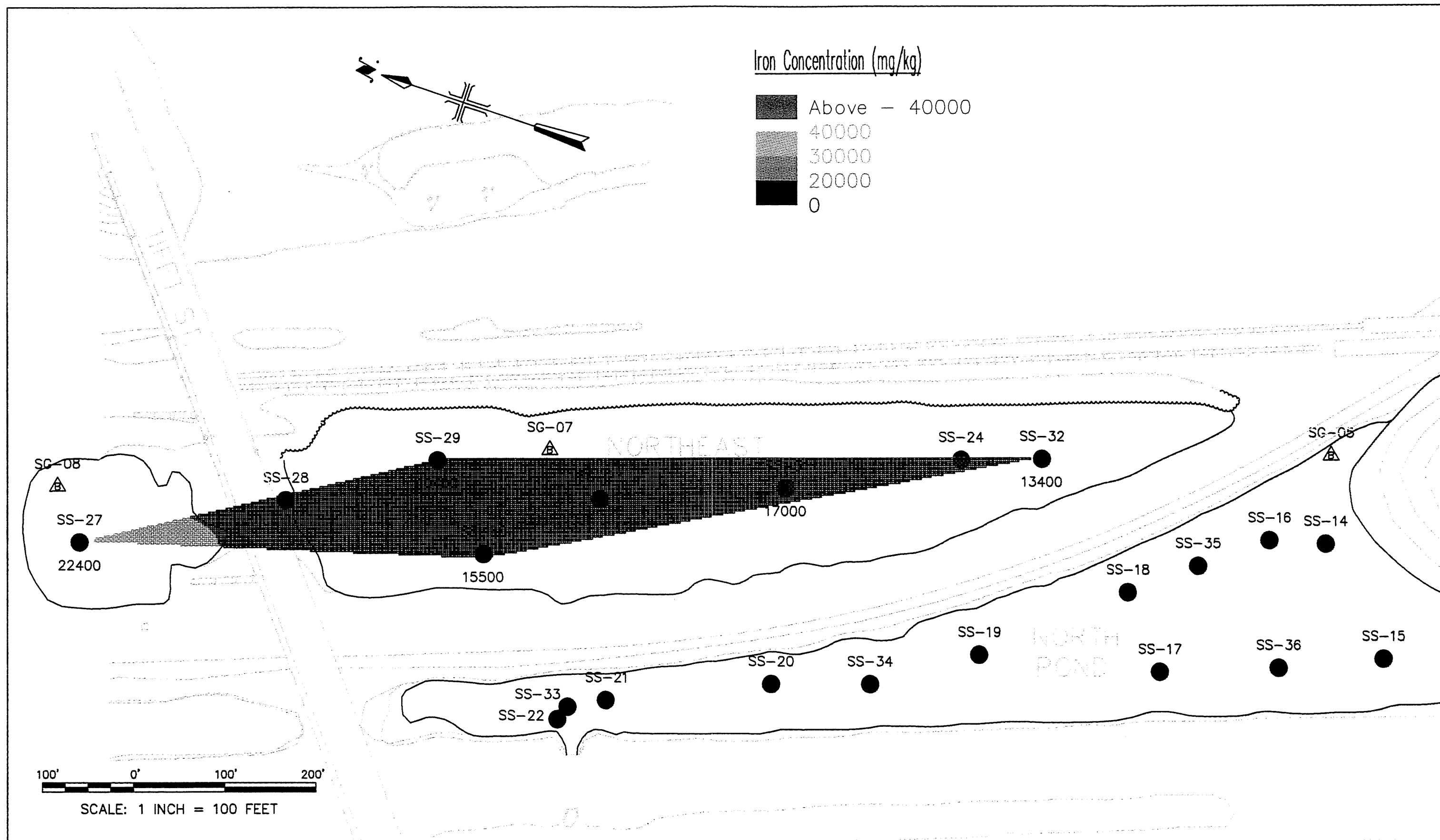
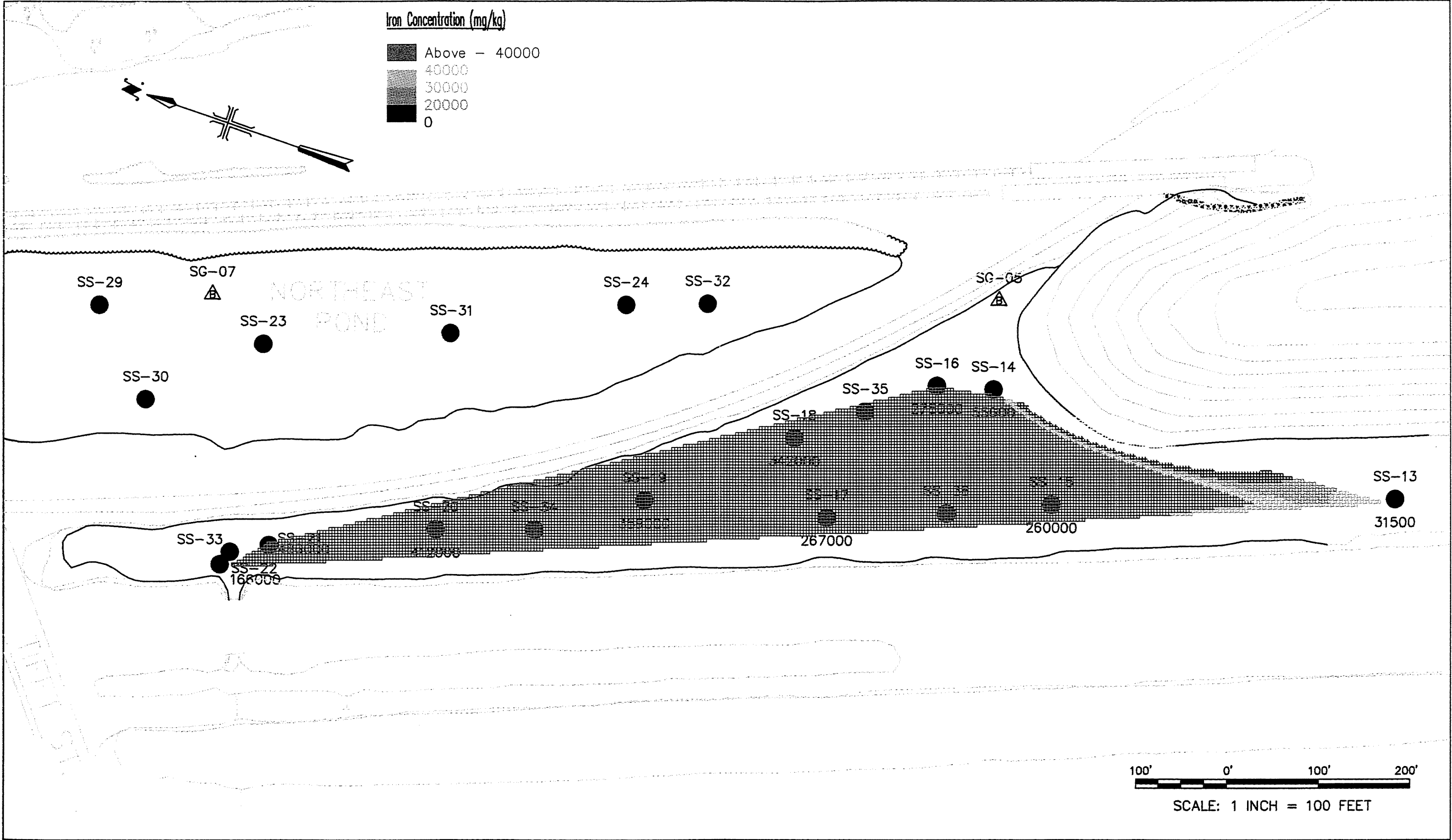


FIGURE2-8



**MALCOLM
PIRNIE**

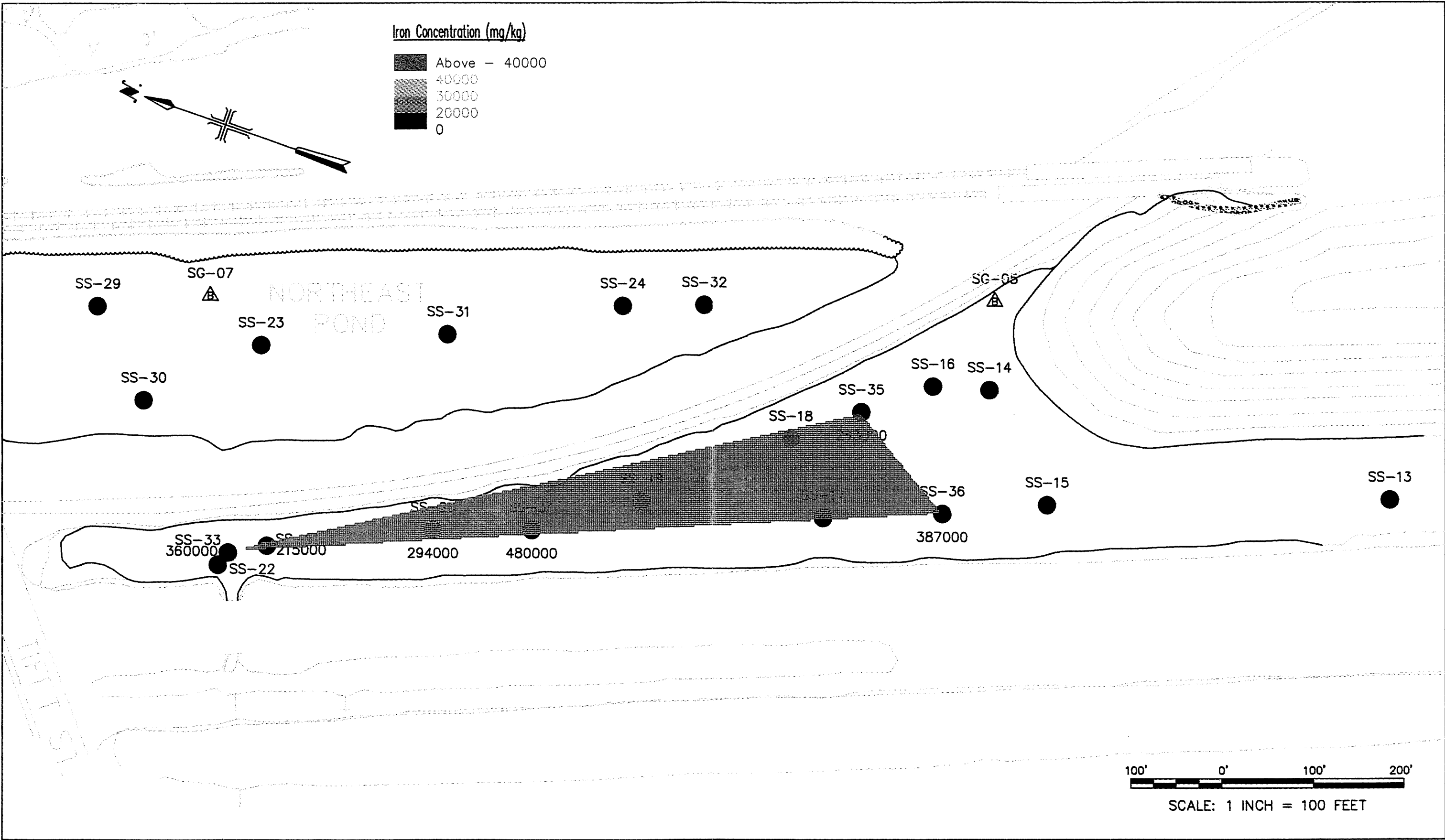
FE01N.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
IRON CONCENTRATION: 0 - 1 FEET

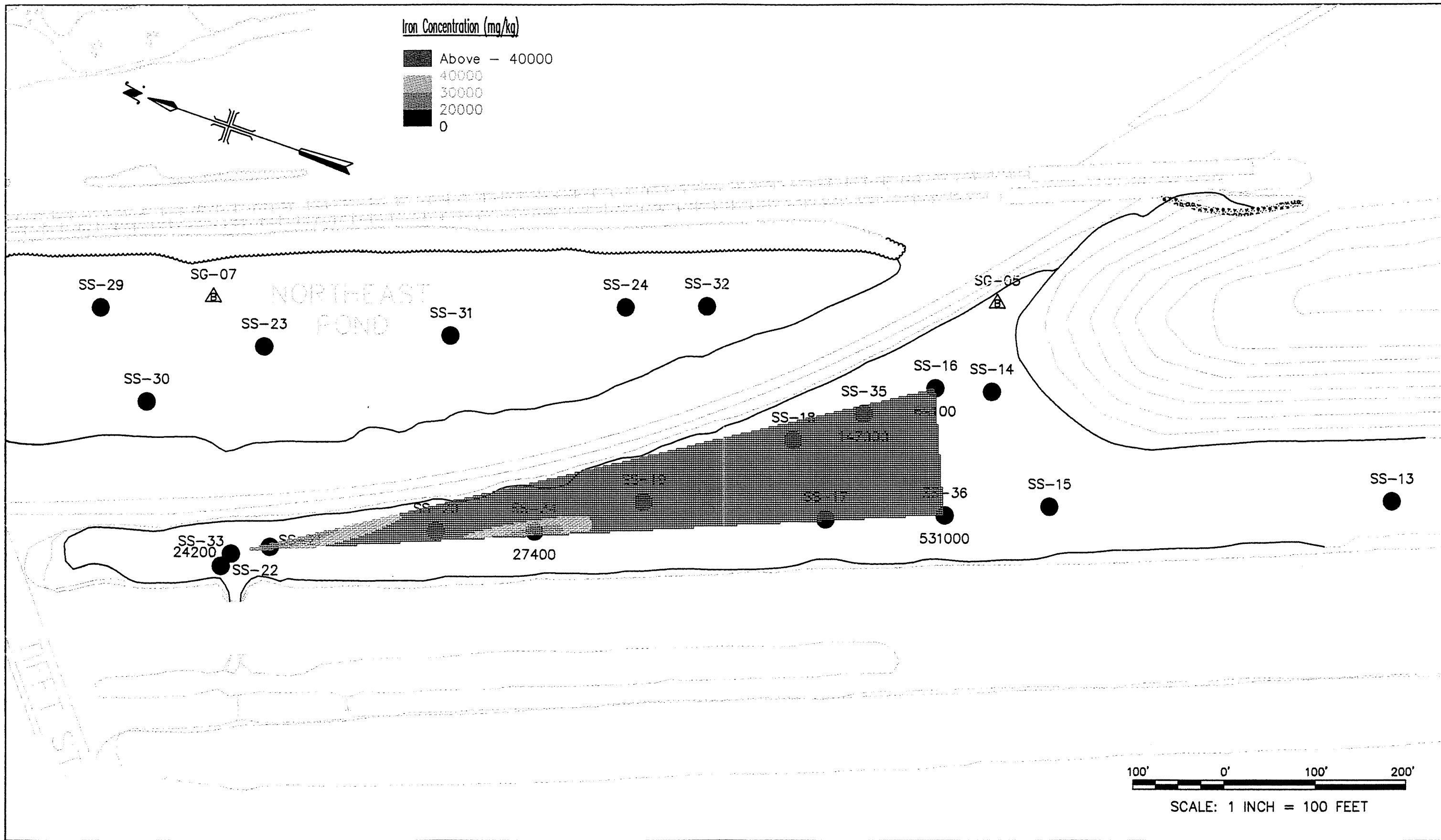
LTV STEEL

FIGURE 2-9



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE 2-10



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

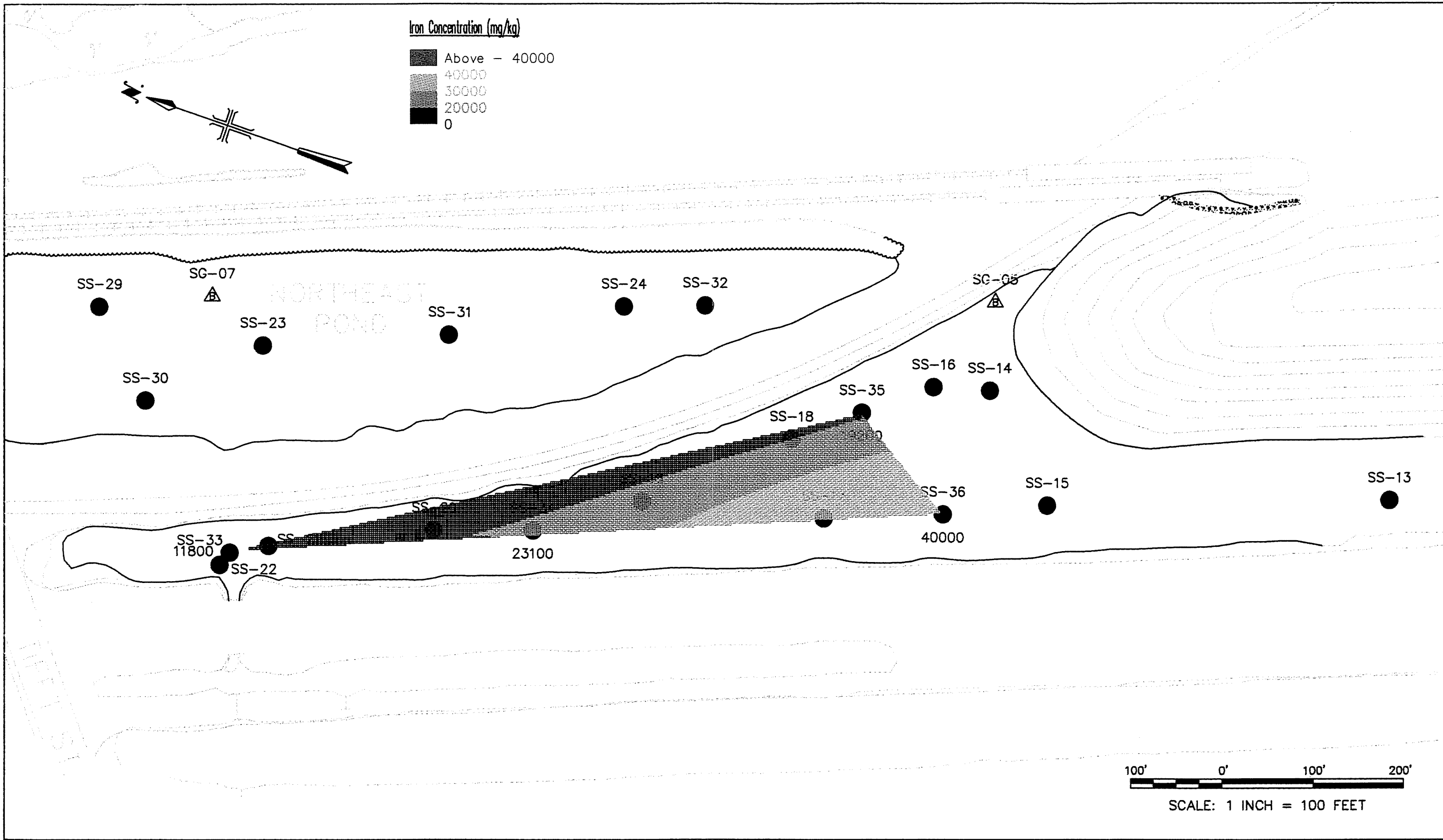
**MALCOLM
PIRNIE**

FE34N.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
IRON CONCENTRATION: 3 - 4 FEET

LTV STEEL

FIGURE 2-11



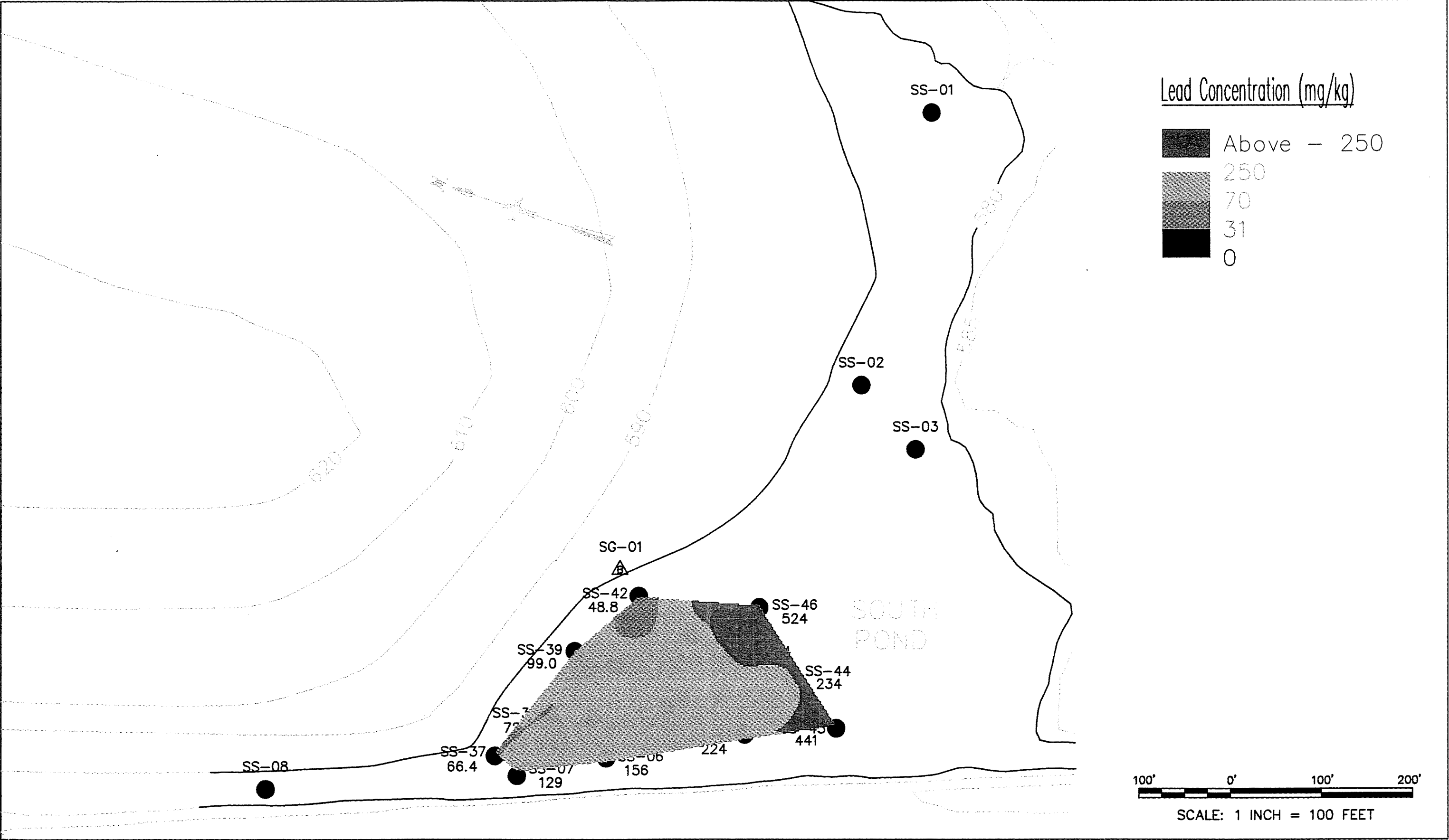
South Pond: Figures E-33 through E-54 in Appendix E show the distribution of select inorganic parameters detected in the South Pond at one foot increments. Compared to the North and Northeast Ponds, a fewer number of inorganic parameters were detected at concentrations exceeding NYSDEC site-specified sediment criteria. Analysis of samples collected from the sediment (0 to 2 feet) detected inorganic concentrations that exceed NYSDEC site-specified sediment criteria. With the exception of iron and nickel, inorganic parameters were below NYSDEC site-specified sediment criteria in samples analyzed below this depth. Iron and nickel are common inorganic parameters detected in native soils in Western New York. Concentrations of iron and nickel are well within the range of naturally occurring metals concentrations detected in Eastern U.S soils reported by Shackletter and Boerngen (1984) (viz., iron - 100 to 100,000 mg/kg and nickel - <5 to 700 mg/kg).

A summary of inorganic parameters detected at concentrations that exceed NYSDEC site-specified sediment criteria at each borehole location in the South Pond with depth is presented in Table 2-3. Since lead is the most frequently detected inorganic parameter to exceed NYSDEC site-specified sediment criteria in the South Pond sediment, lead concentrations have been used to determine the volume of sediment required to be removed based on sediment criteria established by the NYSDEC. The distribution of lead in the South Pond is presented on Figures 2-12 through 2-15.

2.3.4.5 Recommendations for Wetland Remediation

Recommendations for wetland remediation have been formulated based upon the sample results from the 1995 and 1996 wetland investigations. Since inorganic concentrations detected in the sediment layers (generally depths of 0 to 3 feet) exceed NYSDEC site-specified sediment criteria, the entire depth of sediment in the wetland areas should be removed. In addition, the native soils underlying the sediment have been contaminated to varying degrees. Therefore, removal of some of the native soils is also recommended. Specifically:

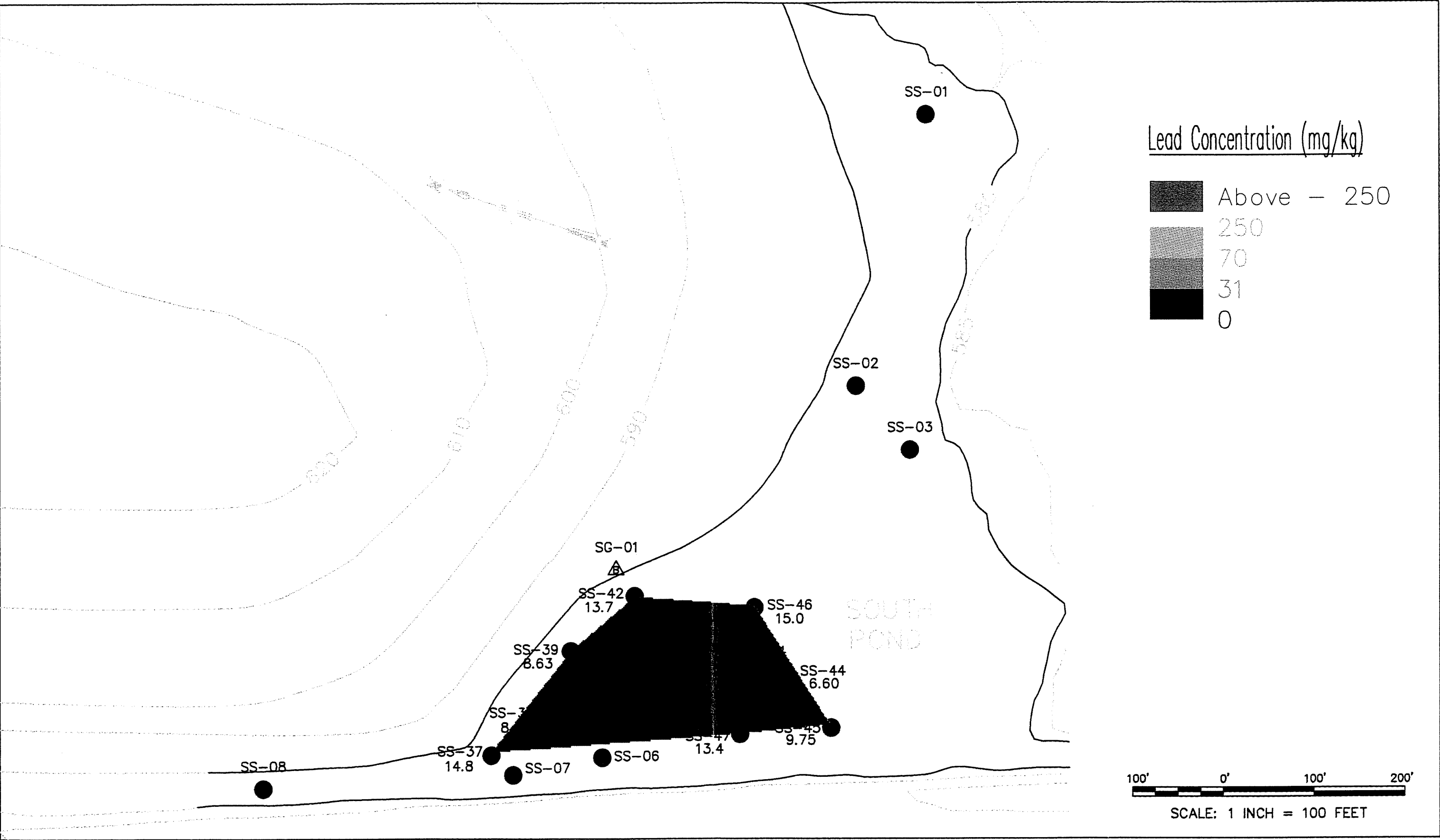
- For the Northeast Pond, samples collected at SS-29 and south of that sample location indicate that the sediment and upper portion of the native soil contain inorganic parameters at concentrations that exceed NYSDEC



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE2-13





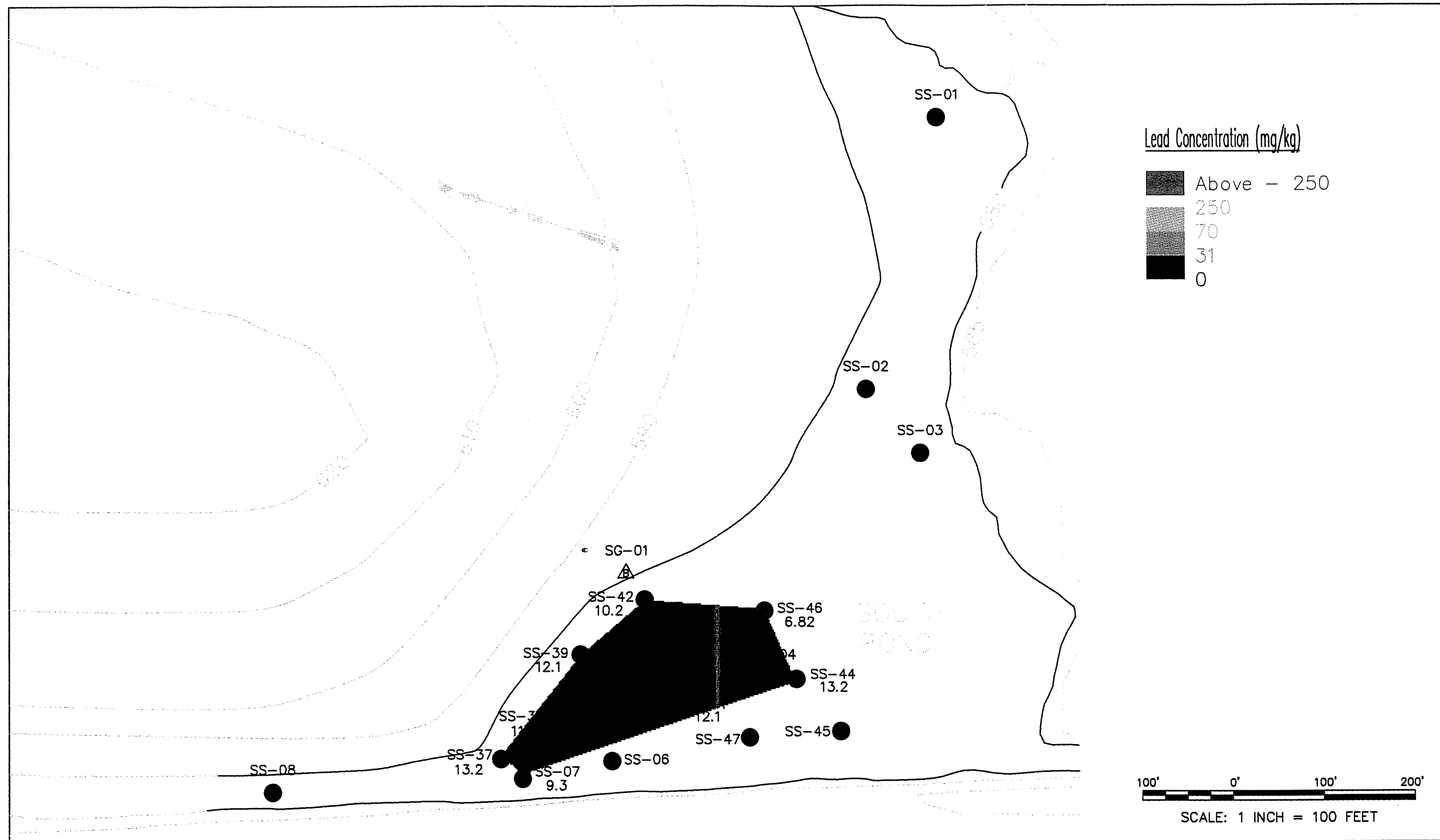
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

**MALCOLM
PIRNIE**

PB23S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
LEAD CONCENTRATION: 2 - 3 FEET
LTV STEEL

FIGURE 2-15



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

**MALCOLM
PIRNIE**

PB34S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
LEAD CONCENTRATION: 3 - 4 FEET
LTV STEEL

sediment criteria to a depth of four feet. For purposes of developing conservative estimates of the amount of material requiring removal, an additional 0.5 feet (a total of 4.5 feet) is planned for removal. Therefore, the estimated volume of sediment/soil to be removed in the Northeast Pond is 28,730 cubic yards.

- For the Northwest Pond, the upper three feet of sediment/native soil generally exceed NYSDEC sediment criteria. Levels of iron and manganese up to a depth of five feet exceed the selected cleanup levels in the portion of the pond south of sample location SS-35. For purposes of developing conservative estimates of the volume of material requiring removal, an additional 0.5 feet (5.5 feet total) is planned for removal. Therefore, the estimated volume of sediment/soil to be removed in the Northwest Pond is 27,550 cubic yards.
- For the South Pond, the upper two feet of sediment in the open water area exceed NYSDEC sediment criteria. For purposes of developing conservative sediment volume estimates requiring removal, an additional 0.5 feet of native soil (for a total of 2.5 feet) is planned for removal. Therefore, the estimated volume of sediment/soil to be removed in the open water area of the South Pond is 18,270 cubic yards.

The spacing of the samples in the South Pond was limited to the open water areas as it had been previously indicated by the NYSDEC that the vegetated areas containing emergent vegetation generally did not require excavation or covering. However, since sampling locations SS-42, SS-45 and SS-46 are still above the cleanup goals, additional sampling will be performed during the detailed design to better delineate the lateral extent of contamination.

Specifically, samples will be collected and analyzed at 12 additional locations to characterize the shallow pond sediments in the vegetated area of the pond located west of sample point SS-03. Sediment samples will be collected from the 0-1 foot interval using a ponar dredge sampler in accordance with the NYSDEC approved SWMFIP Field and Sampling Plan dated October 1993. Sediment samples will be analyzed for a site specific list of selected metals of concern: Antimony; Arsenic; Cadmium; Copper; Iron; Lead; Manganese; Mercury; Nickel; and Zinc. Results of the sediment sampling event will be presented in the Engineering Design Report. Based on the results of the previous sampling conducted in the pond, parameters exceeding cleanup goals occur in the upper 1-2 feet of sediment. The results obtained from this additional sampling event will be used to define the lateral extent of sediment that would be removed to a maximum depth of 2.5 feet within the vegetated areas.

3.0 REGULATORY AND POTENTIAL INVOLVED AGENCY ISSUES

Various regulatory and potential involved agency issues are described in the February 1966 Draft Focused Feasibility Study. Additional concerns are described in the project correspondence included in Appendix A.

4.0 EVALUATION OF REMEDIAL ALTERNATIVES

A final cover system has been constructed on the Marilla Street Landfill. The cover system serves to effectively minimize infiltration into and leachate generation within the waste fill materials in addition to eliminating the potential for contaminant migration via the overland flow migration pathway. The primary potential contaminant migration pathway involves the flow of shallow groundwater into the adjacent freshwater wetlands.

A portion of the waste materials disposed at the site are buried under saturated conditions and, as a result, the shallow groundwater table has been impacted. The contaminated groundwater discharges from the landfill into wetland areas along the southern, western and northern boundaries of the landfill. As a result, surface water quality in the adjacent wetlands is adversely impacted to some degree. However, since the contribution of water to the wetland area as a result of shallow groundwater flow is small (viz. less than 3 percent of the total surface water runoff - see Section 3.3.3 site water balance calculations in the October 1993 SWMFIP report, Malcolm Pirnie, October 1993) relative to the contribution of water due to surface runoff from the landfill, the potential for water quality impacts resulting from groundwater discharge into wetland areas is minimal. The contribution of water from the South Park ponds further reduces the potential for water quality impacts associated with the shallow groundwater discharge.

Sediment in the adjacent wetlands has also been impacted to a large degree as a result of site disposal activities. Waste fill is present in portions of the wetland areas. The presence of waste fill and contaminated sediment within the wetlands and the associated physiochemical interactions with the water column is the more likely source of surface water quality impacts within the wetland areas than the impacts resulting from groundwater discharge.

The wetlands located adjacent to the Marilla Street Landfill are considered valuable wildlife habitat. Since these wetlands have been adversely impacted as a result of site disposal activities, mitigation of on-going and/or potential wetland impacts was

the focus of the February 1996 draft Feasibility Study and remains the focus to this Addendum. Although the discharge of shallow groundwater into the wetlands is not considered a significant impact, and was not the focus of the March 1996 feasibility study and is not the focus of this Addendum, any reduction in the groundwater discharge which should be achieved through implementation of the identified alternative was factored into the evaluation of potential remedial alternatives.

4.1 REMEDIAL ACTION GOALS AND OBJECTIVES

Based upon the results of the SWMFIP investigations, regulatory and involved agency issues and the desires of LTV Steel Company, the remedial action objectives for the wetlands adjacent to the landfill have been revised to consist of the following:

- Project Schedule - Initiate the construction work as soon as possible in 1997 to maximize the potential to complete construction of the majority of the remedial construction activities during dry weather conditions.
- Maintain the existing wetland acreage.
- Perform remedial construction activities so as to minimize contact with and/or release of contaminated fill and sediments.
- Minimize the potential for recontamination of the wetlands by further minimizing the direct flow of contaminated groundwater from the landfill to the adjacent surface water bodies.
- Improve wildlife habitat adjacent to the wetlands.
- Maintain the aesthetic value of the site for potential future use as a public park or nature preserve.
- Mitigate any wetlands which are destroyed as a result of the remediation efforts on a 1:1 ratio.

4.2 IDENTIFICATION AND SCREENING OF REMEDIAL ALTERNATIVES

Eight potential remedial alternatives were identified in the February 1996 Focused Feasibility Study including:

- Alternative 1 - No Action.
- Alternative 2 - Limited Action.
- Alternative 3 - Wetland Filling/Off-Site Mitigation.
- Alternative 4 - Wetland Restoration/Hydraulic Dredging/Mechanical Dewatering/On-Site Disposal.
- Alternative 5 - Wetland Restoration/In situ Dewatering/Mechanical Excavation/On-Site Disposal.
- Alternative 6 - Wetland Restoration/In situ Solidification/Stabilization/Off-Site Mitigation.
- Alternative 7 - Wetland Restoration/In situ Sediment Containment with Soil/Bentonite Cover.
- Alternative 8 - Wetland Restoration/In situ Sediment Containment with Geocomposite Cover.

The effectiveness, implementability and cost of each alternative were evaluated in the February 1996 the Draft Focused Feasibility Study which concluded that the Wetland Restoration/In-Situ Sediment Containment with a Geocomposite Cover was the preferred remedial approach. A revised remedial approach; however, has recently been developed based upon concerns of the New York State Department of Environmental Conservation (NYSDEC) and U.S. Army Corps of Engineers (USACOE) in combination with the additional 1996 sediment sampling data described in Section 2.

4.2.1 Alternative 9: Hot Spot Excavation/On-Site Wetland Restoration No-Action

Description - Alternative 9 would involve excavating the contaminated sediment hot spots, disposing of the material on-site and restoration and improvement of the wetlands and adjacent upland areas. More specifically, this alternative would include the following:

- The wetlands would likely be drained to allow the sediments to dry to the maximum extent possible. The means and methods to accomplish this will be determined during construction. It is likely that the work will be performed in stages whereby each primary work area (the South Pond, the West Ditch, the North Ditch, the NE Pond and the NW Pond) will be drained separately. The water would be pumped to a downstream (of the site) location.
- Contaminated sediment hot spots as described in Section 2.3.4 would be excavated from the South Pond. The type of equipment utilized to perform the work would depend upon the degree of dewatering which is accomplished and the stability of the sediments under the weight of the equipment. Areas of the South Pond requiring excavation would be restored using 12-inches of clean soil overlain by three inches of loamy soil material.
- A recompacted clay barrier wall would be constructed along the South Pond/landfill interface to mitigate the possible migration of groundwater contaminants. The barrier wall would be approximately two feet wide and would key at least one foot into the underlying silty-clay native soils. The soil used to construct the wall would be compacted in 12-inch thick lifts to a minimum of 90 percent modified proctor density. The barrier wall will begin adjacent to Hopkins Street, extend along the South Pond/Landfill interface near the toe of the slope, across the West Ditch and end at the railroad embankment. The combination of the barrier wall and clay layer placed in the bottom of the West Ditch is anticipated to cutoff any groundwater flow from the landfill into either the South Pond or West Ditch.
- Existing vegetation would be cleaned from the West Ditch and the ditch reshaped to improve the open channel flow conditions. A 12-inch thick layer of compacted clay soils would be placed in the entire ditch bottom after it has been regraded. A filter fabric material would be placed above the clay layer to serve as a visual aid in the future should maintenance work need to be performed in the ditch. The fabric would act as a warning signal to maintenance personnel that the underlying clay layer should not be disturbed. A six-inch loamy soil layer would be placed above the fabric for the

restoration of vegetation. The West Ditch would be maintained as an open channel with emergent wetland vegetation. Refer to Section 4.3 for a description of the vegetation types to be re-established.

- Contaminated sediments/soils in both of the North Ponds would be excavated in a manner similar to that used in the South Pond. The depth of excavation is described in Section 2.3.4.5. The entire pond bottom would be covered with a 12-inch layer of clean soil followed by three-inches of loamy topsoil. Portions of the Northwest Pond where iron and manganese levels are above the selected cleanup levels will be excavated to a depth of 5.5 feet. Such excavation may require the installation of sheet piling along the northern toe of slope of the Clarifier Sludge Area to provide structural stability for the landfill slope.

A preferred less costly and more environmentally friendly alternative would be to carry the existing landfill cover system below the water level of the Northwest Pond and tie it into the 12-inch cover layer of soil which will be placed in the bottom of the pond after sediment excavation. This alternative will be evaluated further during the detailed design stage after soil borings and slope stability calculations have been completed on the north slope of the Clarifier Sludge Area.

- In lieu of off-site mitigation, the North Ponds would be utilized to incorporate the loss of wetlands in the West and North Ditches. This would be accomplished by creating islands of emergent vegetation.

The islands would be constructed of clean fill material which would be placed to a depth of approximately three inches below the average water level of the ponds. Three inches of loamy soil will be placed on top of each island to establish a root zone for vegetation. The islands would be planted as described in Section 4.3.2.

- The North Ditch would be cleaned, regraded and lined in the same manner as the West Ditch.
- Since the wetland area north of the Tiff Street bridge is naturally connected to the North East Pond, it will be included in the wetland restoration plan even though certain contaminant constituents (e.g., Mercury) are present in the LTV Steel wetlands and appear to have originated from other adjacent properties. That wetland pocket will be excavated to the depth described in Section 2.3.4.5 and covered with 12-inches of clean soil and 3-inches of loamy topsoil. Ownership of this wetland area is currently being evaluated. It is believed to be owned by the City of Buffalo.

loamy topsoil. Ownership of this wetland area is currently being evaluated. It is believed to be owned by the City of Buffalo.

- As described in the October 1, 1996 letter to the NYSDEC (see Appendix A), the wetland area beneath the Tiffit Street Bridge has been filled with debris associated with the bridge reconstruction work. The underlying sediment/soil is likely contaminated in a similar manner as the remainder of the NE Pond. The sediment would be removed in a similar manner and to the same approximate depth as the sediment in the NE Pond assuming that the NYSDOT removes the bridge debris prior to the start of the wetland remediation work. Ownership of this area is also being evaluated by LTV Steel since it is believed to be owned by the City of Buffalo.
- All vegetation, debris and contaminated sediment/soil excavated from the wetlands would be disposed of on-site beneath the existing cover system. Excavated materials would be loaded onto trucks for transport to the top of the miscellaneous debris area, where it would be disposed of in a bermed, unlined disposal area. The existing cover system would first be stripped and stockpiled for later use in replacing the final cover system upon completion of the wetland excavation activities. The impoundment would then be constructed on top of fill material. Perimeter berms would be constructed of off-site fill materials. The porous nature of the slag fill on the bottom of the basin would aid in dewatering the sediment and waste materials. The solids content of the excavated sediment material is uncertain and would be highly dependent upon the contractor's construction methods and weather conditions during construction. Stabilization of the material with soil, cement or some other agent during or immediately after placement in the basin may be necessary.

After the basin contents have been stabilized, the disposal area would be covered with an 18-inch thick clay layer and 12-inches of topsoil (the same as the current cover system design).

Effectiveness - Alternative 9 will effectively reduce potential exposure of wildlife to contaminated sediments by covering any remaining contamination in-place. Also, the cutoff wall located along the South Pond/Landfill interface along with the clay layers in the West and North Ditches should minimize the volume of groundwater that would infiltrate into the wetland areas from the adjacent landfill. The clean fill material utilized in the open water areas will also reduce the permeability of the sediment layer.

Implementability - The hot spot excavation/on-site wetland restoration alternative can readily be implemented. Conventional construction techniques can be utilized; however, wet weather conditions during construction could slow down construction progress. A two-year construction period may be necessary.

Cost - The estimated capital cost for Alternative 9, including engineering and contingencies is \$3,851,000 (see Appendix G). The operation and maintenance cost associated with annual site mowing, maintenance of cover soils, sediment and water quality monitoring and other items as described in the Maintenance and Monitoring Plan in Section 6.0 has been estimated at \$54,560.00 per year. The total present worth of Alternative 9 (assuming 8 percent interest over 30 years) is \$4,520,900.00.

Conclusion - Alternative 9, Hot Spot Excavation/On-Site Wetland Restoration achieves the remedial action goals and objectives and provides an approach for site remediation which incorporates remediation/restoration concepts developed by the NYSDEC, ASIC and LTV Steel Company.

4.3 VEGETATION RESTORATION AND ENHANCEMENT

Implementation of Alternative 9 would require wetland restoration following sediment remediation. The purpose of wetland restoration would be three-fold: to stabilize and trap sediments, improve water quality, and create increased wildlife habitat for upland and water-dependent species. The West Ditch would provide a vegetated wetland corridor to link the North and South Ponds.

Wetland plant species selected for site restoration would meet the following criteria:

- Be a native species indigenous to the area.
- Provide wildlife value (i.e., nesting site, food, cover).
- Have a shallow root system to protect the integrity of the landfill cap.

- Have a low growth pattern so as not to obstruct the scenic vistas of Lake Erie
- Be resistant to weather extremes typical of landfill habitats i.e., temperature extremes, droughty conditions, prevailing winds.

In addition to proposed plant species, planted upland areas will be seeded with annual rye grass at an application of 15 pounds per acre. Rye grass will not only stabilize the soils, but will also help to control soil temperature and moisture until slower germinating seed mixtures and transplants can be established. The following is a description of the vegetation restoration or enhancement concept for the wetland areas and adjoining landfill site.

4.3.1. West Ditch Plantings

Remediation of the West Ditch requires a minimum of 12-inches of recompact clay-type soil followed by six-inches of topsoil. Placement of 18-inches of cover material across the width of the ditch would decrease the wetland area by approximately 0.69 acres. This loss would be mitigated by creating islands of emergent wetlands in the North Ponds. This wetland area aeration plan is described in detail in Section 4.3.2.

The bank between the east side of the ditch and the toe of the landfill would consist of areas planted with a mixture of shrubs and open areas. Three randomly spaced shrub areas ranging in size from 400 to 600 feet long and 20 to 25 feet wide would provide sufficient cover along this side of the ditch for wildlife. Shrubs would be planted in three alternating rows along an eight foot grid. A typical planting would consist of approximately 31 shrubs per 100 feet. Shrub species considered appropriate for revegetation along the West Ditch banks are provided in Table 4-2. The planting of these shrubs would increase the diversity of the habitat created and provide additional food sources for wildlife.

A seed mixture comprised of northern wildflowers and grass mixture would be planted between the shrub areas. The application rate of the seed mixture would be 12 ounces flower seed, 4 pounds of legumes and 42 pounds of grass seed per acre. This seed mixture includes fast growing grasses and native and naturalized pasture wildflowers. Components of the seed mix are provided in Table 4-3.

**TABLE 4-2
LTV STEEL COMPANY
MARILLA STREET LANDFILL**

***SHRUB SPECIES RECOMMENDED FOR REVEGETATION OF
THE WEST AND NORTH DITCH***

Common Name	Scientific Name
Red Osier Dogwood	<i>Cornus stolonifera</i>
Silky Dogwood	<i>Cornus amomum</i>
Elderberry	<i>Sambucus canadensis</i>
Arrowwood	<i>Viburnum recognitum</i>
Tatarian Honeysuckle	<i>Lonicera tatarica</i>
Staghorn Sumac	<i>Rhus typhina</i>
American Cranberry	<i>Viburnum trilobum</i>
Streamco Willow	<i>Salix purpurea</i>

**TABLE 4-3
LTV STEEL COMPANY
MARILLA STREET LANDFILL**

WEST AND NORTH DITCH SEED MIXTURE

Common Name	Scientific Name
Red Fescue	<i>Festuca rubra</i>
Annual Ryegrass	<i>Lolium multiflorum</i>
Queen Anne's lace	<i>Daucus carota</i>
Yarrow	<i>Achillea millefolium</i>
Daisy	<i>Chrysanthemum leucanthemum</i>
Smartweed	<i>Polygonum pensylvanicum</i>
Red top	<i>Agrostis alba</i>
Bird-foot trefoil	<i>Lotus corniculatus</i>
New England Aster	<i>Aster novae-angliae</i>
Black Eyed Susan	<i>Rudbeckia hirta</i>
Dame's Rocket	<i>Hesperis matronalis</i>

Planting along the west side of the ditch would consist of a mixture of cattails and grass. Three broad-leaf cattail (*Typha latifolia*) areas ranging in size from 400 to 650 feet long and 4 to 6 feet wide would be planted across from the open areas on the east side of the ditch. Cattails would be planted on a 3-foot grid. The seed mixture of northern wildflowers and grasses used on the east bank would be planted between the cattails.

4.3.2 North Ponds

Following excavation of contaminated sediments in the North Ponds as described in Section 4.2.1, 0.5 acre islands will be created in each of the ponds to compensate for the loss of one acre of wetland lost along the perimeters of the West and North ditches. These islands would be designed to maintain emergent as well as grass/sedge wetland. The islands will be constructed using clean, off-site fill material. A three-inch thick layer of loamy soil will be placed over the top of the islands to create a root zone for the re-establishment of wetland vegetation. Broad-leaf cattails would be planted in the following area:

- Around the perimeters of the ponds where the water level is 18 inches or less. For the purpose of estimating the restoration costs for this study, it was assumed that a 15-foot wide fringe of vegetation would be planted at the perimeter of each pond.
- Around the perimeter of each island where the water level is 12 inches or less. For the purpose of estimating the restoration costs for this study, it was assumed that a 15-foot wide fringe of vegetation would be planted at each island.

The remaining portions of the islands would be planted with a mixture of native grass and sedge species/wetland hummock mixture at a rate of 3.25 pounds per acre. Since these native seeds are slow to germinate, the area would be interplanted with bare root transplants on a four-foot grid to facilitate growth. The wetland hummock seed mixture and potential transplant species are provided in Table 4-4. In addition, 200 randomly spaced spatterdock (*Nuphar lutes*) plants would be planted in the open water areas of each pond.

All plants identified in Table 4-4 are native perennial plants commonly found in Western New York. The mixture is readily available and is produced from hand collected

**TABLE 4-4
LTV STEEL COMPANY
MARILLA STREET LANDFILL**

WETLAND HUMMOCK PLANTING FOR NORTH POND ISLANDS

Common Name	Scientific Name
Seed Mixture:	
Fox Sedge	<i>Carex vulpinoidea</i>
Rice Cut Grass	<i>Lersia oryzoides</i>
Sedge	<i>Carex lurida</i>
Fringed Sedge	<i>Carex crinita</i>
Soft Rush	<i>Juncus effusus</i>
Dark Green Bulrush	<i>Scirpus atrovirens</i>
Wool Grass	<i>Scirpus cyperinus</i>
Sedge	<i>Carex comosa</i>
Bladder Sedge	<i>Carex intumescens</i>
Bare Root Transplants:	
Blueflag	<i>Iris versicolor</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Fringed Sedge	<i>Carex crinita</i>
Bladder Sedge	<i>Carex intumescens</i>
Soft Rush	<i>Juncus effusus</i>
Giant Burreed	<i>Sparganium eurycarpum</i>

seeds. This mix will compete effectively against phragmites and purple loosestrife if it has a chance to establish. Purple loosestrife and phragmites do not compete well with cover and also do not grow well from seed. To ensure that phragmites and loosestrife do not become established, the following precautions will be taken:

- Only clean soil (i.e., free of rhizomes) will be used in the wetland areas.
- The wetlands will be seeded immediately after the remediation activities are complete.
- For the first five years, weeding will be conducted in the wetland areas to remove any phragmites or loosestrife that may have germinated.

If these measures are taken, the seed mix with the bare root transplants will have time to become established and provide the cover necessary to effectively compete with phragmites and purple loosestrife.

4.3.3 South Pond

Remediation of the south pond may result in the loss of wetland vegetation, depending upon the results of the additional sampling as discussed in Section 2.3.4.5. To enhance the open water portion of the wetland, 50 randomly spaced spatterdock plants will be planted. In any areas of the South Pond where existing vegetation is removed as a result of the proposed testing, a one-time planting of cattails on a 3-foot grid system will occur to restore the disturbed areas.

The vegetated area of the South Pond is currently dominated by cattails. However, phragmites and purple loosestrife have invaded the pond edges. Removal of the cattails to excavate the underlying sediments will increase the likelihood that seeds and rhizomes from other species that are present in and around the pond may eventually re-establish themselves laterally. As a result, an intensive and costly annual maintenance program in the South Pond is not warranted.

4.3.4 North Ditch

Remediation of the North Ditch is likely to require a minimum of 12 inches of recompacted clay-type soil followed by six inches of topsoil. Placement of 18 inches of cover material would result in decreasing the wetland area by 0.31 acres. This loss would be mitigated by creating islands of emergent wetlands in the North Ponds. This wetland creation is described in detail in Section 4.3.2.

The landfill toe of slope would also be planted with a mixture of shrubs and open areas. Two 500-foot long by 25 feet wide randomly spaced shrub areas would provide sufficient cover along this side of the ditch for wildlife. Shrubs would be planted in three alternating rows along an eight foot grid. A typical planting would consist of approximately 31 shrubs per 100 feet. Shrub species considered appropriate for revegetation along the North Ditch banks are provided in Table 4-2. The planting of these shrubs would increase the diversity of the habitat created and provide additional food sources for wildlife.

A seed mixture comprised of northern wildflowers and grasses would be planted between the shrub areas. The application rate of the seed mixture would be 12 ounces flower seed, 4 pounds legumes and 42 pounds of grass seed per acre. This seed mixture includes fast growing grasses and native and naturalized pasture wildflowers. Components of the seed mix are provided in Table 4-3.

Planting along the north side of the ditch would consist of a mixture of cattails and grass. Two 500-foot long by 4 feet wide cattail areas would be planted along the north side of the ditch. Cattails would be planted on a 3 foot grid. The seed mixture of northern wildflowers and grasses used on the north bank would be planted between the cattails.

4.3.5 Upland Enhancement

In addition to the wetland restoration, LTV Steel is proposing to enhance adjoining upland areas to increase biodiversity. These measures would likely include the following.

- The landfill site is currently mowed on a regular basis, consequently habitat is limited. To increase habitat diversity, the landfill can be mowed annually to provide an open field habitat attractive to grassland bird species, small mammals and raptors, while controlling the establishment of woody

vegetation. Mowing annually during late fall is preferred as it would allow ground-nesting species to nest and raise young undisturbed. In addition, grasses and forbs will form seeds to generate the next season's plants, which are an important food item for native and migratory birds and small mammals.

- Placement of nesting boxes around the perimeter of the landfill. Clusters of three boxes would be placed every 500 feet. This would provide nesting sites for birds such as tree swallows, eastern bluebirds, and wrens.
- Placement of 10 randomly spaced brush or rock piles on the landfill. These would provide cover for wildlife such as cottontail rabbits, small mammals, songbirds, and reptiles.

5.0 DETAILED ANALYSIS OF ALTERNATIVES

This section presents a detailed analysis of Remedial Alternative 9 with respect to six criteria. The following 6 criteria provide a basis of comparison and ranking of Alternative 9 relative to the remedial alternative evaluated in the February 1996 Focused Feasibility Study:

Short-Term Impacts and Effectiveness - This criterion evaluates the effectiveness of alternatives in protecting human health and the environment during construction and implementation of the remedial action. Short-term effectiveness is assessed by protection of the community, protection of workers, environmental impacts, and time until protection is achieved.

Long-term Effectiveness and Permanence - This criterion evaluates the long-term protection of human health and the environment at the completion of the remedial action. Effectiveness is assessed by magnitude of residual risks, adequacy of controls in managing treatment residuals or untreated wastes that remain at the site, reliability of controls against possible failure, and potential to provide continued protection.

Reduction of Toxicity, Mobility and Volume - This evaluation criterion addresses the statutory preference for selecting remedial actions that permanently and significantly reduce constituent toxicity, mobility, or volume. This preference is satisfied when the treatment used destroys toxic constituents, irreversibly reduces constituent mobility, or reduces total volume of impacted media.

Implementability - This assessment evaluates the technical and administrative feasibility of implementing the alternative and the availability of services and materials.

Overall Protection of Human Health and the Environment - This assessment determines if a remedial alternative provides adequate protection and describes how risks

from each pathway are eliminated, reduced, or controlled. This evaluation considers any unacceptable short-term or cross-media impacts from an alternative.

Cost - This criterion evaluates the estimated capital, long-term operation and maintenance, and monitoring costs.

Refer to the February 1996 Focused Feasibility Study for a discussion of Alternatives 1 through 8.

5.1 ANALYSIS OF ALTERNATIVE 9

5.1.1 Alternative 9 - Hot Spot Excavation/On-site Wetland Restoration

This alternative would involve draining the wetland areas and allowing the remaining sediments to dry until such time as they could be excavated. A discussion of the evaluation criteria for this alternative follows.

Short-Term Impacts and Effectiveness - Construction of this alternative would be of longer duration than some of the other alternatives due to the time involved in draining the wetlands sufficiently to work in and because of the time involved with excavating and hauling of materials. This would result in a longer period of loss for wildlife habitat. Also, there is the potential for increased fugitive dust during construction; although this is manageable through conventional construction monitoring. There will be an increase in noise levels during construction activities due to the increased truck traffic from hauling soil to and from the Site and equipment use on-site. Site workers may be subjected to increased chemical exposure during excavation of the sediments. These risks may be properly managed through personal protective equipment, site monitoring, and/or control measures.

This alternative would become effective immediately after excavation activities are complete and the geocomposite liner is in place.

Long-Term Effectiveness and Permanence - Implementation of this alternative would reduce impacts to the wetland areas by removing the most serious hot spots of contamination and by containing any lesser contamination in place. The clean fill and clay layers would reduce the permeability of the sediment layer and thereby would minimize the volume of shallow groundwater discharging to the wetland areas. The clay cutoff wall would also serve as a permanent impediment to groundwater discharge to the South Pond.

Implementability - This alternative is readily implementable.

Reduction of Toxicity, Mobility, or Volume - This alternative would reduce groundwater toxicity through the reduced flow of shallow groundwater to the wetland areas. The mobility of the contaminants would be greatly reduced as a result of the clean fill that will be placed in the excavated areas and the clay barriers which will be placed in the ditches. The wetland islands to be constructed in the North Ponds will also cover the underlying sediments and reduce mobility. Mobility will be further reduced through the re-establishment of wetland vegetations.

Overall Protection of Human Health and the Environment - The environmental risk assessment indicated potential concerns associated with long-term exposure to contaminants in the sediment and with the pH of the surface water in the wetlands. This alternative alleviates these concerns by removing the most contaminated sediment, by minimizing the flow of shallow groundwater into the wetland areas and by minimizing the mobility of the remaining sediments through the placement of cover soils.

Costs - The estimated construction cost of the Hot Spot Excavation/On-site Wetland Remediation alternative (Alternative 9) is \$3,851,500 which is approximately mid-range of all the alternatives which were evaluated.

5.2 RECOMMENDED REMEDIAL ALTERNATIVE

After extensive discussions between LTV Steel, the NYSDEC and the USACOE followed by a detailed analysis of remedial alternatives, the recommended remedial approach for the Marilla Street Landfill is Alternative 9: Hot Spot Excavation/On-site Wetland Restoration. This alternative meets all of the remedial action goals and objectives. It can:

- Be implemented in 1997.
- Maintain the existing wetland acreage
- Minimize contact with contaminated fill and sediments.
- Minimize the potential additional contamination of the wetlands by controlling the flow of potentially contaminated shallow groundwater from the landfill to the wetland areas.
- Improve wildlife habitat.
- Maintain the aesthetic value of the site.

This alternative also achieves these goals in a cost affordable manner.

5.2.1 Groundwater Remediation

Field measurements of the shallow groundwater table within the fill material generally exhibit a pH greater than 12.5, which is the regulatory threshold per 6NYCRR, Part 371 for classification as a corrosive hazardous waste. Based upon the findings of high pH in some of the wells, the site was reclassified to a Class 2 site in 1995. The pH of groundwater in deep overburden wells is almost neutral, while the bedrock wells are slightly acidic. The elevated pH in the shallow wells has been demonstrated to be due to the large quantities of highly alkaline slag buried within the landfill.

It has been demonstrated that the flow of shallow groundwater from the fill area (landfill) is intercepted by a discharge zone in the wetland directly contiguous to the landfill.

However, no groundwater remediation is proposed for the final selected remedial alternative for the following reasons:

- The estimated volume of groundwater discharge from the landfill to the wetlands is minor compared to the runoff from the landfill surface and off-site flows from the South Park ponds.
- The shallow groundwater discharge has been minimized by the landfill cover system which has reduced hydraulic gradients along the groundwater flow path.
- The landfill cover system has virtually eliminated the potential for future contaminated surface water run-off from entering the wetlands.
- The construction of a recompacted clay barrier wall, which will be keyed into the underlying silty-clay soils along the South Pond/landfill interface should mitigate possible migration of contaminated groundwater to the pond. The wall will be extended across the West Ditch.
- The West and North Ditches will be lined with a 12-inch clay layer followed by three-inches of loamy soil. These soil layers are expected to reduce contaminated groundwater migration into the wetland drainage system. The clean soil layers to be placed in each of the ponds after hot spot sediment removal are also expected to reduce groundwater migration. The cover for the ponds and ditches would overlap the existing landfill cover system.
- There are no potable groundwater wells within the vicinity of the site which could be impacted by the groundwater flow.

Long-term monitoring at the site, as described in the Post-Closure Monitoring and Maintenance Plan will determine the effectiveness of the remedial actions. Should it be determined that the shallow groundwater table is impacting the wetlands at some point in the future, further remediation may be required.

5.3 IMPLEMENTATION SCHEDULE

The NYSDEC has indicated that a Record-of-Decision (ROD) must be prepared by the Department for this project prior to construction implementation. The ROD would set forth the selected remedial action plan for the site in accordance with the Comprehensive

Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the New York State Conservation Law (ECL). The ROD will take approximately four to five months to prepare.

Bid and award of the project can proceed only after issuance of the ROD. Construction begins shortly thereafter.

Construction is anticipated to begin by May 1997 and take two construction seasons to complete. LTV Steel Company has agreed to budget funds for the construction effort and is anxious to proceed with the project.

The following project Schedule is anticipated:

LTV STEEL COMPANY MARILLA STREET LANDFILL	
<i>WETLANDS MITIGATION - PROJECT SCHEDULE</i>	
TASK	COMPLETION DATE
Submit focused Feasibility Report Addendum to NYSDEC for review.	11/96
NYSDEC to issue Proposed Remedial Action Plan.	1/97
30% Submittal of Design/Specifications	2/97
NYSDEC issues ROD.	3/97
Remedial Action Order on Consent Signed.	3/97
Prepare Final Design/Specifications	3/97
Bid/Award	4/97
Initiate Construction	5/97
Construction Complete	11/98

6.0 POST-CLOSURE MONITORING AND MAINTENANCE PLAN

A draft Post-Closure Monitoring and Maintenance Plan is included as Appendix H. The Plan has been prepared to describe proposed monitoring and maintenance activities to be performed at the site following completion of the wetland remediation work. A final report will be issued as a separate document after NYSDEC review comments have been received.

APPENDIX A
RELATED PROJECT CORRESPONDENCE

October 1, 1996

Mr. Martin Doster, P.E.
NYS Dept. of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

Re: Marilla Street Landfill
Wetlands Remediation

Dear Mr. Doster:

During wetland investigation and sediment sampling activities at the Marilla Street Landfill site, construction debris (e.g., concrete, rubble, tires, rebars, etc.) was observed on the bottom of the Northeast Pond immediately below and adjacent to the Tiftt Street Bridge. Conversations with the New York State Department of Environmental Conservation (NYSDEC) have indicated that the Department of Transportation (DOT) was issued a permit amendment by the NYSDEC to place temporary fill in the wetlands as part of the bridge work.

The purpose of this letter is to notify you that some of the debris is still present. The area does not appear to have been restored to "pre-work conditions".

As requested, Malcolm Pirnie recently attempted to sample the underlying sediment during recent sediment sampling program at the site but was unable to do so. The water level was too shallow for the boat mounted drill rig and hand augering was ineffective due to the hard, compacted nature of the fill material. We will characterize the material in the area upon removal of the construction debris to determine if the underlying sediment requires remediation. We therefore request that the NYSDEC contact the DOT to enforce the conditions of the permit requiring the removal of the fill material (see permit condition No. 9 in the October 12, 1995 permit amendment, DEC No. 9-1402-00724/0001-0).

Mr. Martin Doster, P.E.
270 Michigan Avenue

October 1, 1996
Page 2

Please feel free to contact us if you have any questions.

Very truly yours,

MALCOLM PIRNIE, INC.

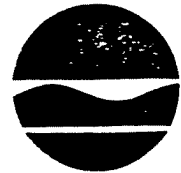


Kent R. McManus, P.E.
Senior Associate

c: W. Gould, LTV
D. Papajcik, LTV
J. Etchison, LTV
S. Doleski, NYSDEC
J. Dietz, NYSDEC
K. Roblee, NYSDEC
Capt. D. Schultz, Region 9 Law Enforcement
G. McDannell, USACOE

0848-258
plb/KRM10016.L1

New York State Department of Environmental Conservation
270 Michigan Avenue, Buffalo, New York 14203-2999
(716) 851-7220



Michael D. Zagata
Commissioner

September 17, 1996

Mr. John Etchison
LTV Steel Company
Corporate Environmental Department
3100 East 45th Street
Cleveland, Ohio 44127

Dear Mr. Etchison:

Republic Steel/ LTV Site # 915047
Buffalo(C), Erie County

This letter will clarify the Department's understanding of items discussed in your letter of August 12, 1996 [*Etchison to Walia*], and meetings held on August 2, 1996, and September 6, 1996, which included representatives of New York State Department of Environmental Conservation (NYSDEC), LTV, Army Corps of Engineers (ACOE), Malcolm Pirnie and the City of Buffalo (August 2, 1996). The agreements reached at the meetings can be summarized as follows:

1. The vegetated areas in the South Pond containing emergent vegetation in general do not require excavation or covering. The actual delineation of excavation areas will be defined by further sampling as outlined by Malcolm Pirnie.
2. The barrier wall along the South Pond/landfill interface will be extended to enclose the West Ditch to mitigate the possible migration of contaminants.
3. The West Ditch will be maintained as an open channel with emergent wetland restoration after covering the contaminated sediments with 12 inches of clay. The ditch will be replanted and maintained as emergent growth with an open channel. Filter fabric or some other mechanism will be used to determine the contaminated soil/clay interface.

4. At a minimum, the sediments exceeding the following concentrations will be considered "Hot Spots" subject to excavation. Areas requiring excavation will be restored using 12 inches of clean soil barrier overlain by 6 inches of topsoil. In the open water, only 3 inches of topsoil may be used.

Metal	Remedial Action Objective (ug/g - ppm) **
Antimony	6
Arsenic	18
Cadmium	1.8
Chromium	78
Copper	48
Iron	3 %
Lead	70
Manganese	780
Mercury	0.20
Nickel	33
Zinc	195

** Except for iron, all concentrations in ppm

5. The excavation of the pond sediments will be done under dry conditions instead of dredging.
6. In lieu of off-site mitigation, the north ponds are to be expanded to incorporate the loss of wetland in the West Ditch. This expansion will be enhanced by creating islands of emergent vegetation.
7. The wetland area north of the Tift Street bridge is naturally connected to the north ponds and if contamination is found to be present from the LTV property, it must be included in the proposed wetlands restoration plan. LTV agreed to review this matter and include in the sampling plan scheduled for September 1996.

8. The proposed Maintenance and Monitoring Plan will be expanded to include sediment quality monitoring and maintenance of the cover soils. In addition, an Ecological Assessment will be required on a periodic basis to monitor the health of the wetland. The objectives of the monitoring program include insuring that the work performed complies with design specifications as they pertain to fish and wildlife resources, evaluating the efficacy of the remedial actions in minimizing risk to fish and wildlife, and determining the effectiveness of remedial measures over time.

A. Design Compliance

On-site inspection and evaluation should be done to insure the implementation complies with design specifications. The monitoring program should include criteria for evaluating results. Monitoring of biological populations may be needed to insure that construction is not affecting biota. Frequent inspections of erosion control devices will be required, and sampling of soil, water, or sediments may be necessary. An acceptable program must be completed before the remedial design is carried out. If monitoring results do not meet criteria, the design and methods should be re-evaluated and/or corrective action taken.

B. Remedial Action Effectiveness

Monitoring techniques to insure that the remedial action is effective in minimizing the risk from site-related contaminants to fish and wildlife may include: sampling media (water, sediment, soil, etc.), sampling tissue, toxicity testing, biomonitoring, or monitoring trends in population density or community diversity.

In the case of habitat restoration or replacement, long-term evaluation of communities may be necessary to insure that there is adequate compensation for lost resources. Long-term sampling schedules and evaluation criteria must be established. If monitoring indicates that criteria have been exceeded, the remedial measures must be re-evaluated and/or corrective action taken.

9. The landfill areas will be managed as tall grass habitat under a reduced mowing schedule to provide habitat for grassland nesting bird species.
10. LTV will incorporate a conceptual design of a green way trail which will link South Park with the waterfront as well as using the landfill/wetland area for public use and enjoyment.

11. This office has agreed to the following schedule for the upcoming events is as follows:

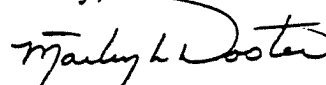
9/96 Pond sediment sampling
10/96 Final Feasibility Study Report
12/96 NYSDEC issue Proposed Remedial Action Plan
2/97 NYSDEC issue Record of Decision
3/97 Remedial Design/Remedial Action Order on Consent Signed
3/97 Design Submittal
5/97 Start construction

In summary, this letter attempts to clarify the major issues discussed over the past few months to set the stage for additional work to be performed this year with the goal of completing construction of the remedial work in 1997. It is understood that many minor points are to be left to design such as soil specifications, construction techniques, dewatering mechanisms, etc.

I would ask that after you have reviewed this letter, please respond in writing with the anticipated action/submittal dates. If there are questions or clarification is necessary, I encourage you to contact Mr. Jaspal Walia or myself at (716) 851-7220.

It has been a pleasure working with you on this complex and crucial environmental restoration project and I look forward to completing the tasks at hand to bring this project to a successful end.

Sincerely,



Martin L. Doster, P.E.
Regional Engineer - Environmental
Remediation

MLD:sz

cc: Mr. Ken Roblee - NYSDEC, Division of Fish and Wildlife
Mr. Gary McDannel - US Army Corps of Engineers
Mr. Terry Ried - Malcolm Pirnie
Mr. David Sengbusch - City of Buffalo

August 12, 1996

Mr. Jaspal Walia, P.E.
NYSDEC
270 Michigan Avenue
Buffalo, NY 14203

Re: Marilla Street Landfill

Dear Mr. Walia:

We have reviewed your July 24, 1996 comments regarding the Draft Focused Feasibility Study for the Marilla Street Landfill wetlands. As a result of those comments and discussions in our August 2, 1996 project meeting, LTV Steel has revised the wetland remediation approach. The revised remedial approach will consist of the following:

- Delineate contaminant hot spots within the South Pond, NE Pond and NW Pond through a detailed sampling program (see Attachment A).
- Prepare a detailed topographic survey of the wetlands to determine bottom contours, water depths and sampling locations.
- Based upon the results of the sampling program, prepare a site excavation/dredging plan to remove contamination hot spots.
- Excavate/dredge contaminated sediments from the open water area of the South Pond and both northern ponds. The vegetated area of the South Pond will not be disturbed.
- Dispose of sediments on-site beneath the existing final cover system. This will be accomplished by:
 - Stripping and stockpiling a portion of the existing final cover system soil within the Miscellaneous Debris Area.
 - Constructing soil berms around the perimeter of the stripped area.
 - Disposing of sediment within the bermed area. The sediment is expected to dewater by gravity. The addition of portland cement or other solidifying agent may be required to enhance dewatering.

Mr. Jaspal Walia, P.E.
NYSDEC

August 12, 1996
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- Cover the open water area of the South Pond and the entire pond bottom of both northern ponds with a 12-inch thick layer of clean off-site soil material to create a physical barrier.
- Construct a groundwater barrier (e.g. compacted clay soil or soil/bentonite) connecting the cover system barrier layer to the existing native silty-clay layer along the landfill toe of slope of the northern perimeter of the South Pond to minimize the potential for shallow groundwater to enter the pond from the adjacent fill.
- Remove vegetation and regrade the North Ditch. Cover the entire ditch with an 18-inch thick recompacted soil layer and six inches of topsoil.
- Remove vegetation and regrade the West Ditch. Fill the ditch with off-site soil material (most likely a recompacted clay-type soil) followed by six inches of topsoil. A concrete-lined open channel consisting of pre-cast concrete sections, cable concrete or possibly a grout-filled erosion control mat would be placed in the ditch to serve as an open conduit for water flow between the South and NW Pond.
- Re-vegetate both ditch areas with upland wetland plant and shrub species to increase the diversity of habitats created and provide food sources for wildlife.
- Perform off-site wetland mitigation on a one-to-one ratio as necessary for any wetland areas eliminated by the remediation efforts.

The details of the revised remedial approach will be presented in a Focused Feasibility Study (FFS) Report Addendum to be submitted to the NYSDEC for review.

The following responses refer to the Department's July 24, 1996 review comments:

Comment 1: Please forward any available documents regarding Phragmites and liner integrity at the Marathon Battery site so that we can be sure that the proposed liner would not fail.

Response 1: Data is currently being collected and will be provided to the NYSDEC as part of the FFS Report Addendum.

Comment 2: It is the Department's position that fully understanding the wetland monitoring requirements will directly affect the selection of the remedy.

Mr. Jaspal Walia, P.E.
NYSDEC

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Page 3

Therefore, the monitoring requirements must be evaluated in the Feasibility Study.

Response 2: An outline of the proposed post-closure monitoring requirements, including wetland monitoring requirements, is presented in Attachment B. Details will be presented in the FFS Report Addendum.

Comment 3: *The quality of the habitat at the South Pond and its proximity to South Park justify protection of this habitat. NYSDEC does not believe that this habitat can be replaced, if removed, at the original location or elsewhere at the site. If extensive capping of the South Pond results in the loss of the emergent marsh and open water habitat mix that is there presently, then the partial excavation of contaminated sediments (hot-spots) is required as a remedy for that portion of the site. The contaminant levels are below or only slightly above DEC sediment guidance levels at many sample points within this pond. Measures will have to be taken to preclude leachate or contaminated groundwater from entering the pond from the adjacent fill under this area.*

Response 3: The proposed sediment sampling plan enclosed as Attachment A describes how the lateral and vertical extent of hot spots will be determined. Only the open water area of the South Pond will be sampled and remediated. Following excavation/dredging of the sediment, a twelve-inch layer of clean off-site soil material will be placed over the excavated area to create a physical barrier between the remaining sediments and wildlife. A groundwater barrier (e.g., compacted clay soil or soil/bentonite) connecting the cover system barrier layer to the existing native silty-clay layer will be constructed along the landfill toe of slope adjacent to the south pond to minimize the potential for shallow groundwater to enter the pond from the adjacent fill area.

Comment 4: *The Department considers any area which shows contaminants three times the sediment criteria a hot spot. Such areas will have to be delineated. As recommended, the hot spots can be excavated and placed in a cell next to the landfill and capped. The capped area of the cell would not require a geocomposite liner.*

Response 4: The Sediment Sampling Plan included as Attachment A describes identification and delineation of hot spots as three times the sediment criteria. Rather than creating a new cell next to the landfill, LTV proposes instead to rebury the sediments on-site beneath the existing cover system. Any

Mr. Jaspal Walia, P.E.
NYSDEC

August 12, 1996
Page 4

vegetation or debris excavated from the wetlands during the remediation activities will also be disposed of on-site beneath the final cover system.

Comment 5: *Under present conditions, water levels in both the South Pond and the Northwest Pond are at the same elevation and are interconnected by the West Ditch. Aerial photos indicate leachate plumes entering the South Pond in 1987. We believe that groundwater can still enter the South Pond.*

Response 5: The previously described groundwater barrier is expected to minimize or eliminate the potential for groundwater flow from the fill into the South Pond.

Comment 6: *With the capping of the on-site ponds, contaminants in shallow groundwater will no longer be retained in the ponds, as they may be at present, but may migrate to other downgradient aquatic habitats. What contaminants are contained in the shallow groundwater? Do they pose a threat to these aquatic habitats? Should wetlands on-site be used as biofilters to cleanse shallow groundwater?*

Response 6: The shallow groundwater is characterized by low levels of ketones and chlorinated organics; high levels of the common major inorganic constituents of groundwater (calcium, sodium, and potassium); and an alkaline pH. Shallow groundwater discharge from the site was estimated in the October 1993 SWMFIP Report as only 3% of the site surface run-off. Therefore, groundwater inflow from the site is not a significant contribution to the hydrology of the wetland system. There is no information that the contaminants detected in groundwater impact surface water or sediments that are associated with the aquatic habitat. Rather, the sediments which will be remediated may be a potential source of surface water impacts. The need for shallow groundwater remediation in the wetland system has not been established.

Comment 7: *Any off-site mitigation of wetlands would have to comply with DEC guidelines for compensatory mitigation. A contribution to a wetland bank or to the City of Buffalo for wetland creation may not be adequate. Detailed plans which indicate the adequate replacement of the functions and values of the on-site wetlands must be provided with any such contribution.*

Response 7: Detailed plans regarding off-site mitigation of wetlands will be provided after more detailed discussions with the NYSDEC Fish and Wildlife Division and

Mr. Jaspal Walia, P.E.
NYSDEC

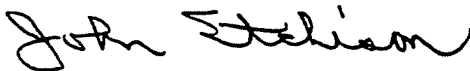
August 12, 1996
Page 5

City of Buffalo have occurred and each party's requirements have been determined.

As discussed in the August 2, 1996 project meeting, LTV Steel's commitment to develop and carry out an acceptable wetland remediation project at the Marilla Street Landfill is directly linked to the City of Buffalo's desire to utilize the site upon completion of remediation activities and the City's plans to clean-up the Truscon property on South Park Avenue. Both the project time frames and construction costs are major concerns for all involved parties. It is therefore imperative that the NYSDEC review and approve the wetland mitigation concept by August 16, 1996.

We are hoping to meet on August 9, 1996 to discuss any concerns the Department may have. If you have any questions in the meantime, please call me at 216-429-6476 or Malcolm Pirnie, Inc. at 716-828-1300.

Sincerely,



John W. Etchison
Manager - Waste Management

c: Wayne Gould, LTV
Dale Papajcik, LTV
Terry Ried, MPI
Kent McManus, MPI
Marty Doster, NYSDEC

Gary McDannel, USACOE
Cameron O'Conner, NYSDOH
Dave Sengbusch, C-Buff
James Smith, C-Buffalo
Peter Beuchi, NYSDEC

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ATTACHMENT A

SEDIMENT SAMPLING PLAN FOR THE MARILLA STREET LANDFILL BUFFALO, NEW YORK LTV STEEL COMPANY

1.0 INTRODUCTION

1.1 Purpose

Previous investigations (Malcolm Pirnie, 1993 and 1995) have indicated the presence of contaminated sediments within the wetland areas next to the LTV Marilla Street Landfill in South Buffalo, New York. Based on these investigative results, the New York State Department of Environmental Conservation (NYSDEC) has requested delineation and removal of hot spots. Hot spots are defined as those areas that contain contaminant concentrations greater than or equal to three times the NYSDEC sediment criteria. This Sampling Plan (SP) was developed to delineate hot spots in the wetland areas. Information collected during this hot spot investigation will be combined with results of previous investigations, to determine the aerial extent of dredging/excavation required for wetland remediation.

1.2 Previous Investigations

Table 1 presents the results of the previous wetland sediment sampling events at the Marilla Street Landfill. Previous sampling locations are illustrated on Figures 1 and 2. Heavy metals were the only constituents detected at concentrations greater than or equal to the NYSDEC sediment criteria.

The data showed two potential hot spot areas in the South Pond wetland area. The largest area is characterized by the analytical results for SS-4, SS-5, SS-6 and SS-7 which indicated the presence of arsenic, cadmium, lead, manganese and zinc at concentrations exceeding three times the sediment criteria. These sample locations are in the open water area of the South Pond. A smaller area characterized by sample SS-1 is in the dense cattail portion of the wetland. Since this area is isolated and found within the densely vegetated southeastern portion of the South Pond wetland Area, no further investigation or remediation of this isolated pocket of contaminants is planned.

With one exception (viz. SD-6), all samples collected in both northern ponds exceeded three times the sediment criteria in the surface sediment (0 to 0.5 feet) samples, and in the limited number of subsurface sediment samples (2 to 4 feet).

Samples collected from the west ditch (viz. SS-8 through SS-13, SD-2 and SD-3) and the North Ditch (viz. SS-25, SS-26 and SD-4) also indicated the presence of heavy metals at concentrations exceeding three times the sediment criteria. No further delineation of the ditch wetland areas is proposed. The remedial plan for the ditches will involve capping of the sediment and conversion of these wetland areas into upland/wetland environments while maintaining the hydraulic characteristics.

2.0 HOT SPOT SEDIMENT SAMPLING FOR PONDS

2.1 Sampling Locations

Pond sediments will be sampled at 19 locations as shown on Figures 1 and 2. Eleven (11) of these location are in the South Pond to determine the lateral and vertical extent of the identified hot spot in the open water area. Sample locations will also be located at 50 foot intervals from the previous sample locations (see Figure 1). Four (4) equally spaced sample locations will be completed in each of the north ponds (see Figure 2) to determine the depth of contamination (the lateral extent of contamination in each of the north ponds and covers the entire pond bottom).

2.2 Sample Methods

The procedures for drilling and sediment sampling will be as follows:

- a. Secure and anchor a boat mounted drilling rig to enable continuous drilling and sampling operations.
- b. Install new staff gauges in each of the ponds.
- c. Measure water depth.
- d. Advance each boring through bottom sediments or fill to a depth approximately ten feet using a 5-foot overburden sampler with a 140 pound geotechnical hammer.

- e. Collect samples of the sediment from every one foot interval along the split spoon. All samples not submitted for chemical analysis will be archived in laboratory cleaned glass sample jars.
- f. Flag and identify each borehole location to enable a location survey to be performed.

All five depth intervals and the last three depth intervals (2 to 3 feet, 3 to 4 feet and 4 to 5 feet) from the south and north ponds, respectively will be submitted for analysis. Table 2 summarizes the sediment samples that will be submitted for chemical analysis. Sediment samples will be analyzed by the analytical methods listed in Table 3. Samples from the second 5 foot sampling interval will be archived in laboratory cleaned sample jars. The archived samples will be analyzed if the hot spot criteria (3x the NYSDEC sediment criteria) is exceeded in the entire upper five foot interval.

Applicable Standard Operating Procedures for sediment sampling are presented in the SWMFIP Field and Sampling Plan (FSAP) dated October 1993 and are listed below as follows:

- A.4 Documentation Requirements for Drilling/Well Installation
- A.6 Soil Boring Log Description
- C.5 Procedure for Collection of Bottom Sediment Samples in Deep Water
- C.8 Sample Bottle Cleaning
- C.9 Sample Labeling
- C.10 Sample Shipping

Split-spoon samplers will be washed between samples over a wash tub that will collect the wash and rinse water. The applicable equipment cleaning SOP (C.13 Sampling Equipment Decontamination Protocols) is provided in Appendix C of the FSAP.

2.3 Quality Control Samples

The frequency of quality control sample analysis for site-specific parameters will be in accordance with the NYS CLP requirements summarized in Section 4.9 of the FSAP. Field quality control samples are summarized on Table 3.

2.4 Data Validation

The analytical data generated during this investigation will be evaluated for compliance with the 1991 NYSDEC ASP for Superfund CLP (Protocol A) reporting and deliverable requirements.

3.0 REPORT

Malcolm Pirnie will prepare a summary report at the conclusion of the sediment sampling event. The report will summarize the data and delineate the extent of the hot spots in the ponds. Topics that will be presented in the report are as follows:

- Field sampling procedures
- Sediment sampling results
- The estimated extent and thickness of material to be dredged.

TABLE 1

MARILLA STREET LANDFILL

COMPARISON OF PREVIOUS SEDIMENT RESULTS WITH 3 TIMES THE NYSDEC SEDIMENT CRITERIA

		South Pond										
Sample Number Sample Depth (ft)	3 Times NYSDEC Sediment Criteria	SS-1	SS-2	SS-2	SS-3	SS-3	SS-4	SS-5	SS-6	SS-7	SS-7	SD-1
		(0 to 0.5)	(0 to 0.5)	(2.5-2.6)	(0 to 0.5)	(1.5 to 2)	(0 to 0.5)	(0 to 0.5)	(0 to 0.5)	(0 to 0.5)	(0 to 0.5)	(3 to 3.3)
Antimony	6											
Arsenic	18	8.7J	5.5J	2.6J	6.6J	11.9	18.7J	8.0J	13.2	9.8	1.7J	2.8J
Cadmium	1.8	2.0J		1.3J	1.7J		6.7J					
Chromium	78	32.6J	28.5J	9.3J	21.2J	15.1J	34.2	17.9	25.1	30.1	10.1	28.7
Copper	48	30.9	28	11.7	23.5	18.7	39.8	16.2	27.4	34.5	2.7J	18.8
Iron	6%	32,600	33,300	14,400	27,400	28,000	35,100	17,900	26,100	28,700	12,100	20,200
Lead	93	124	28.7J	20.4	54.6J	73.6J	265J	92.7	156J	125J	9.3	85.7
Manganese	1380	538	435	165	359	296J	1380J	230J	210J	1880J	83.9	1040J
Mercury	0.45											
Nickel	48	33.5	47.7		34.5	15.9J	18.5J			10.3		17
Zinc	360	374J	150J	108J	189J	278J	958J	290	315J	397J	44.2	161

Note: Shading indicates exceeds three times the sediment criteria. Blanks mean analyte not detected

TABLE 1

MARILLA STREET LANDFILL

COMPARISON OF PREVIOUS SEDIMENT RESULTS WITH 3 TIMES THE NYSDEC SEDIMENT CRITERIA

Sample Number Sample Depth (ft)	3 Times NYSDEC Sediment Criteria	Northeast Pond				Northwest Pond				
		SS-23 (0 to 0.5)	SS-23 (2 to 2.4)	SS-24 (0 to 0.5)	SS-14 (0 to 0.5)	SS-15 (0 to 0.5)	SS-15A (0 to 0.5)	SS-16 (0 to 0.5)	SS-16 (2 to 4)	SS-17 (0 to 0.5)
Antimony	6	78.2					20.7	22.0		
Arsenic	18	27.4	9.7	57.7	7.8	55.5	21.4	23.5	22.2	16.1
Cadmium	1.8	14.1		11.0	18.3	18.3	15.4	1.0	16.0	1.0
Chromium	78	317.1	35.6J	218.3	38.3	19.7	14.5	18.2	33.6	16.8
Copper	48	63.1	59.5J	38.1	25.2	76.7	42.8	58.9	43.1	51.9
Iron	6%	466,000	40,400	227,000	55,600	226,000	23,000	225,000	691,000	267,000
Lead	93	504	64.2	505.1	162.1	25.1	2.3	3.0	79.6	28.2
Manganese	1380	75.6J	105J	87.9J	591	172.0	15.0	15.0	133.0	446
Mercury	0.45	0.47			53.7					
Nickel	48				24.9	63.4	41.2	31.6	26.8	24.2J
Zinc	360	114	197	96.1	130	220	236	325	194	272

Note: Shading indicates exceeds three times the sediment criteria. Blanks mean analyte not detected

Sample Number Sample Depth (ft)	3 Times NYSDEC Sediment Criteria	Northwest Pond								
		SS-18 (0 to 0.5)	SS-19 (0 to 0.5)	SS-20 (0 to 0.5)	SS-20 (2 to 2.5)	SS-21 (0 to 0.5)	SS-21 1.9 to 2.5	SS-22 (0 to 0.5)	SD-6 (0 to 0.5)	SD-7 (0 to 0.5)
Antimony	6	24.3J								
Arsenic	18	31.8	36.8J	46.4	67.3	31.9	22.7J	29.1	4.5J	15
Cadmium	1.8	11.6	11.4J	14.3J	10.8J	8.3J	9.2J	19.1		
Chromium	78	209	195J	224J	255J	250J	33.3	12.1	18.4J	35.5J
Copper	48	58.8	57.9J	64.3J	21.3J	27.3J	20.1J	18.1J	21.8	17.2J
Iron	6%	342,000	359,000	242,000	294,000	248,000	215,000	165,000	21,500J	255,000
Lead	93	358	287J	377J	251J	350J	104J	12.1	44.6J	33.9J
Manganese	1380	1580J	1610J	2010J	151J	1160J	2050J	683J	403J	809J
Mercury	0.45					0.47				
Nickel	48	32.2	33.8	30.1	96.5	6.4J	262.5	202	21.6	
Zinc	360	307	263J	258J	291J	194J	278J	244J	69.6J	357

Note: Shading indicates exceeds three times the sediment criteria. Blanks mean analyte not detected

Table 2 MARILLA STREET LANDFILL SUMMARY OF SEDIMENT SAMPLES		
Location	Surficial Sediment¹	Subsurface Sediment^{2,3}
South Pond	22	33
North East Pond	0	12
North Pond	0	12
Total	22	57

Notes:

- 1 Surficial sediment depth interval is 0 to 1 foot and 1 to 2 feet.
- 2 Subsurface sediment depth intervals are 2 to 3 feet, 3 to 4 feet and 4 to 5 feet.
- 3 Samples for 5 to 10 feet will be collected and archived. These include a maximum of 95 additional samples.

TABLE 3**MARILLA STREET LANDFILL****ANALYTICAL PARAMETERS AND METHODS**

Parameter	Method	Sediment	Quality Control			
			MD	MD	DUPL	EB
Antimony	6010/200.7	79	4	4	8	4
Arsenic	7060/206.2	79	4	4	8	4
Cadmium	6010/200.7	79	4	4	8	4
Chromium	6010/200.7	79	4	4	8	4
Copper	6010/200.7	79	4	4	8	4
Iron	6010/200.7	79	4	4	8	4
Lead	7421/239.2	79	4	4	8	4
Manganese	6010/200.7	79	4	4	8	4
Mercury	7470/245.1	79	4	4	8	4
Nickel	6010/200.7	79	4	4	8	4
Zinc	6010/200.7	79	4	4	8	4

ATTACHMENT B
MARILLA STREET LANDFILL
PRELIMINARY POST-CLOSURE MONITORING PROGRAM

GROUNDWATER AND SURFACE WATER

Monitoring Objectives

- To detect changes in shallow groundwater quality. Since the landfill is over thirty years old, the groundwater chemistry is not expected to change significantly.
- To detect changes in deep overburden groundwater quality that may indicate downward leachate migration.
- To monitor surface water quality and potential impacts to the aquatic habitat.

Monitoring Locations

Monitoring locations were selected based on the shallow groundwater isopotential map for June 1993 presented in the October 1993 SWMFIP Report. Monitoring wells MW-6A/6B are background wells for each water bearing zone. The remaining wells in the sampling program monitor the downgradient perimeter of the landfill along the landfill-wetland boundary. Proposed monitoring locations include:

- Shallow Overburden: MW-6B, MW-16B, MW-14BR, MW-15B, MW-18B, MW-3B
- Deep Overburden: MW-6A, MW-16A, MW-15A, MW-18A, MW-3A
- Surface Water: South Pond, North Pond

Sample Collection Procedures

Sampling procedures will be consistent with the procedures identified in the existing sampling and analysis plan for the Marilla Street Landfill.

Parameters

Based on a review of sampling results presented in the October 1993 SWMFIP Report, the shallow groundwater quality is characterized by low concentrations of ketones, chlorinated volatile organics, and phenols; elevated concentrations of common elements (calcium,

potassium, sodium, and iron); and an alkaline pH. Several trace metals were also detected above NYS Groundwater Quality Standards. The proposed parameter lists include:

- 6NYCRR Part 360 Routine Parameter List, excluding BOD₅ and COD.
- 6NYCRR Part 360 Baseline Parameter List, excluding BOD₅.

BOD₅ and COD are excluded, because the waste is primarily inorganic.

Frequency

Changes in groundwater quality, if any, would be expected to occur slowly. Therefore, semi-annual sampling is proposed for the Spring and Fall. Routine parameters will be performed in Spring. Baseline Parameter list sampling will be performed in Fall, during seasonal low groundwater levels when dilution of leachate constituents due to precipitation is minimal.

Analytical Methods and Quality Control

Recommended analytical methods provided in the 6NYCRR Part 360 regulations will be used. All analyses will be performed at a NYSDOH certified ELAP laboratory.

Quality control samples will include the collection and analysis of one blind field duplicate sample and one matrix spike sample per monitoring event. The laboratory will be required to perform the analyses in accordance with published methods, including analysis and reporting of method blanks for each parameter.

Reporting

A sampling and analysis report will be prepared for each sampling event. A site water quality database will be established, and presented in the Fall sampling report. The database will be used to track changes in groundwater quality over time, in order to meet the objectives of the monitoring program.

WETLANDS

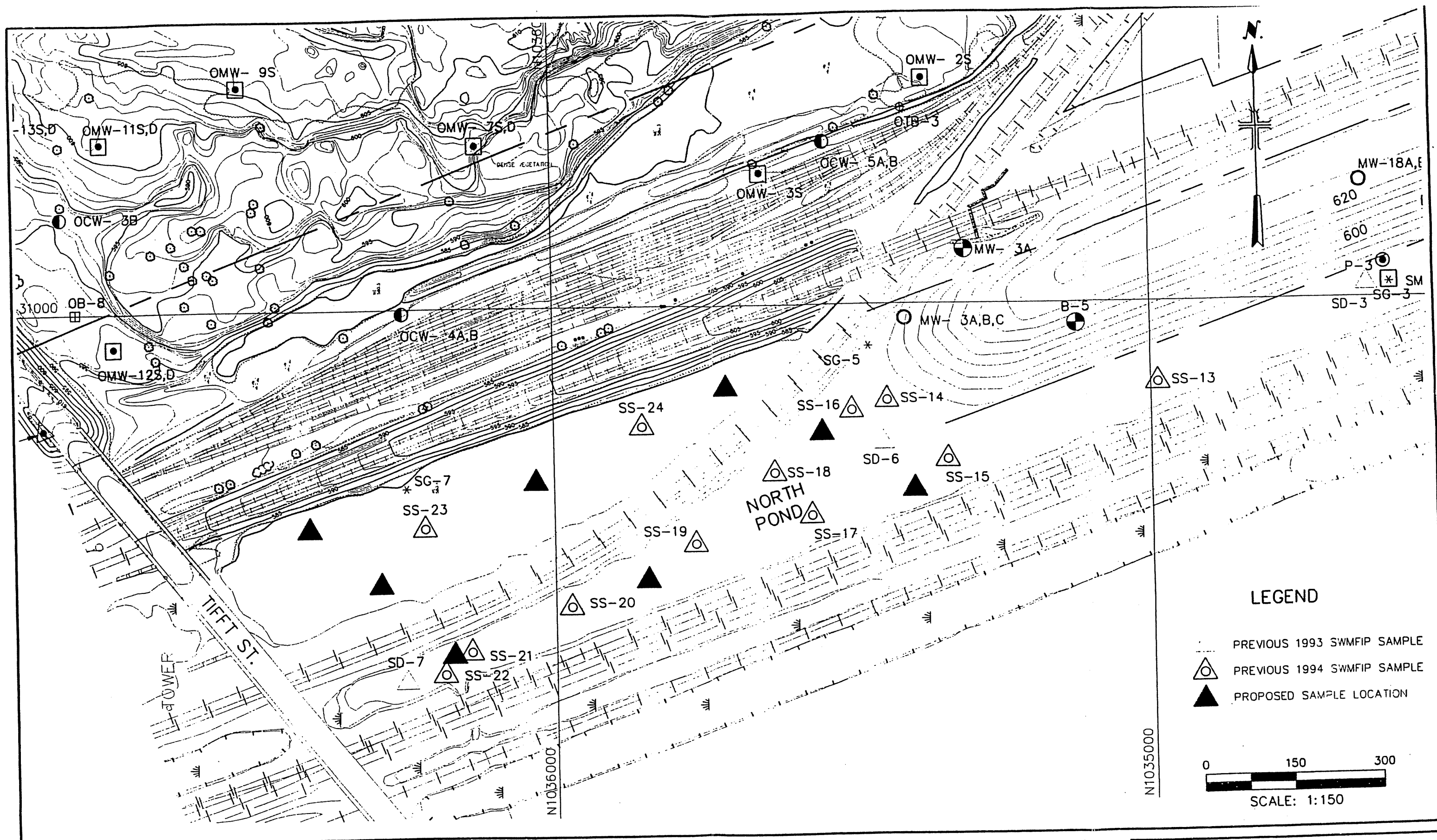
Monitoring Objectives

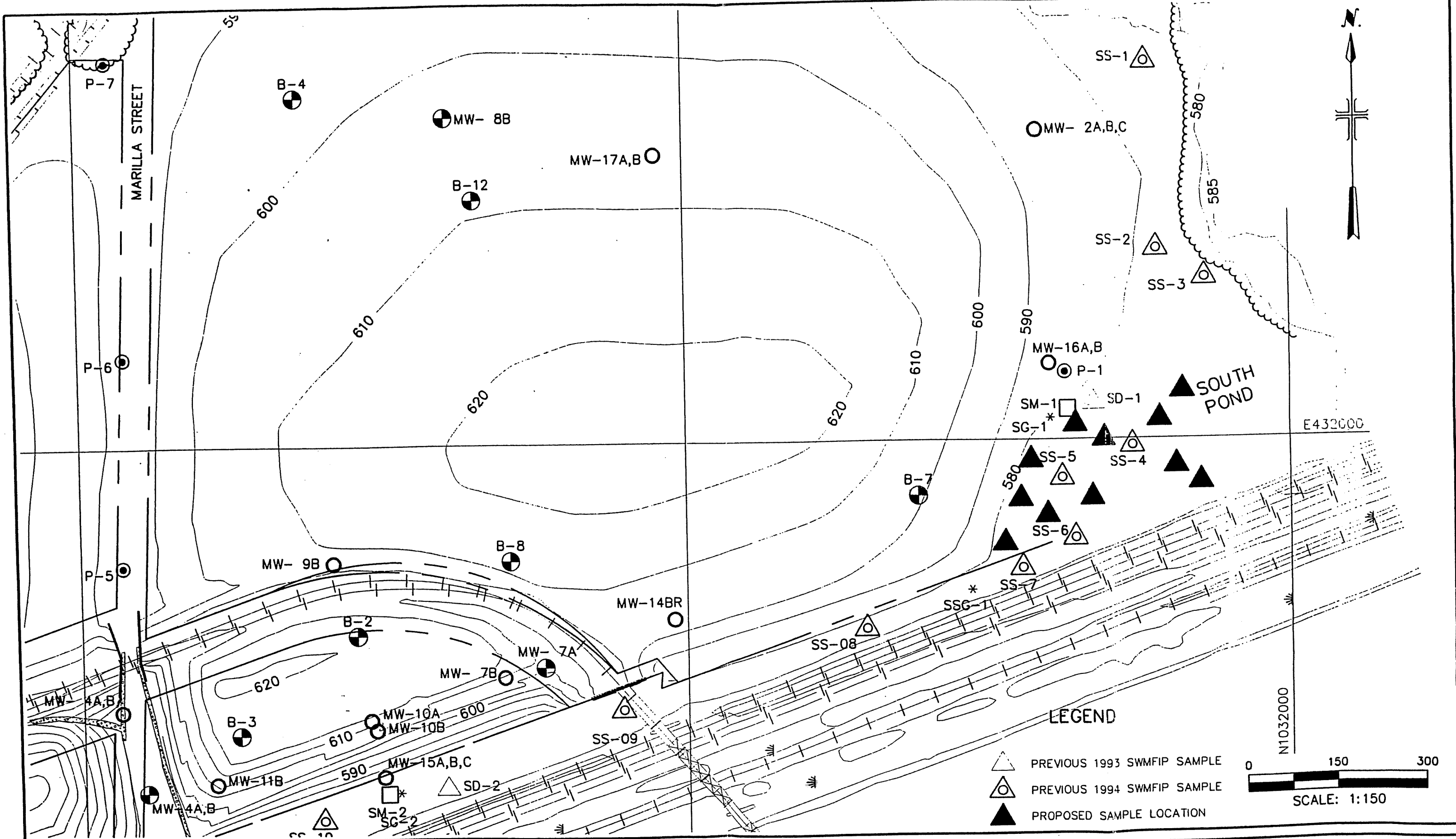
- To monitor the success of wetland restoration activities

Monitoring Plan

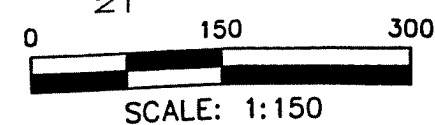
- The aerial distribution of submerged aquatic vegetation will be measured annually for five years to ensure that wetland restoration is self sustaining.

Details of the monitoring program are dependent on the type of vegetation that will be planted.





- LEGEND**
- △ PREVIOUS 1993 SWMFIP SAMPLE
 - PREVIOUS 1994 SWMFIP SAMPLE
 - ▲ PROPOSED SAMPLE LOCATION



**MALCOLM
PIRNIE**

LTV24_S2/XREF: ALTIFT

MARILLA STREET LANDFILL
REPORT TITLE
SHEET TITLE

LTV STEEL COMPANY

AUGUST 1996

June 7, 1996



Mr. Jaspal S. Walia, P.E.
NYS Dept. of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

Re: LTV Steel Company
Marilla Street Landfill
Feasibility Study

Dear Mr. Walia:

We have reviewed your April 24, 1996 review comments regarding the draft Focused Feasibility Study for the Marilla Street Landfill Wetlands. The following responses refer to those comments:

General Comments:

Comment 1: The proposed capping of sediments in place with a geocomposite liner would seem to preclude both contact with sediments by aquatic organisms and infiltration of groundwater to the wetlands. Given the low permeability of the liner, establishment of a functional wetland above the liner should be feasible if proper substrate and hydrology are supplied. Since contaminated sediments would be left in place, the long-term integrity of such a remedy is a matter of significant concern.

Response 1: LTV Steel is committed to maintaining the long-term integrity of the proposed capping alternative.

Comment 2: The phragmites which currently exist in the wetlands are a highly tenacious plant with an extensive rhizome system capable of growing through asphalt. The ability of the geocomposite to withstand both phragmites and the activity of burrowing animals must be demonstrated. Punctures of the liner would result in recontamination of the wetlands and eventual failure of the remedy. This would put both wildlife and future recreational users of the area at risk. Since the liner integrity cannot be assured with a reasonable degree of certainty, some combination of either excavation plus liner or solidification plus liner should be considered. This is more critical for the north ponds than for the south ponds since levels of metals are uniformly above the severe effect level in the northern area.

Response 2: We believe that with slight design modifications, the integrity of the liner can be assured with a reasonable degree of certainty. To resolve the Department's concern about burrowing animals, we are evaluating the use of a 12-inch thick compacted cobble stone barrier over the geocomposite to prevent animals from digging. Another alternative being evaluated is the placement of some sort of fencing material placed horizontally above the geomembrane for the same purpose. The stone or fencing material would likely be placed only around the perimeter of the wetlands where the digging of bank holes would occur.

Based upon Malcolm Pirnie's experience on the Marathon Battery project, the root system of phragmites will not penetrate the underlying geocomposite liner but will instead turn laterally and run parallel to the liner. Qualified wetlands biologists who monitor the wetlands restoration activities on that project have observed and documented that occurrence in the field. If the Department has documentation to the contrary, we would be interested in reviewing it.

We are convinced that the original remediation approach, with slight design modifications, can properly protect the environment and accomplish the established project objectives, however, we are evaluating the Department's suggestion that consideration be given to some combination of either selective excavation plus liner or selective solidification plus liner.

Comment 3: *Geocomposite Liner: The resistance of the proposed liner to rodent (muskrat and beaver) chewing and burrowing is questionable. Perhaps the use of a thick HDPE liner should be considered as a more rodent resistant material.*

Response 3: See response to No. 2 regarding alternate materials being evaluated to discourage rodent digging. The use of HDPE liner was initially considered but eliminated due to difficulties in placement and welding of the material over a possibly soft subgrade. The use of HDPE in place of the geocomposite is being reevaluated at the Department's request.

- Comment 4: Regardless of the final selected remedy, wetland monitoring is required to ensure the effectiveness of the remedy. Monitoring should include sediment and surface water sampling as well as documentation of plant survival. If the ponds eventually provide a fishery, periodic sampling of biota will also be necessary.
- Response 4: LTV Steel Company recognizes that some sort of wetland monitoring will be required to ensure the effectiveness of the project. The exact nature of the monitoring can be determined after the project approach is finalized.
- Comment 5: Haul Road: Will the perimeter haul road be located on the existing landfill or upon fill placed in the wetland? It is recommended that the road be constructed in a manner which avoids filling the wetland. Any significant loss of wetland due to road construction should be mitigated for.
- Response 5: It is anticipated that a haul road would be constructed at the toe of slope above the waterline to avoid any loss of wetland area.
- Comment 6: West Ditch Plantings: Planting of cattails on a 6 foot grid here may permit the invasion of purple loosestrife. Closer spacing of these plantings or interplanting with other suitable wetland species may prevent this.
- Response 6: LTV Steel is willing to consider closer spacing of the cattails or planting other species suitable to the Department.
- Comment 7: South Pond Remediation: Presently, the open water community of the South Pond is attractive to wildlife because of the mixture of open water and emergent wetland types found here. The capping and planting plan describes the possible elimination of much of the open water habitat. A significant area of open water area planted to white water lily or yellow pond lily must be reestablished here. Recontouring of sediments may be required to accomplish this.
- Response 7: Significant recontouring of the South Pond may require the excavation of materials and redisposal and recapping of it within the landfill area. A significant cost would be associated with this option.

Since open water will be maintained in both north ponds, we recommend that the Department consider replanting those areas with white water lily or yellow lily pond lily instead of the South Pond.

Specific Comments:

- Comment 1: Sections 2.3 and 2.4: It is recommended that the ponds sediment sampling data be included in the Feasibility Report. The test data should also be compared against the sediment criteria (refer to: Technical Guidance for Screening Contaminated Sediments, NYSDEC, November, 1993) to show the severity of sediment contamination.
- Response 1: The requested data will be provided in the revised Feasibility Report to be submitted to the Department for review after the project approach has been reevaluated.
- Comment 2: Section 4.3.2: Testing data reported in the SWMFIP August, 1995 report shows elevated concentrations of metals in the northwest pond. This is perhaps due to disposal of clarifier sludge or leaching of contaminants from the clarifier sludge disposal area. The proposed Alternative No. 8 should consider minimizing the contamination level in sediment before placing the geocomposite. This could be accomplished by consolidating the hot spots of highly contaminated sediment within the landfill or creating a new cell along the landfill. The consolidated sediment area would be capped and sealed to prevent it from leaching into the wetland. With this approach, the geocomposite liner would not be placed over the grossly contaminated surface. Also, in case of failure of the geocomposite liner, the impact of contaminants on wetland would not be too severe.
- Response 2: It is unclear based on existing sampling data, what areas the Department considers as "hot spots". It is also unclear which areas would not require a geocomposite liner. This item needs further discussion and evaluation.
- Comment 3: Page 4-1, 2nd paragraph, last sentence: The impact of contaminated shallow groundwater discharge to the South Pond, which is upgradient of the landfill, may be minimal due to dilution factors. The north ponds being downgradient from the landfill are likely to be significantly impacted by the shallow groundwater.

Response 3: The Northwest Pond receives the same degree of dilution as the South Pond since the two are interconnected via the West Ditch. Actually, the majority of surface water runoff from the capped landfill runs either into the West Ditch or Northwest Pond.

The Northeast Pond is likely more effected by adjacent off-site groundwater flow rather than on-site groundwater flow since groundwater movement from the landfill is generally in a west-northwest direction. A railroad dike separates the Northwest and Northeast Ponds.

Comment 4: *Shallow Groundwater:* Even if the contaminated shallow groundwater would not directly impact the lined wetlands, the contaminants would keep on moving underneath the liner and move off-site. In case of deterioration or failure of the geocomposite cover, the wetland would then be recontaminated. This factor shall be considered during design and construction of the geocomposite cover.

Response 4: The comment implies that contamination in the wetland sediment is a result of contaminated groundwater flow. Although possible, we believe that the contamination is more likely the result of erosion of the landfilled material into the wetlands prior to capping the site or else placement of the waste material directly into the wetlands during past operations.

It is conceivable that contaminants present in the groundwater may flow under the liner and move off-site. The intent of the liner is not to stop off-site migration of groundwater.

Comment 5: *Monitoring:* Once the wetlands have been constructed, periodic monitoring and maintenance of wetlands would have to be instituted to determine whether or not the contaminants underneath the liner are impacting the water body of the wetland. This O&M component needs to be addressed in the work plan. In addition, monitoring and maintenance of wetland plantings will be required for a minimum of five years to ensure successful establishment of wetland vegetation.

Response 5: LTV Steel acknowledges that monitoring and maintenance of the wetlands will be required.

Comment 6: *Dewatering: Dewatering of ponds is dependent upon weather and recharge from the groundwater. In case dewatering of the ponds to dryness becomes impractical, would there be any problem to implement the proposed Alternative No. 8?*

Response 6: Dewatering of the ponds is a significant concern regarding each of the alternatives. Construction will be highly dependent upon the weather and construction methods used by the contractor.

Comment 7: *In Alternative No. 8, it is not clear whether or not the North Ponds and the West Ditch would also be provided with a geocomposite cover.*

Response 7: The North Ponds and West Ditch would receive the same geocomposite cover as the South Pond.

Comment 8: *Integrity of the Liner:*

a. *Have any chemical compatibility tests been performed to find out the suitability of the geocomposite material with the contaminants in the LTV ponds?*

b. *Would the proposed composite liner withstand stresses due to wetland media?*

Response 8: a. Groundwater monitoring data was sent to the geocomposite liner manufacturer to determine the chemical compatibility of the bentonite. We were informed that the groundwater will have no detrimental effect on the liner.

b. No design calculations have been performed, however, the geogrid placed beneath the liner was intended to reduce stresses due to potential settlement of a soft subgrade.

Comment 9: *Additional Wetland Area: With the proposed Alternative No. 8, there would be some decrease in the wetland area. During our last meeting of October 27, 1995, LTV indicated that the wetland loss would be compensated by redevelopment of an additional area east of the Hopkins Street; however, there is not mention of that in this Feasibility Study.*

Mr. Jaspal S. Walia, P.E.
June 7, 1996
Page 7

Response 9: It is the intent of Alternative No. 8 to have no net loss of wetland area, therefore, no redevelopment areas would be required.

The major portion of the area east of Hopkins Street is already a wetland area. Very little acreage is available for redevelopment.

Should redevelopment be required, however, LTV Steel is considering the following options:

- Purchasing off-site property and creating new wetlands for mitigation purposes.
- Contributing an agreed upon amount of funds to either the NYSDEC or USACOE as part of a wetland mitigation bank to spend as they see fit to improve wetland habitat in the State.
- Contributing an agreed upon amount of funds to the City of Buffalo to create wetland habitat as they see fit for other projects.

Comment 10: *There is no mention of incorporating the City of Buffalo's design ideas into this plan.*

Response 10: LTV Steel intends to contact the City of Buffalo to discuss their ideas regarding future land uses after we reach agreement with the Department on a conceptual plan. LTV Steel committed to the City of Buffalo to maximize the incorporation of their ideas into long term benefits.

LTV would appreciate the opportunity to discuss these comments with Department staff to clarify and resolve project concerns. We will contact you within the next week to set up a meeting date.

Sincerely,



John W. Etchison
Manager-Waste Management
Corporate Environmental Control Department

JWE/dh
002425.dlh

Mr. Jaspal S. Walia, P.E.
June 7, 1996
Page 8

cc: M. Doster, NYSDEC
W. Gould, LTV
G. McDannell, USACOE
~~K. McManus~~, Malcolm Pirnie
D. E. Papajcik, LTV
J. Smith, Office of the Environment-City of Buffalo
R. A. Voytko, LTV
W. L. West, LTV

APPENDIX B
STRATIGRAPHIC BOREHOLE LOGS

CLIENT LTV Steel Company

ELEVATIONS: DATUM

H_2O @ 39' below top
of SS-7
slight lower

- Depth to bottom sediment
measured from rock surface
- water depth @ 4.5'

Advanced vibrance
for approx 8' power to
rejuvenate

interbeds, $< 2''$
#2 clay and silt w/ trace pebbles

[illegible]Sheet No. 1 of 1

CLIENT LTV Steel Company
PROJECT FOCUSSED WEHMS INV.

LOCATION _____

CONTRACTOR	TESTED BY	LOGGED BY	STARTED	9/23/18
Wm.	22	5.2.15.18	12:45	96
	9			

~~CONCRETE~~

~~ME THOD~~

~~SOIL~~

~~PENNA PRESS - CO~~

~~Vibra - Co~~

~~7/22 M~~

~~FINISHED 13.00~~

~~96~~

OF _____
COING : _____
ROCK _____
CORE DIA. _____
ELEVATIONS: DATUM _____

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Order, Etc.

STATION	DATE	TIME	DEPTH (FATHOMS)	WIND (DIRECTION & FORCE)	SEA (HEIGHT & PERIOD)	WEATHER	REMARKS
1			0				DREDGE SAMPLE lost 0-2.5' as loose fu sediment / precipitate
2			1				lost
3			2				lost
4			3				lost
5			4				lost
6			5				lost
7			6				lost
8			7				lost
9			8				lost
10			9				lost
			10				lost
			11				lost
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			96				lost
			97				lost
			98				lost
			99				lost
			100				lost

Depth to bottom sediment measured from probe surface - water depth 0 3.7

Advised sample to approx 6' below sediment disp

STATION

MAJCOUM

LTV Steel Company

Focused Wetlands Inventory

NE 7375

501 West 26th St

SOIL PENAR PRESSGS / VIBRA

ROCK

FINISHED 13.4/5 M 9/23 10 96

CORE DIA.

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Odor, Etc.

DREDGE SAMPLE - NONE TAKEN
LAST 0-2' - LOOSE FILL / BOTTOM SEDIMENT

H₂O @ 11' below top
of S6-7

2.0 - 3.6 Sample lost
P₁ Peat brown-black
0.6 Silt dark brown-gray, w/ some clay, *
dense, trace fine sands
1.1 Silt as above w/ increasing fine
sands content w/ depth
.9 Sand Monocotile. brown-orange, fine grain
w/ trace - little silt

- Depth to bottom significant
measured from rock surface
- water depth 0.3.2.

Behaviour in sand
at approx 60.0.

* Blind Dupl L.
C-3-41

WIDOM

CLIENT LTV Steel Company
PROJECT FOCUSED WETLAND INV.

BOREHOLE NO. S-28

STARTED 10:20 M 9/23 1996

FINISHED DISC 9/23/96

ELEVATIONS: DATUM

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain Drilling and Testing Equipment, Etc.

$H_2O @ .4$ ' below top
of SS-7

- Depth to bottom sediment

MEASURED from water surface

- water depth 6.11'

Could not advance heads
single through bit - 45
front.

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Order ,Etc.

REDEC Sample - not taken
used hands aver to attempt
sawzling through ground back till 02"
Fill - back organic silt and fine crushed shale

[illegible]

CLIENT LTV Steel Company
 PROJECT FOURSEER WETLANDS INV.
 LOCATION LITTLE POND NORTH
 CONTRACTOR SOIL TESTING INC.
 METHOD OF SOIL PENETRATION DREDGE / VIBRA-CORE
 JOB NO. 0848-258
 LOGGED BY J.P. Hilton
 BOREHOLE NO. SS-27
 STARTED 15:00 M 9/23 19 96
 FINISHED 15:15 M 9/23 19 96
 ELEVATIONS: DATUM _____
 CORE DIA. _____

FIELD BOREHOLE LOG

SAMPLE NO.	TYPE	DEPTH	BLOWS / FT	RECOVERY %	MOISTURE TIN NO.	SAMPLE DESCRIPTION: Color, Texture Classification, Compaction/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Odor, Etc.	NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain, Drilling and Testing Equipment, Etc.
1		0		-		DREDGE SAMPLE 0-1' Silt, loose black-gray bottom sediment w/ trace woody tissue	H2O @ 25' below top of S6-B
2		1		-		1.6-2.0 (1.3) Bottom sediment, orange-brown, loose	
3		2				0.1 Part black, decayed plant tissue	
4		3				1.5 Part black as above w/ increasing silt content	
5		4				1.6 Part also silt dark gray-black silt content	
6		5				1.7 Silt and clay dark gray-brown transitional to	
7		6				1.2 Sand and silt olive-brown-gray fine grain	
8		7				1.4 Sand and silt as above w/ increasing silt content with debris	
9		8				1.6 Silt Moderate gray-brown, little clay, trace fine sand	
10		9					
11		10					
12		11					
13		12					
14		13					
15		14					
16		15					
17		16					
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97		96					
98		97					
99		98					
100		99					

11
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 4
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 2
 1

CLIENT	LTV Steel Company
PROJECT	FOCUSED WEHMS INV.

LOCATION

LOCATION	
CONTRACTOR	Soil Testing Inc.
METHOD OF	SOIL PENETR. PRESSURE / Vibra - Core

LOGGED BY S. P. Jilka

BORING : ROCK

CORE DIA.

ELEVATIONS: DATUM

BORERHOLE NO.

STARTED 09:45 9/24 96

FINISHED 09:50 M 9/24 " 96

[illegible]

CLIENT LTV Steel Company
PROJECT Focused Wetlands Inv.

BOREHOLE NO. SS-37

BOREHOLE NO. 98-21
STARTED 8:40 W 9/26 19 96

STARTED	8:40	M	9/26	19	96
FINISHED	8:50	M	9/26	19	96

FINISHED 8:50 M 9/26 10 96

ELEVATIONS: DATUM

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gels Drilling and Testing Equipment, Etc.

$H_2O @ 1.7^\circ - \text{below } 1.0^\circ$

- Depth to bottom sediment measured from ponds surface - water depth of 3.10.

Sander refusal in clay
approx 4.5' below pond
bottom

MAISON

CLIENT LTV Steel Company
PROJECT Focused Wetlands Inv.
LOCATION

LOCATION _____
CONTRACTOR Soil Testing Inc
METHOD OF SOIL PENAR PRESSURE VIBRA-CORE
BORING : ROCK

JOB NO. 0848-258

FIELD BOREHOLE LOG

BOREHOLE NO. SS-39

STARTED 9:15 M 9/26/10 76

FINISHED 9:20 M 9/26/10 76

ELEVATIONS: DATUM

ELEVATIONS: DATUM _____

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain Drilling and Testing Equipment, Etc.

H₂O @ 1, 2, below top of SS -

- Depth to bottom sediment measured from water surface - water depth of 24.5'

Sampler Refused in clay
approx 4.0' below pond /
app 4.1'

Blind Duplicate #6 taken
at 2-3' interval

Sheet No. 1 of 1

MAIDOM

CLIENT LTV Steel Company
PROJECT FOCUSSED WEHMS INV.

LOGGED BY: S.P. Jilka

LOCATION	
CONTRACTOR	Soil Testing Inc
METHOD	SOIL PENN. PRESS. / Vibra-Core

LOCATION**CONTRACTOR**

METHOD OF SOIL PENNAR PRESSURE / Vibra - Core

BORING : ROCK

CORE DIA.

ELEVATIONS: DATUM

BOREHOLE NO.

STARTED 13:15 M 9/25 19 76

FINISHED 13:20 M 9/25/96

ELEVATIONS: DATUM

[illegible]

CLIENT LTV Steel Company

PROJECT FOCUSSED WEAPONS INV.

PROJECT FOCUSSED WE-HAD IN INV.

LOCATION

LOCATION	
CONTRACTOR	Soil Testing Inc

METHOD	SOIL	POWELL DESIGN	VIBRA-CORE

BOBING : ROCK

CORE DIA-

BOREHOLE NO.

STARTED 10:30 W 9/25 96

FINISHED 10:35 M 9/25 19 96

ELEVATIONS: DATUM

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Order .Etc.

MOISTURE
TIN NO.

RECOVERY

.N. SMO78

DEPTN

TYPE

SAMPLE

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain Drilling and Testing Equipment, Etc.

$H_2O @ 11^\circ$ below $2p$
of $SS = 1$

- * Blinds Duplicate
- Depth to bottom sediment
- MEASURED from sand surface
- water depth 0.327

- Depth to bottom sedimentary Mesozoic. from north surface - water depth of 327.

DREDGE SAMPLE - 0-1 SILT black, loose
ORGANIC plant debris, trace of green clay
1.6 SILT and Pent black
1.8 SILT brown w/ lent (12) CLAY * Blind Duplicate 1-2
1.11 CLAY gray - olive silt w trace silt -
translucent color change gray - brown
③ ~~1.11~~ 2.3 - 2.5

1.6 silt and peat black
1.7 silt and w/leaf - (2) clay * Blind Duplication 1-2
1.1 clay gray - olive silt w/ trace silt
transitional color change gray - brown
(3) approx 2.3 - 3.5

1.1 CLAY gray-olive, stiff w trace silt-
transmission color change gray-brown
③ 1.3-2.5

⑩ 446X 2.3--2.5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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WISDOM

CLIENT LTV Steel Company

PROJECT FOCUSSED Wetlands INV.

PROJECT

PROJECT FOCUS: WETLANDS - INVENTORY

LOCATION

LOCATION	
CONTRACTOR	Soil Testing Inc

CONTRACTOR

METHOD SOIL POWELL ROAD VIBRA-CORE

OF

BORING : ROCK

COME DIA.

BOREHOLE NO.

STARTED 12:45 M

FINISHED 09:15 M

ELEVATIONS: DATUM

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Order ,Etc.

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain Drilling and Testing Equipment, Etc.

DREDGE SAMPLE 0-1, SILT black organic
debris, loose w/ mass - little more
sand

$H_2O @ 1.08 - \text{below top of SS} = 1$

4 Part 4 clayey sand tissue, calc. silt black sand w/ TR sand

1 SAND Med brn, fine w/ little s/f,

1, 9 CAY SLIM, GAP TIGER, 2, 2 AL TO BOWA
C 1 MAY, 2 C - 3 M

Q. 17/18/19 - 6/20

H Clay brownish - olive, stiff w/ silt - lamin in p. 0

•

Walden

1000

CLIENT LTV Steel Company,

PROJECT FOCUSSED WEHWA INV.

LOCATION	
CONTRACTOR	SOIL TESTING INC
METHOD OF	PENAR PRESSURE / VIBRA - CORE

BORING : ROCK

JOB NO. 0848-258

FIELD BOREHOLE LOG

LOGGED BY S. P. J. J. J. J.

CORE DIA.

BOREHOLE NO. 22-70
STARTED 13:00 ⁹⁰⁰9/25 ¹⁰76
FINISHED 09:00 ⁷²⁵9/25 ¹⁰76

ELEVATIONS: DATUM

SAMPLE DESCRIPTION: Color, Texture Classification, Compactness/Consistency, Moisture Condition, Weathering/Fracturing, Inclusions, Order ,Etc.

NOTES: Boring, Testing and Sampling Procedures, Water Loss and Gain Drilling and Testing Equipment, Etc.

[illegible]

101. $\frac{1}{2} \frac{1}{3} \frac{1}{4} \frac{1}{5} \frac{1}{6} \frac{1}{7} \frac{1}{8} \frac{1}{9} \frac{1}{10}$

W

APPENDIX C

1996 ANALYTICAL RESULTS OF SEDIMENT SAMPLING

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method:

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-01 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-01(0-1) Lab Batch ID:			Field Sample ID: SS-01 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-01(0-1) Lab Batch ID:			Field Sample ID: SS-02 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-02(0-1) Lab Batch ID:			Field Sample ID: SS-02 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-02(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	8.7	1.0	1.0	8.7	1.0	1.0	5.5	1.0	1.0	5.5	1.0	1.0
Cadmium	2.0	0.50	0.50	2.0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Chromium	32.6	1.0	1.0	32.6	1.0	1.0	28.5	1.0	1.0	28.5	1.0	1.0
Copper	30.9	2.0	2.0	30.9	2.0	2.0	28.0	2.0	2.0	28.0	2.0	2.0
Iron	32600	10.0	10.0	32600	10.0	10.0	33300	10.0	10.0	33300	10.0	10.0
Lead	124	0.5	0.5	124	0.5	0.5	28.7	0.5	0.5	28.7	0.5	0.5
Manganese	538	1.0	1.0	538	1.0	1.0	435	1.0	1.0	435	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	33.5	4.0	4.0	33.5	4.0	4.0	47.7	4.0	4.0	47.7	4.0	4.0
Zinc	374	1.0	1.0	374	1.0	1.0	150	1.0	1.0	150	1.0	1.0

Base: (NA)

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-02 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-02(2-3) Lab Batch ID:			Field Sample ID: SS-02 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-02(2-3) Lab Batch ID:			Field Sample ID: SS-03 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-03(0-1) Lab Batch ID:			Field Sample ID: SS-03 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-03(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	2.6	1.0	1.0	2.6	1.0	1.0	6.6	1.0	1.0	6.6	1.0	1.0
Cadmium	1.3	0.50	0.50	1.3	0.50	0.50	1.7	0.50	0.50	1.7	0.50	0.50
Chromium	9.3	1.0	1.0	9.3	1.0	1.0	21.2	1.0	1.0	21.2	1.0	1.0
Copper	11.7	2.0	2.0	11.7	2.0	2.0	23.5	2.0	2.0	23.5	2.0	2.0
Iron	14400	10.0	10.0	14400	10.0	10.0	27400	10.0	10.0	27400	10.0	10.0
Lead	20.4	0.5	0.5	20.4	0.5	0.5	54.6	0.5	0.5	54.6	0.5	0.5
Manganese	165	1.0	1.0	165	1.0	1.0	359	1.0	1.0	359	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	4.0	4.0	4.0	4.0	4.0	4.0	34.5	4.0	4.0	34.5	4.0	4.0
Zinc	108	1.0	1.0	108	1.0	1.0	189	1.0	1.0	189	1.0	1.0

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-03			Field Sample ID: SS-03			Field Sample ID: SS-04			Field Sample ID: SS-04		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	11.9	1.0	1.0	11.9	1.0	1.0	18.4	1.0	1.0	18.4	1.0	1.0
Cadmium	0.50	0.50	0.50	0.50	0.50	0.50	6.4	0.50	0.50	6.4	0.50	0.50
Chromium	15.1	1.0	1.0	15.1	1.0	1.0	34.2	1.0	1.0	34.2	1.0	1.0
Copper	18.7	2.0	2.0	18.7	2.0	2.0	39.8	2.0	2.0	39.8	2.0	2.0
Iron	28000	10.0	10.0	28000	10.0	10.0	35100	10.0	10.0	35100	10.0	10.0
Lead	73.6	0.5	0.5	73.6	0.5	0.5	265	0.5	0.5	265	0.5	0.5
Manganese	296	1.0	1.0	296	1.0	1.0	1380	1.0	1.0	1380	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	15.9	4.0	4.0	15.9	4.0	4.0	18.5	4.0	4.0	18.5	4.0	4.0
Zinc	278	1.0	1.0	278	1.0	1.0	968	1.0	1.0	968	1.0	1.0

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-05 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-05(0-1) Lab Batch ID:			Field Sample ID: SS-05 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-05(0-1) Lab Batch ID:			Field Sample ID: SS-06 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-06(0-1) Lab Batch ID:			Field Sample ID: SS-06 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-06(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	8.0	1.0	1.0	8.0	1.0	1.0	13.2	1.0	1.0	13.2	1.0	1.0
Cadmium	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Chromium	17.9	1.0	1.0	17.9	1.0	1.0	25.1	1.0	1.0	25.1	1.0	1.0
Copper	16.2	2.0	2.0	16.2	2.0	2.0	27.4	2.0	2.0	27.4	2.0	2.0
Iron	17900	10.0	10.0	17900	10.0	10.0	26100	10.0	10.0	26100	10.0	10.0
Lead	92.7	0.5	0.5	92.7	0.5	0.5	156	0.5	0.5	156	0.5	0.5
Manganese	2340	1.0	1.0	2340	1.0	1.0	2440	1.0	1.0	2440	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Zinc	290	1.0	1.0	290	1.0	1.0	515	1.0	1.0	515	1.0	1.0

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-07 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-07(0-1) Lab Batch ID:			Field Sample ID: SS-07 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-07(0-1) Lab Batch ID:			Field Sample ID: SS-07 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-07(3-4) Lab Batch ID:			Field Sample ID: SS-07 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-07(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	9.8	1.0	1.0	9.8	1.0	1.0	1.7	1.0	1.0	1.7	1.0	1.0
Cadmium	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Chromium	30.1	1.0	1.0	30.1	1.0	1.0	11.3	1.0	1.0	11.3	1.0	1.0
Copper	34.5	2.0	2.0	34.5	2.0	2.0	2.7	2.0	2.0	2.7	2.0	2.0
Iron	28700	10.0	10.0	28700	10.0	10.0	12100	10.0	10.0	12100	10.0	10.0
Lead	129	0.5	0.5	129	0.5	0.5	9.3	0.5	0.5	9.3	0.5	0.5
Manganese	1380	1.0	1.0	1380	1.0	1.0	83.9	1.0	1.0	83.9	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	4.0	4.0	4.0	4.0	4.0	4.0	10.3	4.0	4.0	10.3	4.0	4.0
Zinc	397	1.0	1.0	397	1.0	1.0	44.2	1.0	1.0	44.2	1.0	1.0

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:
Extraction Method:
Analytical Method: 6010
Log Date: 10/01/94
Matrix:
Units: mg/kg

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-08			Field Sample ID: SS-08			Field Sample ID: SS-08			Field Sample ID: SS-08		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	1.7	1.0	1.0	1.7	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0
Cadmium	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Chromium	10.1	1.0	1.0	10.1	1.0	1.0	5.9	1.0	1.0	5.9	1.0	1.0
Copper	10.9	2.0	2.0	10.9	2.0	2.0	16.1	2.0	2.0	16.1	2.0	2.0
Iron	12000	10.0	10.0	12000	10.0	10.0	3070	10.0	10.0	3070	10.0	10.0
Lead	86.3	0.5	0.5	86.3	0.5	0.5	45.9	0.5	0.5	45.9	0.5	0.5
Manganese	426	1.0	1.0	426	1.0	1.0	576	1.0	1.0	576	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Zinc	287	1.0	1.0	287	1.0	1.0	30.2	1.0	1.0	30.2	1.0	1.0

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-13 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-13(O-1) Lab Batch ID:			Field Sample ID: SS-14 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-14(O-1) Lab Batch ID:			Field Sample ID: SS-14 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-14(O-1) Lab Batch ID:			Field Sample ID: SS-15 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-15(O-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	8.9	1.0	1.0	7.8	1.0	1.0	7.8	1.0	1.0	35.5	1.0	1.0
Cadmium	0.50	0.50	0.50	1.8	0.50	0.50	1.8	0.50	0.50	8.0	0.50	0.50
Chromium	27.5	1.0	1.0	38.3	1.0	1.0	38.3	1.0	1.0	192	1.0	1.0
Copper	26.6	2.0	2.0	25.2	2.0	2.0	25.2	2.0	2.0	73.7	2.0	2.0
Iron	31500	10.0	10.0	55600	10.0	10.0	55600	10.0	10.0	260000	10.0	10.0
Lead	107	0.5	0.5	162	0.5	0.5	162	0.5	0.5	251	0.5	0.5
Manganese	489	1.0	1.0	591	1.0	1.0	591	1.0	1.0	1720	1.0	1.0
Mercury	0.150	0.150	0.150	53.7	0.150	0.150	53.7	0.150	0.150	0.150	0.150	0.150
Nickel	30.4	4.0	4.0	24.9	4.0	4.0	24.9	4.0	4.0	63.4	4.0	4.0
Zinc	154	1.0	1.0	130	1.0	1.0	130	1.0	1.0	520	1.0	1.0

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-15 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-15(0-1) Lab Batch ID:			Field Sample ID: SS-16 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-16(0-1) Lab Batch ID:			Field Sample ID: SS-16 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-16(0-1) Lab Batch ID:			Field Sample ID: SS-16 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-16(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	22.2	6.0	6.0	22.2	6.0	6.0	6.0	6.0	6.0
Arsenic	35.5	1.0	1.0	24.5	1.0	1.0	24.5	1.0	1.0	22.0	1.0	1.0
Cadmium	8.0	0.50	0.50	10.9	0.50	0.50	10.9	0.50	0.50	3.6	0.50	0.50
Chromium	192	1.0	1.0	182	1.0	1.0	182	1.0	1.0	33.6	1.0	1.0
Copper	73.7	2.0	2.0	58.6	2.0	2.0	58.6	2.0	2.0	43.1	2.0	2.0
Iron	260000	10.0	10.0	275000	10.0	10.0	275000	10.0	10.0	69100	10.0	10.0
Lead	251	0.5	0.5	340	0.5	0.5	340	0.5	0.5	79.6	0.5	0.5
Manganese	1720	1.0	1.0	1530	1.0	1.0	1530	1.0	1.0	446	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel	63.4	4.0	4.0	31.6	4.0	4.0	31.6	4.0	4.0	26.8	4.0	4.0
Zinc	520	1.0	1.0	325	1.0	1.0	325	1.0	1.0	194	1.0	1.0

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

Base: (NA)

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-16 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-16(3-4) Lab Batch ID:			Field Sample ID: SS-17 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-17(0-1) Lab Batch ID:			Field Sample ID: SS-17 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-17(0-1) Lab Batch ID:			Field Sample ID: SS-18 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-18(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	24.3	6.0	6.0
	22.0	1.0	1.0	31.8	1.0	1.0	31.8	1.0	1.0	31.8	1.0	1.0
	3.6	0.50	0.50	10	0.50	0.50	10	0.50	0.50	11.6	0.50	0.50
	33.6	1.0	1.0	168	1.0	1.0	168	1.0	1.0	209	1.0	1.0
	43.1	2.0	2.0	51.9	2.0	2.0	51.9	2.0	2.0	58.8	2.0	2.0
	69100	10.0	10.0	267000	10.0	10.0	267000	10.0	10.0	342000	10.0	10.0
	79.6	0.5	0.5	282	0.5	0.5	282	0.5	0.5	358	0.5	0.5
	446	1.0	1.0	1580	1.0	1.0	1580	1.0	1.0	1690	1.0	1.0
	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
	26.8	4.0	4.0	24.2	4.0	4.0	24.2	4.0	4.0	32.2	4.0	4.0
	194	1.0	1.0	272	1.0	1.0	272	1.0	1.0	307	1.0	1.0

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE													
Parameters	Field Sample ID: SS-18 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-18(0-1) Lab Batch ID:			Field Sample ID: SS-19 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-19(0-1) Lab Batch ID:			Field Sample ID: SS-19 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-19(0-1) Lab Batch ID:			Field Sample ID: SS-20 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-20(0-1) Lab Batch ID:			
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	
Antimony	24.3	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Arsenic	31.8	1.0	1.0	36.8	1.0	1.0	36.8	1.0	1.0	46.4	1.0	1.0	
Cadmium	11.6	0.50	0.50	11.4	0.50	0.50	11.4	0.50	0.50	14.3	0.50	0.50	
Chromium	209	1.0	1.0	195	1.0	1.0	195	1.0	1.0	224	1.0	1.0	
Copper	58.8	2.0	2.0	57.9	2.0	2.0	57.9	2.0	2.0	64.3	2.0	2.0	
Iron	342000	10.0	10.0	359000	10.0	10.0	359000	10.0	10.0	412000	10.0	10.0	
Lead	358	0.5	0.5	287	0.5	0.5	287	0.5	0.5	377	0.5	0.5	
Manganese	1690	1.0	1.0	1610	1.0	1.0	1610	1.0	1.0	2010	1.0	1.0	
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
Nickel	32.2	4.0	4.0	33.8	4.0	4.0	33.8	4.0	4.0	30.1	4.0	4.0	
Zinc	307	1.0	1.0	263	1.0	1.0	263	1.0	1.0	258	1.0	1.0	

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-20 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-20(0-1) Lab Batch ID:			Field Sample ID: SS-20 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-20(2-3) Lab Batch ID:			Field Sample ID: SS-20 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-20(2-3) Lab Batch ID:			Field Sample ID: SS-21 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-21(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	46.4	1.0	1.0	67.3	1.0	1.0	67.3	1.0	1.0	41.5	1.0	1.0
Cadmium	14.3	0.50	0.50	10.8	0.50	0.50	10.8	0.50	0.50	8.8	0.50	0.50
Chromium	224	1.0	1.0	255	1.0	1.0	255	1.0	1.0	266	1.0	1.0
Copper	64.3	2.0	2.0	214	2.0	2.0	214	2.0	2.0	73.4	2.0	2.0
Iron	412000	10.0	10.0	294000	10.0	10.0	294000	10.0	10.0	486000	10.0	10.0
Lead	377	0.5	0.5	75.1	0.5	0.5	75.1	0.5	0.5	435	0.5	0.5
Manganese	2010	1.0	1.0	151	1.0	1.0	151	1.0	1.0	1160	1.0	1.0
Mercury	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.47	0.150	0.150
Nickel	30.1	4.0	4.0	96.5	4.0	4.0	96.5	4.0	4.0	6.4	4.0	4.0
Zinc	258	1.0	1.0	291	1.0	1.0	291	1.0	1.0	194	1.0	1.0

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-21 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-21(0-1) Lab Batch ID:			Field Sample ID: SS-21 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-21(2-3) Lab Batch ID:			Field Sample ID: SS-21 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-21(2-3) Lab Batch ID:			Field Sample ID: SS-22 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-22(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic	41.5	1.0	1.0	22.7	1.0	1.0	22.7	1.0	1.0	29.3	1.0	1.0
Cadmium	8.8	0.50	0.50	6.4	0.50	0.50	6.4	0.50	0.50	1.9	0.50	0.50
Chromium	266	1.0	1.0	83.6	1.0	1.0	83.6	1.0	1.0	122	1.0	1.0
Copper	73.4	2.0	2.0	201	2.0	2.0	201	2.0	2.0	181	2.0	2.0
Iron	486000	10.0	10.0	215000	10.0	10.0	215000	10.0	10.0	166000	10.0	10.0
Lead	435	0.5	0.5	104	0.5	0.5	104	0.5	0.5	122	0.5	0.5
Manganese	1160	1.0	1.0	2060	1.0	1.0	2060	1.0	1.0	638	1.0	1.0
Mercury	0.47	0.150	0.150	0.51	0.150	0.150	0.51	0.150	0.150	0.150	0.150	0.150
Nickel	6.4	4.0	4.0	62.5	4.0	4.0	62.5	4.0	4.0	70.4	4.0	4.0
Zinc	194	1.0	1.0	278	1.0	1.0	278	1.0	1.0	244	1.0	1.0

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-22			Field Sample ID: SS-23			Field Sample ID: SS-23			Field Sample ID: SS-23		
	Sbd: 0.00	Sed: 1.00	Column: PR	Sbd: 0.00	Sed: 1.00	Column: PR	Sbd: 0.00	Sed: 1.00	Column: PR	Sbd: 1.00	Sed: 2.00	Column: PR
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	6.0	6.0	6.0	72.8	6.0	6.0	72.8	6.0	6.0			
Arsenic	29.3	1.0	1.0	27.0	1.0	1.0	27.0	1.0	1.0			
Cadmium	1.9	0.50	0.50	14.1	0.50	0.50	14.1	0.50	0.50			
Chromium	122	1.0	1.0	317	1.0	1.0	317	1.0	1.0			
Copper	181	2.0	2.0	63.1	2.0	2.0	63.1	2.0	2.0			
Iron	166000	10.0	10.0	466000	10.0	10.0	466000	10.0	10.0			
Lead	122	0.5	0.5	504	0.5	0.5	504	0.5	0.5			
Manganese	638	1.0	1.0	75.6	1.0	1.0	75.6	1.0	1.0			
Mercury	0.150	0.150	0.150	0.47	0.150	0.150	0.47	0.150	0.150			
Nickel	70.4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			
Zinc	244	1.0	1.0	114	1.0	1.0	114	1.0	1.0			

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 10/01/94

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-23 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-23(1-2) Lab Batch ID:			Field Sample ID: SS-23 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: Lab Batch ID:			Field Sample ID: SS-24 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-24(0-1) Lab Batch ID:			Field Sample ID: SS-24 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-24(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony				6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Arsenic				9.7	1.0	1.0	57.0	1.0	1.0	57.0	1.0	1.0
Cadmium				0.50	0.50	0.50	11.0	0.50	0.50	11.0	0.50	0.50
Chromium				35.6	1.0	1.0	218	1.0	1.0	218	1.0	1.0
Copper				59.5	2.0	2.0	38.1	2.0	2.0	38.1	2.0	2.0
Iron				40400	10.0	10.0	327000	10.0	10.0	327000	10.0	10.0
Lead				64.2	0.5	0.5	505	0.5	0.5	505	0.5	0.5
Manganese				105	1.0	1.0	87.9	1.0	1.0	87.9	1.0	1.0
Mercury				0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Nickel				172	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Zinc				192	1.0	1.0	96.1	1.0	1.0	96.1	1.0	1.0

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/23/96

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-27 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-27(0-1) Lab Batch ID:			Field Sample ID: SS-27 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-27(1-2) Lab Batch ID:			Field Sample ID: SS-27 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-27(2-3) Lab Batch ID:			Field Sample ID: SS-27 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-27(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	22.1	6.00	6.00	25.4	6.00	6.00	14.3	6.00	6.00	7.27	6.00	6.00
Arsenic	28.8	1.00	1.00	57.9	1.00	1.00	8.77	1.00	1.00	1.75	1.00	1.00
Cadmium	1.84	0.500	0.500	2.12	0.500	0.500	1.19	0.500	0.500	0.606	0.500	0.500
Chromium	72.3	1.00	1.00	82.1	1.00	1.00	22.6	1.00	1.00	15.6	1.00	1.00
Copper	93.3	2.00	2.00	85.1	2.00	2.00	39.4	2.00	2.00	13.8	2.00	2.00
Iron	314000	100	100	249000	100	100	55800	1.0	1.0	16200	1.0	1.0
Lead	371	0.500	0.500	333	0.500	0.500	38.1	0.500	0.500	9.07	0.500	0.500
Manganese	423	1.00	1.00	135	1.00	1.00	161	1.00	1.00	108	1.00	1.00
Mercury	0.611	0.150	0.150	0.640	0.150	0.150	0.356	0.150	0.150	0.182	0.150	0.150
Nickel	26.7	4.00	4.00	98.6	4.00	4.00	22.2	4.00	4.00	18.2	4.00	4.00
Zinc	331	1.00	1.00	305	1.00	1.00	65.8	1.00	1.00	57.7	1.00	1.00

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/23/96

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-27 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-27(4-5) Lab Batch ID:			Field Sample ID: SS-28 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-28(0-1) Lab Batch ID:			Field Sample ID: SS-28 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-28(1-2) Lab Batch ID:			Field Sample ID: SS-29 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-29(2-3) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	7.47	6.00	6.00	14.5	6.00	6.00	9.48	6.00	6.00	18.6	6.00	6.00
Arsenic	4.36	1.00	1.00	10.6	1.00	1.00	8.40	1.00	1.00	44.8	1.00	1.00
Cadmium	0.623	0.500	0.500	1.20	0.500	0.500	0.790	0.500	0.500	1.55	0.500	0.500
Chromium	14.7	1.00	1.00	52.9	1.00	1.00	52.5	1.00	1.00	80.0	1.00	1.00
Copper	22.8	2.00	2.00	50.5	2.00	2.00	79.0	2.00	2.00	53.2	2.00	2.00
Iron	22400	1.0	1.0	62300	10.0	10.0	37000	10.0	10.0	172000	10.0	10.0
Lead	9.01	0.500	0.500	156	0.500	0.500	82.1	0.500	0.500	202	0.500	0.500
Manganese	238	1.00	1.00	574	1.00	1.00	429	1.00	1.00	179	1.00	1.00
Mercury	0.187	0.150	0.150	0.361	0.150	0.150	0.237	0.150	0.150	0.552	0.150	0.150
Nickel	25.6	4.00	4.00	28.5	4.00	4.00	85.5	4.00	4.00	47.6	4.00	4.00
Zinc	55.8	1.00	1.00	303	1.00	1.00	281	1.00	1.00	113	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/23/96

Matrix:

Units: mg/kg

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-29 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-29(3-4) Lab Batch ID:			Field Sample ID: SS-29 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-29(4-5) Lab Batch ID:			Field Sample ID: SS-30 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-30(2-3) Lab Batch ID:			Field Sample ID: SS-30 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-30(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	10.1	6.00	6.00	7.28	6.00	6.00	13.7	6.00	6.00	8.15	6.00	6.00
Arsenic	5.84	1.00	1.00	1.85	1.00	1.00	5.19	1.00	1.00	4.35	1.00	1.00
Cadmium	0.845	0.500	0.500	0.607	0.500	0.500	1.14	0.500	0.500	0.679	0.500	0.500
Chromium	19.7	1.00	1.00	9.70	1.00	1.00	28.3	1.00	1.00	20.3	1.00	1.00
Copper	29.9	2.00	2.00	6.33	2.00	2.00	32.3	2.00	2.00	25.5	2.00	2.00
Iron	37600	10.0	10.0	10400	10.0	10.0	33000	10.0	10.0	21600	10.0	10.0
Lead	18.4	0.500	0.500	5.44	0.500	0.500	30.1	0.500	0.500	20.0	0.500	0.500
Manganese	92.6	1.00	1.00	60.7	1.00	1.00	112	1.00	1.00	104	1.00	1.00
Mercury	0.263	0.150	0.150	0.182	0.150	0.150	0.411	0.150	0.150	0.204	0.150	0.150
Nickel	14.1	4.00	4.00	11.1	4.00	4.00	19.4	4.00	4.00	21.2	4.00	4.00
Zinc	46.5	1.00	1.00	28.9	1.00	1.00	62.6	1.00	1.00	70.6	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:
Extraction Method:
Analytical Method: 6010
Log Date: 09/23/96
Matrix:
Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-30 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-30(4-5) Lab Batch ID:			Field Sample ID: SS-31 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-31(2-3) Lab Batch ID:			Field Sample ID: SS-31 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-31(3-4) Lab Batch ID:			Field Sample ID: SS-31 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-31(4-5) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	7.40	6.00	6.00	15.2	6.00	6.00	14.1	6.00	6.00	7.24	6.00	6.00
Arsenic	3.25	1.00	1.00	16.8	1.00	1.00	9.79	1.00	1.00	3.02	1.00	1.00
Cadmium	0.617	0.500	0.500	1.27	0.500	0.500	1.18	0.500	0.500	0.603	0.500	0.500
Chromium	12.8	1.00	1.00	58.7	1.00	1.00	39.3	1.00	1.00	13.8	1.00	1.00
Copper	11.0	2.00	2.00	41.9	2.00	2.00	79.5	2.00	2.00	15.2	2.00	2.00
Iron	15500	10.0	10.0	44900	10.0	10.0	46000	10.0	10.0	17000	10.0	10.0
Lead	8.56	0.500	0.500	48.5	0.500	0.500	40.5	0.500	0.500	10.3	0.500	0.500
Manganese	84.3	1.00	1.00	120	1.00	1.00	157	1.00	1.00	93.4	1.00	1.00
Mercury	0.185	0.150	0.150	0.380	0.150	0.150	0.405	0.150	0.150	0.181	0.150	0.150
Nickel	16.2	4.00	4.00	17.5	4.00	4.00	29.8	4.00	4.00	15.6	4.00	4.00
Zinc	49.1	1.00	1.00	41.5	1.00	1.00	148	1.00	1.00	49.3	1.00	1.00

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/23/96

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE											
Parameters	Field Sample ID: SS-32 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-32(2-3) Lab Batch ID:			Field Sample ID: SS-32 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-32(3-4) Lab Batch ID:			Field Sample ID: SS-32 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-32(4-5) Lab Batch ID:			Field Sample ID: Sbd: Sed: Sacode: Column: Field Batch ID: Lab Sample ID: Lab Batch ID:	
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	PQL
Antimony	16.3	6.00	6.00	18.7	6.00	6.00	7.51	6.00	6.00		
Arsenic	29.8	1.00	1.00	6.17	1.00	1.00	1.47	1.00	1.00		
Cadmium	2.28	0.500	0.500	1.61	0.500	0.500	0.626	0.500	0.500		
Chromium	210	1.00	1.00	28.3	1.00	1.00	18.1	1.00	1.00		
Copper	1720	2.00	2.00	56.9	2.00	2.00	32.7	2.00	2.00		
Iron	53600	10.0	10.0	39300	10.0	10.0	13400	10.0	10.0		
Lead	84.3	0.500	0.500	26.6	0.500	0.500	8.40	0.500	0.500		
Manganese	54.7	1.00	1.00	153	1.00	1.00	79.7	1.00	1.00		
Mercury	0.408	0.150	0.150	0.558	0.150	0.150	0.188	0.150	0.150		
Nickel	158	4.00	4.00	129	4.00	4.00	14.4	4.00	4.00		
Zinc	345	1.00	1.00	88.9	1.00	1.00	50.3	1.00	1.00		

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/24/96

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-33 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-33(2-3) Lab Batch ID:			Field Sample ID: SS-33 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-33(3-4) Lab Batch ID:			Field Sample ID: SS-33 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-33(4-5) Lab Batch ID:			Field Sample ID: SS-34 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-34(2-3) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	22.6	6.00	6.00	9.16	6.00	6.00	7.21	6.00	6.00	31.4	6.00	6.00
Arsenic	54.4	1.00	1.00	5.35	1.00	1.00	1.53	1.00	1.00	86.9	1.00	1.00
Cadmium	1.89	0.500	0.500	0.763	0.500	0.500	0.601	0.500	0.500	2.62	0.500	0.500
Chromium	211	1.00	1.00	17.9	1.00	1.00	10.4	1.00	1.00	315	1.00	1.00
Copper	219	2.00	2.00	26.6	2.00	2.00	6.92	2.00	2.00	138	2.00	2.00
Iron	360000	10.0	10.0	24200	10.0	10.0	11800	10.0	10.0	480000	10.0	10.0
Lead	69.8	0.500	0.500	14.1	0.500	0.500	6.51	0.500	0.500	169	0.500	0.500
Manganese	225	1.00	1.00	109	1.00	1.00	58.0	1.00	1.00	306	1.00	1.00
Mercury	0.566	0.150	0.150	0.229	0.150	0.150	0.180	0.150	0.150	0.785	0.150	0.150
Nickel	71.1	4.00	4.00	20.0	4.00	4.00	9.97	4.00	4.00	80.4	4.00	4.00
Zinc	153	1.00	1.00	70.4	1.00	1.00	37.2	1.00	1.00	344	1.00	1.00

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/24/96

Matrix:

Units: mg/kg

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-34			Field Sample ID: SS-34			Field Sample ID: SS-34			Field Sample ID: SS-35		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	9.63	6.00	6.00	7.15	6.00	6.00	16.6	6.00	6.00	29.1	6.00	6.00
Arsenic	6.29	1.00	1.00	7.6	1.00	1.00	46.4	1.00	1.00	25.0	1.00	1.00
Cadmium	0.803	0.500	0.500	0.596	0.500	0.500	1.38	0.500	0.500	2.43	0.500	0.500
Chromium	26.4	1.00	1.00	16.0	1.00	1.00	115	1.00	1.00	76.2	1.00	1.00
Copper	52.8	2.00	2.00	28.9	2.00	2.00	70.3	2.00	2.00	83.5	2.00	2.00
Iron	27400	10.0	10.0	23100	10.0	10.0	263000	10.0	10.0	147000	10.0	10.0
Lead	16.1	0.500	0.500	9.39	0.500	0.500	94.2	0.500	0.500	39.6	0.500	0.500
Manganese	178	1.00	1.00	372	1.00	1.00	707	1.00	1.00	518	1.00	1.00
Mercury	0.241	0.150	0.150	0.179	0.150	0.150	0.414	0.150	0.150	0.728	0.150	0.150
Nickel	37.6	4.00	4.00	26.4	4.00	4.00	45.5	4.00	4.00	43.9	4.00	4.00
Zinc	93.9	1.00	1.00	63.7	1.00	1.00	262	1.00	1.00	150	1.00	1.00

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/24/96

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-35 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-35(4-5) Lab Batch ID:			Field Sample ID: SS-36 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-36(2-3) Lab Batch ID:			Field Sample ID: SS-36 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-36(3-4) Lab Batch ID:			Field Sample ID: SS-36 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-36(4-5) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	10.1	6.00	6.00	26.2	6.00	6.00	30.9	6.00	6.00	7.50	6.00	6.00
Arsenic	1.82	1.00	1.00	35.6	1.00	1.00	56.8	1.00	1.00	9.54	1.00	1.00
Cadmium	0.843	0.500	0.500	2.18	0.500	0.500	2.58	0.500	0.500	0.625	0.500	0.500
Chromium	19.3	1.00	1.00	210	1.00	1.00	360	1.00	1.00	11.1	1.00	1.00
Copper	20.9	2.00	2.00	66.2	2.00	2.00	133	2.00	2.00	29.0	2.00	2.00
Iron	19200	10.0	10.0	387000	10.0	10.0	531000	10.0	10.0	40000	10.0	10.0
Lead	9.08	0.500	0.500	164	0.500	0.500	240	0.500	0.500	21.6	0.500	0.500
Manganese	173	1.00	1.00	857	1.00	1.00	304	1.00	1.00	6280	1.00	1.00
Mercury	0.253	0.150	0.150	0.655	0.150	0.150	0.773	0.150	0.150	0.188	0.150	0.150
Nickel	27.9	4.00	4.00	21.8	4.00	4.00	38.9	4.00	4.00	12.2	4.00	4.00
Zinc	90.1	1.00	1.00	179	1.00	1.00	490	1.00	1.00	143	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:
Extraction Method:
Analytical Method: 6010
Log Date: 09/24/96
Matrix:
Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-44			Field Sample ID: SS-45			Field Sample ID:			Field Sample ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Sbd:	Sed:	Column:	Sbd:	Sed:	Column:
Antimony	40.3	6.00	6.00	69.0	6.00	6.00	Sacode:	1.00	PR	Field Batch ID:	Lab Sample ID:	Lab Batch ID:
Arsenic	23.2	1.00	1.00	26.7	1.00	1.00	Field Batch ID:	SS-45(0-1)		Field Batch ID:	Lab Sample ID:	Lab Batch ID:
Cadmium	4.05	0.500	0.500	6.85	0.500	0.500	Lab Sample ID:			Lab Sample ID:		
Chromium	48.8	1.00	1.00	67.2	1.00	1.00	Lab Batch ID:			Lab Batch ID:		
Copper	194	2.00	2.00	87.2	2.00	2.00						
Iron	67000	100	100	74700	100	100						
Lead	234	0.500	0.500	441	0.500	0.500						
Manganese	725	1.00	1.00	1130	1.00	1.00						
Mercury	1.01	0.150	0.150	1.72	0.150	0.150						
Nickel	37.8	4.00	4.00	47.4	4.00	4.00						
Zinc	846	1.00	1.00	1390	1.00	1.00						

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:
Extraction Method:
Analytical Method: 6010
Log Date: 09/25/96
Matrix:
Units: mg/kg

ENVIRONMENTAL SAMPLE											
Parameters	Field Sample ID: SS-40			Field Sample ID: SS-40			Field Sample ID: SS-41				
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Field Sample ID: SS-41	
Antimony	17.3	6.00	6.00	15.0	6.00	6.00	23.1	6.00	6.00	Sbd: 0.00 Sed: 1.00	
Arsenic	12.5	1.00	1.00	13.3	1.00	1.00	14.3	1.00	1.00	Sacode: Column: PR	
Cadmium	1.64	0.500	0.500	1.25	0.500	0.500	1.99	0.500	0.500	Field Batch ID:	
Chromium	22.3	1.00	1.00	18.9	1.00	1.00	21.9	1.00	1.00	Lab Sample ID: SS-41(0-1)	
Copper	25.8	2.00	2.00	32.6	2.00	2.00	25.9	2.00	2.00	Lab Batch ID:	
Iron	22900	100	100	32300	10.0	10.0	22000	100	100		
Lead	106	0.500	0.500	62.8	0.500	0.500	146	0.500	0.500		
Manganese	2110	1.00	1.00	728	1.00	1.00	2330	1.00	1.00		
Mercury	0.432	0.150	0.150	0.376	0.150	0.150	0.577	0.150	0.150		
Nickel	11.8	4.00	4.00	17.1	4.00	4.00	15.4	4.00	4.00		
Zinc	352	1.00	1.00	268	1.00	1.00	401	1.00	1.00		

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/25/96

Matrix:

Units: mg/kg

Parameters	ENVIRONMENTAL SAMPLE											
	Field Sample ID: SS-41 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-41(1-2) Lab Batch ID:			Field Sample ID: SS-41 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-41(2-3) Lab Batch ID:			Field Sample ID: SS-41 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-41(3-4) Lab Batch ID:			Field Sample ID: SS-42 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-42(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	15.3	6.00	6.00	7.89	6.00	6.00	7.43	6.00	6.00	15.9	6.00	6.00
Arsenic	14.1	1.00	1.00	10.6	1.00	1.00	11.3	1.00	1.00	9.94	1.00	1.00
Cadmium	1.28	0.500	0.500	0.658	0.500	0.500	0.620	0.500	0.500	1.33	0.500	0.500
Chromium	24.8	1.00	1.00	28.9	1.00	1.00	27.5	1.00	1.00	33.4	1.00	1.00
Copper	35.7	2.00	2.00	37.3	2.00	2.00	34.4	2.00	2.00	33.8	2.00	2.00
Iron	49400	10.0	10.0	43600	10.0	10.0	35200	10.0	10.0	39900	100	100
Lead	43.6	0.500	0.500	13.7	0.500	0.500	12.1	0.500	0.500	48.8	0.500	0.500
Manganese	383	1.00	1.00	640	1.00	1.00	628	1.00	1.00	995	1.00	1.00
Mercury	0.384	0.150	0.150	0.197	0.150	0.150	0.192	0.150	0.150	0.398	0.150	0.150
Nickel	27.8	4.00	4.00	40.5	4.00	4.00	35.0	4.00	4.00	42.4	4.00	4.00
Zinc	254	1.00	1.00	88.1	1.00	1.00	77.7	1.00	1.00	176	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/25/96

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-42 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-42(1-2) Lab Batch ID:			Field Sample ID: SS-42 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-42(2-3) Lab Batch ID:			Field Sample ID: SS-42 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-42(3-4) Lab Batch ID:			Field Sample ID: SS-43 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-43(0-1) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	12.6	6.00	6.00	7.93	6.00	6.00	7.69	6.00	6.00	29.1	6.00	6.00
Arsenic	8.18	1.00	1.00	2.70	1.00	1.00	10.6	1.00	1.00	16.4	1.00	1.00
Cadmium	1.05	0.500	0.500	0.661	0.500	0.500	0.641	0.500	0.500	2.43	0.500	0.500
Chromium	21.3	1.00	1.00	27.9	1.00	1.00	25.6	1.00	1.00	21.6	1.00	1.00
Copper	33.4	2.00	2.00	26.2	2.00	2.00	31.4	2.00	2.00	27.1	2.00	2.00
Iron	29500	10.0	10.0	27200	10.0	10.0	34900	10.0	10.0	23400	100	100
Lead	37.3	0.500	0.500	13.7	0.500	0.500	10.2	0.500	0.500	138	0.500	0.500
Manganese	372	1.00	1.00	190	1.00	1.00	405	1.00	1.00	1850	1.00	1.00
Mercury	0.314	0.150	0.150	0.198	0.150	0.150	0.192	0.150	0.150	0.728	0.150	0.150
Nickel	20.4	4.00	4.00	39.4	4.00	4.00	36.3	4.00	4.00	19.4	4.00	4.00
Zinc	159	1.00	1.00	90.5	1.00	1.00	78.6	1.00	1.00	392	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:
Extraction Method:
Analytical Method: 6010
Log Date: 09/25/96
Matrix:
Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-43 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-43(1-2) Lab Batch ID:			Field Sample ID: SS-43 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-43(2-3) Lab Batch ID:			Field Sample ID: SS-43 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-43(3-4) Lab Batch ID:			Field Sample ID: SS-44 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-44(1-2) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	18.5	6.00	6.00	8.05	6.00	6.00	7.59	6.00	6.00	9.09	6.00	6.00
Arsenic	16.2	1.00	1.00	3.43	1.00	1.00	7.55	1.00	1.00	5.94	1.00	1.00
Cadmium	3.13	0.500	0.500	0.671	0.500	0.500	0.633	0.500	0.500	0.758	0.500	0.500
Chromium	27.0	1.00	1.00	20.6	1.00	1.00	22.2	1.00	1.00	12.1	1.00	1.00
Copper	33.6	2.00	2.00	13.6	2.00	2.00	30.0	2.00	2.00	29.7	2.00	2.00
Iron	25600	10.0	10.0	17400	10.0	10.0	39700	10.0	10.0	13800	10.0	10.0
Lead	198	0.500	0.500	18.9	0.500	0.500	13.3	0.500	0.500	9.70	0.500	0.500
Manganese	2160	1.00	1.00	180	1.00	1.00	774	1.00	1.00	198	1.00	1.00
Mercury	0.463	0.150	0.150	0.201	0.150	0.150	0.190	0.150	0.150	0.227	0.150	0.150
Nickel	14.1	4.00	4.00	16.9	4.00	4.00	32.5	4.00	4.00	14.3	4.00	4.00
Zinc	634	1.00	1.00	76.8	1.00	1.00	76.0	1.00	1.00	49.6	1.00	1.00

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/25/96

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-44 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-44(2-3) Lab Batch ID:			Field Sample ID: SS-44 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-44(3-4) Lab Batch ID:			Field Sample ID: SS-44 Sbd: 4.00 Sed: 5.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-44(4-5) Lab Batch ID:			Field Sample ID: SS-45 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-45(1-2) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	7.59	6.00	6.00	7.31	6.00	6.00	7.38	6.00	6.00	7.43	6.00	6.00
Arsenic	1.27	1.00	1.00	3.85	1.00	1.00	6.61	1.00	1.00	4.72	1.00	1.00
Cadmium	0.633	0.500	0.500	0.609	0.500	0.500	0.615	0.500	0.500	0.620	0.500	0.500
Chromium	8.95	1.00	1.00	23.0	1.00	1.00	20.6	1.00	1.00	23.4	1.00	1.00
Copper	10.8	2.00	2.00	37.2	2.00	2.00	32.8	2.00	2.00	32.8	2.00	2.00
Iron	7220	10.0	10.0	26600	10.0	10.0	27100	10.0	10.0	33000	10.0	10.0
Lead	6.60	0.500	0.500	13.2	0.500	0.500	11.9	0.500	0.500	14.8	0.500	0.500
Manganese	67.0	1.00	1.00	390	1.00	1.00	350	1.00	1.00	175	1.00	1.00
Mercury	0.190	0.150	0.150	0.183	0.150	0.150	0.185	0.150	0.150	0.186	0.150	0.150
Nickel	11.3	4.00	4.00	35.0	4.00	4.00	32.7	4.00	4.00	34.2	4.00	4.00
Zinc	26.9	1.00	1.00	83.6	1.00	1.00	75.6	1.00	1.00	79.3	1.00	1.00

Base: {NA}

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/25/96

Matrix:

Units: mg/kg

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-45 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-45(2-3) Lab Batch ID:			Field Sample ID: SS-46 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-46(0-1) Lab Batch ID:			Field Sample ID: SS-46 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-46(1-2) Lab Batch ID:			Field Sample ID: SS-46 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-46(2-3) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	7.25	6.00	6.00	83.3	6.00	6.00	7.94	6.00	6.00	7.85	6.00	6.00
Arsenic	7.86	1.00	1.00	26.5	1.00	1.00	2.32	1.00	1.00	17.3	1.00	1.00
Cadmium	0.604	0.500	0.500	8.57	0.500	0.500	0.661	0.500	0.500	0.654	0.500	0.500
Chromium	18.0	1.00	1.00	79.8	1.00	1.00	26.4	1.00	1.00	22.8	1.00	1.00
Copper	13.7	2.00	2.00	87.8	2.00	2.00	6.29	2.00	2.00	30.7	2.00	2.00
Iron	29700	10.0	10.0	68800	100	100	19700	10.0	10.0	40900	10.0	10.0
Lead	9.75	0.500	0.500	524	0.500	0.500	13.6	0.500	0.500	15.0	0.500	0.500
Manganese	163	1.00	1.00	760	1.00	1.00	152	1.00	1.00	427	1.00	1.00
Mercury	0.181	0.150	0.150	2.08	0.150	0.150	0.198	0.150	0.150	0.196	0.150	0.150
Nickel	24.3	4.00	4.00	55.6	4.00	4.00	23.2	4.00	4.00	38.3	4.00	4.00
Zinc	71.6	1.00	1.00	1710	1.00	1.00	99.7	1.00	1.00	80.9	1.00	1.00

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/25/96

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-46 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-46(3-4) Lab Batch ID:			Field Sample ID: SS-47 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-47(0-1) Lab Batch ID:			Field Sample ID: SS-47 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-47(1-2) Lab Batch ID:			Field Sample ID: SS-47 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-47(2-3) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	7.34	6.00	6.00	46.5	6.00	6.00	9.90	6.00	6.00	7.37	6.00	6.00
Arsenic	6.64	1.00	1.00	19.3	1.00	1.00	4.45	1.00	1.00	8.49	1.00	1.00
Cadmium	0.612	0.500	0.500	3.88	0.500	0.500	0.825	0.500	0.500	0.614	0.500	0.500
Chromium	11.8	1.00	1.00	35.7	1.00	1.00	18.3	1.00	1.00	22.5	1.00	1.00
Copper	16.5	2.00	2.00	43.6	2.00	2.00	21.2	2.00	2.00	30.2	2.00	2.00
Iron	17200	10.0	10.0	35400	100	100	14900	10.0	10.0	38500	10.0	10.0
Lead	6.82	0.500	0.500	224	0.500	0.500	16.5	0.500	0.500	13.4	0.500	0.500
Manganese	359	1.00	1.00	1440	1.00	1.00	162	1.00	1.00	766	1.00	1.00
Mercury	0.184	0.150	0.150	1.16	0.150	0.150	0.248	0.150	0.150	0.184	0.150	0.150
Nickel	15.1	4.00	4.00	31.0	4.00	4.00	15.1	4.00	4.00	37.8	4.00	4.00
Zinc	52.8	1.00	1.00	648	1.00	1.00	73.6	1.00	1.00	83.5	1.00	1.00

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/26/96

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-37 Sbd: 0.00 Sed: 1.00 Sacode: Columnn: PR Field Batch ID: Lab Sample ID: SS-37(0-1) Lab Batch ID:			Field Sample ID: SS-37 Sbd: 1.00 Sed: 2.00 Sacode: Columnn: PR Field Batch ID: Lab Sample ID: SS-37(1-2) Lab Batch ID:			Field Sample ID: SS-37 Sbd: 2.00 Sed: 3.00 Sacode: Columnn: PR Field Batch ID: Lab Sample ID: SS-37(2-3) Lab Batch ID:			Field Sample ID: SS-37 Sbd: 3.00 Sed: 4.00 Sacode: Columnn: PR Field Batch ID: Lab Sample ID: SS-37(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	16.6	6.00	6.00	16.9	6.00	6.00	7.77	6.00	6.00	7.52	6.00	6.00
Arsenic	9.71	1.00	1.00	24.8	1.00	1.00	1.60	1.00	1.00	8.43	1.00	1.00
Cadmium	1.39	0.500	0.500	2.44	0.500	0.500	0.648	0.500	0.500	0.627	0.500	0.500
Chromium	17.1	1.00	1.00	29.0	1.00	1.00	21.4	1.00	1.00	23.2	1.00	1.00
Copper	23.3	2.00	2.00	39.9	2.00	2.00	12.7	2.00	2.00	31.1	2.00	2.00
Iron	16100	100	100	54300	10.0	10.0	14100	10.0	10.0	42300	10.0	10.0
Lead	66.4	0.500	0.500	156	0.500	0.500	14.8	0.500	0.500	13.2	0.500	0.500
Manganese	1470	1.00	1.00	1820	1.00	1.00	112	1.00	1.00	656	1.00	1.00
Mercury	0.416	0.150	0.150	0.421	0.150	0.150	0.194	0.150	0.150	0.188	0.150	0.150
Nickel	12.1	4.00	4.00	18.3	4.00	4.00	19.9	4.00	4.00	36.3	4.00	4.00
Zinc	182	1.00	1.00	661	1.00	1.00	70.3	1.00	1.00	79.6	1.00	1.00

Base: {NA}

Table 1
ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/26/96

Matrix:

Units: mg/kg

ENVIRONMENTAL SAMPLE													
Parameters	Field Sample ID: SS-38 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-38(0-1) Lab Batch ID:			Field Sample ID: SS-38 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-38(1-2) Lab Batch ID:			Field Sample ID: SS-38 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-38(2-3) Lab Batch ID:			Field Sample ID: SS-38 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-38(3-4) Lab Batch ID:			
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	
Antimony	13.0	6.00	6.00	18.6	6.00	6.00	7.81	6.00	6.00	7.21	6.00	6.00	
Arsenic	9.86	1.00	1.00	12.7	1.00	1.00	2.39	1.00	1.00	11.0	1.00	1.00	
Cadmium	1.08	0.500	0.500	1.55	0.500	0.500	0.651	0.500	0.500	0.601	0.500	0.500	
Chromium	16.0	1.00	1.00	26.0	1.00	1.00	16.9	1.00	1.00	21.2	1.00	1.00	
Copper	18.1	2.00	2.00	52.7	2.00	2.00	7.36	2.00	2.00	27.4	2.00	2.00	
Iron	15600	100	100	41400	10.0	10.0	9610	10.0	10.0	30200	10.0	10.0	
Lead	72.3	0.500	0.500	41.4	0.500	0.500	8.10	0.500	0.500	11.3	0.500	0.500	
Manganese	1940	1.00	1.00	364	1.00	1.00	70.8	1.00	1.00	499	1.00	1.00	
Mercury	0.325	0.150	0.150	0.466	0.150	0.150	0.195	0.150	0.150	0.180	0.150	0.150	
Nickel	10.2	4.00	4.00	33.2	4.00	4.00	19.2	4.00	4.00	34.7	4.00	4.00	
Zinc	210	1.00	1.00	190	1.00	1.00	67.5	1.00	1.00	76.1	1.00	1.00	

Base: {NA}

Table 1

ANALYTICAL DATA SUMMARY
TOTAL METALS SUMMARY

11/04/96

Site:

Extraction Method:

Analytical Method: 6010

Log Date: 09/26/96

Matrix:

Units: mg/kg

Units: mg/kg

ENVIRONMENTAL SAMPLE												
Parameters	Field Sample ID: SS-39 Sbd: 0.00 Sed: 1.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-39(0-1) Lab Batch ID:			Field Sample ID: SS-39 Sbd: 1.00 Sed: 2.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-39(1-2) Lab Batch ID:			Field Sample ID: SS-39 Sbd: 2.00 Sed: 3.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-39(2-3) Lab Batch ID:			Field Sample ID: SS-39 Sbd: 3.00 Sed: 4.00 Sacode: Column: PR Field Batch ID: Lab Sample ID: SS-39(3-4) Lab Batch ID:		
	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL	Parameter Result	MDL	PQL
Antimony	15.9	6.00	6.00	21.7	6.00	6.00	7.69	6.00	6.00	7.34	6.00	6.00
Arsenic	12.0	1.00	1.00	25.9	1.00	1.00	1.82	1.00	1.00	10.7	1.00	1.00
Cadmium	1.32	0.500	0.500	1.81	0.500	0.500	0.641	0.500	0.500	0.612	0.500	0.500
Chromium	19.2	1.00	1.00	25.8	1.00	1.00	19.9	1.00	1.00	23.9	1.00	1.00
Copper	20.9	2.00	2.00	49.9	2.00	2.00	11.3	2.00	2.00	27.0	2.00	2.00
Iron	15800	100	100	68400	10.0	10.0	12200	10.0	10.0	40700	10.0	10.0
Lead	99.0	0.500	0.500	70.5	0.500	0.500	8.63	0.500	0.500	12.1	0.500	0.500
Manganese	2280	1.00	1.00	600	1.00	1.00	93.3	1.00	1.00	215	1.00	1.00
Mercury	0.397	0.150	0.150	0.543	0.150	0.150	0.221	0.150	0.150	0.184	0.150	0.150
Nickel	10.6	4.00	4.00	27.2	4.00	4.00	21.0	4.00	4.00	40.9	4.00	4.00
Zinc	286	1.00	1.00	382	1.00	1.00	75.2	1.00	1.00	85.6	1.00	1.00

APPENDIX D
DATA VALIDATION



November 1, 1996

Mr. Rick Frappa
Malcolm Pirnie
40 Centre Drive
Orchard Park, NY 14127

Dear Mr. Frappa:

Please find enclosed the analytical results of samples SS-36 (4-5), CAS #103288 and SS-32 (4-5), CAS #103253. These results have been recalculated based on a total solids content of 80%. This was done to more closely reflect the solids content of other samples in this project taken at a depth of 4-5 feet. The original solids content calculated for the 2 samples were anomalous to the other samples.

If you have any questions please call me at (716) 454-6810.

Sincerely,

COLUMBIA ANALYTICAL SERVICES

A handwritten signature in black ink, appearing to read 'Mark Wilson', is written over the typed name.

Mark Wilson
Project Chemist

CASE NARRATIVE

COMPANY: Malcolm Pirnie
Marilla St
SUBMISSION #: 9609000244
SDG#: SS28

MPI soil samples were collected on 09/23/96 and received at CAS on 9/27/96 in good condition at a cooler temperature of 5.0 C. See the attached batching form.

METALS ANALYSIS

Twenty soil samples were analyzed for a site specific list of metals by SW-846 ICP method 6010 and cold vapor method 7470 for Mercury. All data was reported with NYSDEC ASP B deliverables.

Sample SS27(3-4) was analyzed for QC. The Antimony results and % recovery were flagged with a "N" since the Matrix Spike recovery was outside of advisory QC limits of 75 - 125 %. The Matrix Spike recovery for Iron could not be determined since the amount detected in the sample was over 100x greater than the amount added. The recovery was flagged with a "D". All other matrix spike recoveries, Blank Spike Recoveries, and precision data were within of CLP QC limits.

Note: According to EPA validation criteria, all data is compliant and useable.

No other analytical or QC problems were encountered.

00001

CAS
ASP/CLP BATCHING FORM

BATCH COMPLETE: Y SDG #: SS28 CLIENT: Mpirnie
 DISKETTE REQUESTED: Y N X SUBMISSION #: 96-09-244 PROJECT: Marilla St
 CLIENT REP: Mark Wilson DATE: 09/27/96 PROTOCOL: ASP
 DATE DUE: 10/11/96 DATE REVISED:

CAS JOB #	CLIENT/EPA ID	MATRIX	REQUESTED PARAMETERS	DATE SAMPLED	DATE RECEIVED	pH (SOLIDS)	% SOLIDS
103249	SS2801	soil	Metals (see below) %sol	9/23/96	9/27/96		
103250	SS2812	soil	Metals (see below) %sol	9/23/96	9/27/96		
103251	SS3223	soil	Metals (see below) %sol	9/23/96	9/27/96		
103252	SS3234	soil	Metals (see below) %sol	9/23/96	9/27/96		
103253	SS3245	soil	Metals (see below) %sol	9/23/96	9/27/96		
103254	SS3123	soil	Metals (see below) %sol	9/23/96	9/27/96		
103255	SS3134	soil	Metals (see below) %sol	9/23/96	9/27/96		
103256	SS3145	soil	Metals (see below) %sol	9/23/96	9/27/96		
103257	SS3023	soil	Metals (see below) %sol	9/23/96	9/27/96		
103258	SS3034	soil	Metals (see below) %sol	9/23/96	9/27/96		
103259	SS3045	soil	Metals (see below) %sol	9/23/96	9/27/96		
103260	SS2923	soil	Metals (see below) %sol	9/23/96	9/27/96		
103261	SS2934	soil	Metals (see below) %sol	9/23/96	9/27/96		
103262	SS2945	soil	Metals (see below) %sol	9/23/96	9/27/96		
103263	EQ1	soil	Metals (see below) %sol	9/23/96	9/27/96		
103264	SS2701	soil	Metals (see below) %sol	9/23/96	9/27/96		
103265	SS2712	soil	Metals (see below) %sol	9/23/96	9/27/96		
103266	SS2723	soil	Metals (see below) %sol	9/23/96	9/27/96		
103267	QC SS2734	soil	Metals (see below) %sol	9/23/96	9/27/96		
103268	SS2745	soil	Metals (see below) %sol	9/23/96	9/27/96		
Metals:	Sb,As,Cd,Cr,Cu,Fe,Pb,Mn,Ni,Zn by ICP Meth 6010						
	Hg by cold vapor						

CASE NARRATIVE

COMPANY: Malcolm Pirnie
Marilla St
SUBMISSION #: 9609000246
SDG#: SS33

MPI soil samples were collected on 09/23/96 and received at CAS on 9/27/96 in good condition at a cooler temperature of 5.0 C.

METALS ANALYSIS

Twenty soil samples were analyzed for a site specific list of metals by SW-846 ICP method 6010 and cold vapor method 7470 for Mercury. All data was reported with NYSDEC ASP B deliverables.

Sample MS/MSD#3(SS-45) was analyzed for QC. The Antimony results and % recovery were flagged with a "N" since the Matrix Spike recovery was outside of advisory QC limits of 75 - 125 %. The Matrix Spike recovery for Iron could not be determined since the amount detected in the sample was over 100x greater than the amount added. The recovery was flagged with a "D". All other matrix spike recoveries, Blank Spike Recoveries, and precision data were within of CLP QC limits.

Note: According to EPA validation criteria, all data is compliant and useable.

No other analytical or QC problems were encountered.

00001

GTC ASP/CLP BATCHING FORM

[illegible]

CASE NARRATIVE

COMPANY: Malcolm Pirnie
Marilla St
SUBMISSION #: 9609000249
SDG#: SS39

MPI soil samples were collected on 09/23/96 and received at CAS on 9/27/96 in good condition at a cooler temperature of 5.0 C. See the attached batching form.

METALS ANALYSIS

Six soil samples were analyzed for a site specific list of metals by SW-846 ICP method 6010 and cold vapor method 7470 for Mercury. All data was reported with NYSDEC ASP B deliverables.

Sample MS/MSD #2 was analyzed for QC. The Antimony, Copper and Manganese results and % recoveries were flagged with a "N" since the Matrix Spike recovery was outside of advisory QC limits of 75 - 125 %. The Matrix Spike recovery for Iron could not be determined since the amount detected in the sample was over 100x greater than the amount added. The recovery was flagged with a "D". All other matrix spike recoveries, Blank Spike Recoveries, and precision data were within of CLP QC limits.

Note: According to EPA validation criteria, all data is compliant and useable.

No other analytical or QC problems were encountered.

00001

BATCH COMPLETE: Y
DISKETTE REQUESTED: Y N X
CLIENT REP: Mark Wilson
DATE DUE: 10/11/96
SDG #: SS39
SUBMISSION #: 96-09-249
DATE: 09/27/96
DATE REVISED:
CLIENT: MPIRnie
PROJECT: Marilla St
PROTOCOL: ASP

[illegible]

CASE NARRATIVE

COMPANY: Malcolm Pirnie
Marilla St
SUBMISSION #: 9609000247
SDG#: SS41

MPI soil samples were collected on 09/23/96 and received at CAS on 9/27/96 in good condition at a cooler temperature of 5.0 C. See the attached batching form.

METALS ANALYSIS

Twenty soil samples were analyzed for a site specific list of metals by SW-846 ICP method 6010 and cold vapor method 7470 for Mercury. All data was reported with NYSDEC ASP B deliverables.

Sample MS/MSD #4 was analyzed for QC. The Antimony and Manganese results and % recoveries were flagged with a "N" since the Matrix Spike recovery was outside of advisory QC limits of 75 - 125 %. The Matrix Spike recovery for Iron could not be determined since the amount detected in the sample was over 100x greater than the amount added. The recovery was flagged with a "D". All other matrix spike recoveries, Blank Spike Recoveries, and precision data were within of CLP QC limits.

Note: According to EPA validation criteria, all data is compliant and useable.

No other analytical or QC problems were encountered.

* 00001

[illegible]

CASE NARRATIVE

COMPANY: Malcolm Pirnie
Marilla St
SUBMISSION #: 9609000248
SDG#: SS46

MPI soil samples were collected on 09/23/96 and received at CAS on 9/27/96 in good condition at a cooler temperature of 5.0 C. See the attached batching form.

METALS ANALYSIS

Twenty soil samples were analyzed for a site specific list of metals by SW-846 ICP method 6010 and cold vapor method 7470 for Mercury. All data was reported with NYSDEC ASP B deliverables.

Sample MS/MSD #4 was analyzed for QC. The Antimony and Mercury results and % recoveries were flagged with a "N" since the Matrix Spike recovery was outside of advisory QC limits of 75 - 125 %. The Matrix Spike recovery for Iron could not be determined since the amount detected in the sample was over 100x greater than the amount added. The recovery was flagged with a "D". All other matrix spike recoveries, Blank Spike Recoveries, and precision data were within of CLP QC limits.

Note: According to EPA validation criteria, all data is compliant and useable.

No other analytical or QC problems were encountered.

00001

BATCH COMPLETE: Y _____
DISKETTE REQUESTED: Y _____ N X _____
CLIENT REP: Mark Wilson
DATE DUE: 10/11/96
SDG #: SS46
SUBMISSION #: 96-09-248
PROJECT: Marilla St
DATE: 09/27/96
DATE REVISED: _____
CLIENT: MPirnie
PROTOCOL: ASP

[illegible]

INORGANIC QUALIFIERS - 1991

C (Concentration) qualifier - Enter "B" if the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but was greater than or equal to the Instrument Detection Limit (IDL). If the analyte was analyzed for, but not detected, a "U" must be entered.

Q qualifier - Specified entries and their meanings are as follows:

- E - The reported value is estimated because of the presence of interference.
- M - Duplicate injection precision not met.
- N - Spiked sample recovery not within control limits.
- S - The reported value was determined by the Method of Standard Additions (MSA).
- W - Post-digestion spike for Furnace AA Analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.
- * - Duplicate analysis not within control limits.
- + - Correlation coefficient for the MSA is less than 0.995.

M (Method) qualifier - Enter:

- "P" for ICP
- "A" for Flame AA
- "F" for Furnace AA
- "PM" for ICP when Microwave Digestion is used
- "AM" for Flame AA when Microwave Digestion is used
- "FM" for Furnace M when Microwave Digestion is used
- "CV" for Manual Cold Vapor AA
- "AV" for Automated Cold Vapor AA
- "CA" for Spectrophotometric Midi-Distillation
- "AS" for Semi-Automated Spectrophotometric
- "C" for Spectrophotometric Manual
- "T" for Titrimetric
- " " where no data has been entered
- "NR" if the analyte is not required to be analyzed.

APPENDIX E
GIS MAPPING

FIGURE E-1

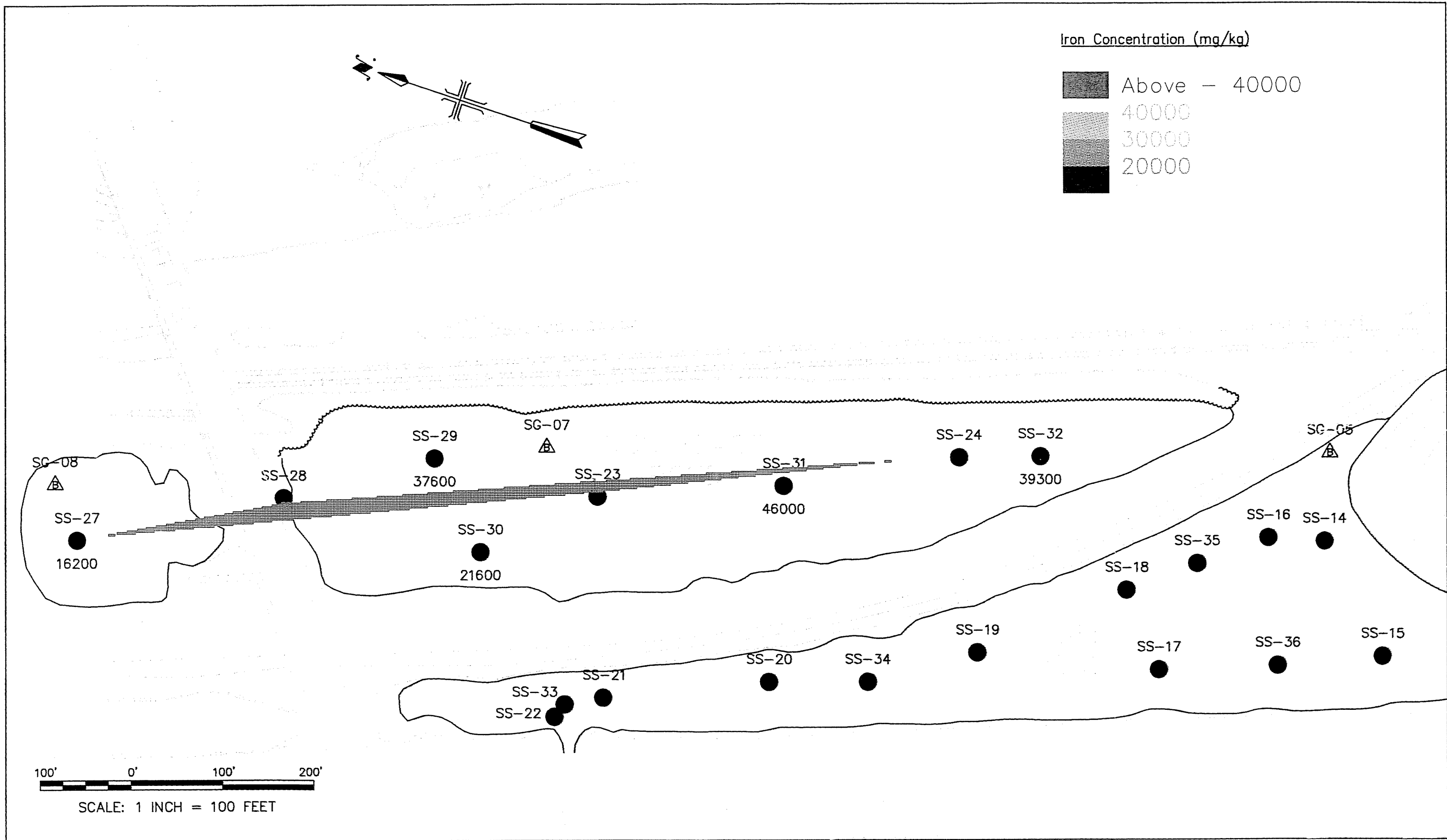


FIGURE E-2

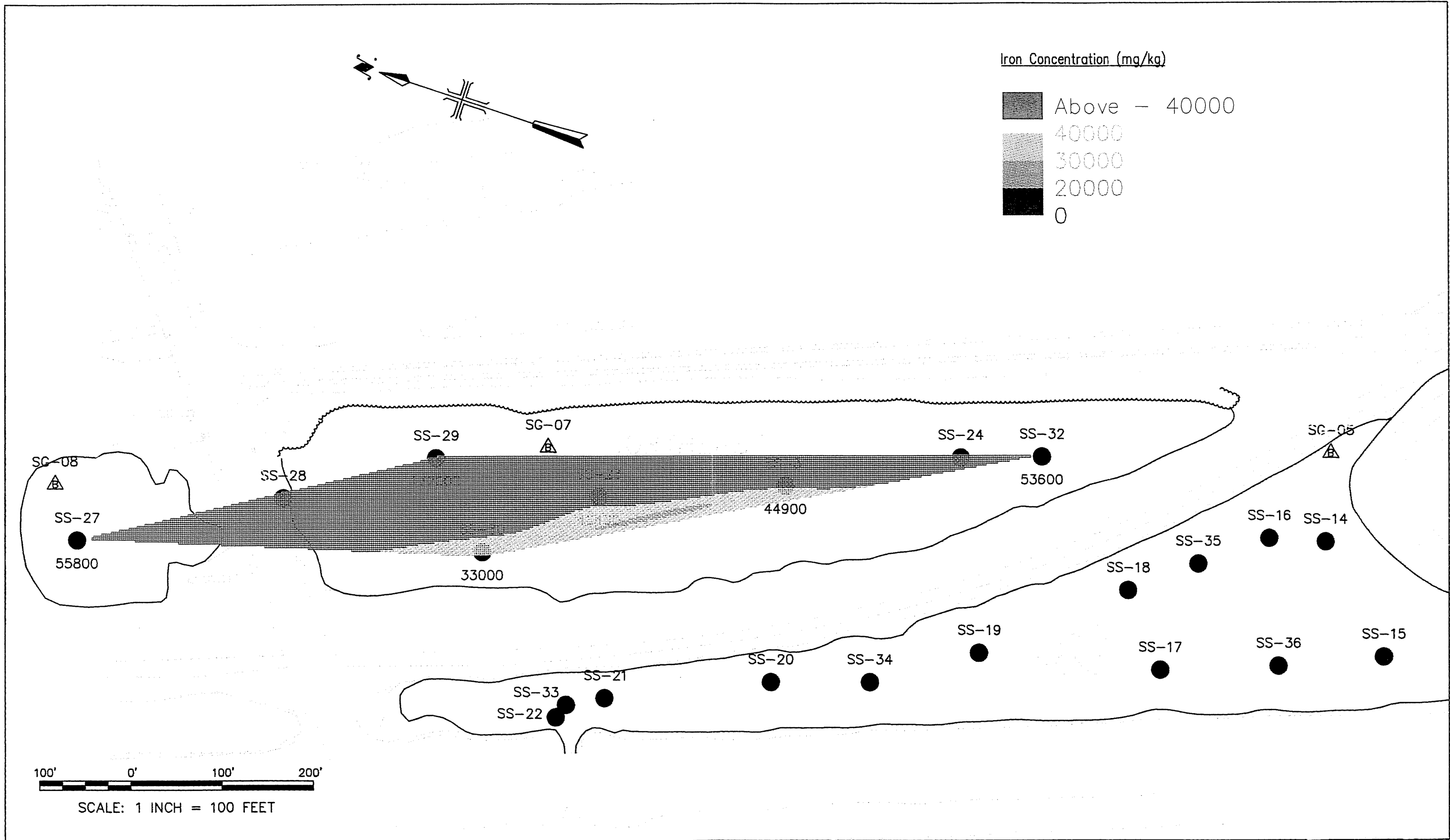


FIGURE E-3

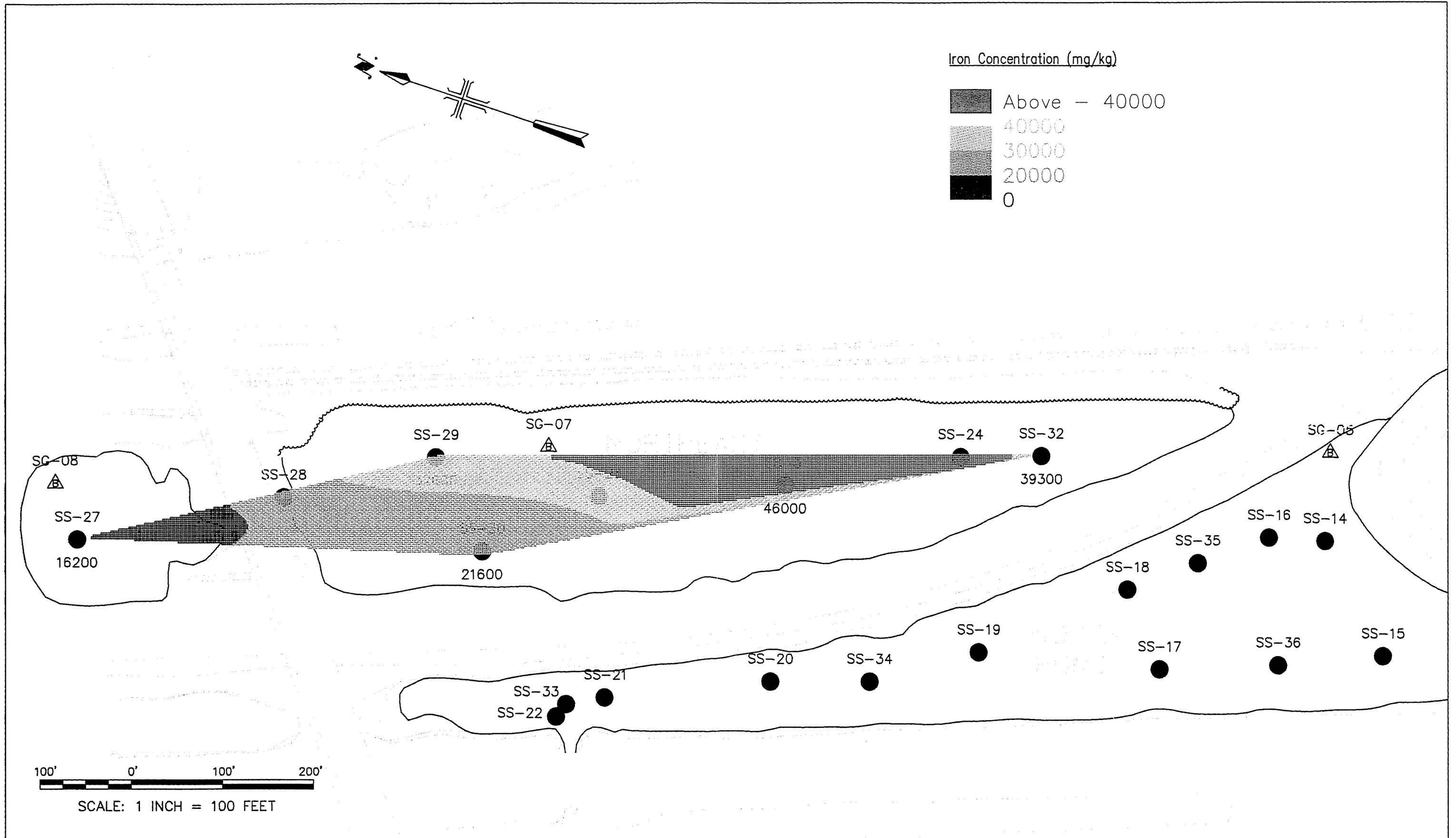


FIGURE E-4

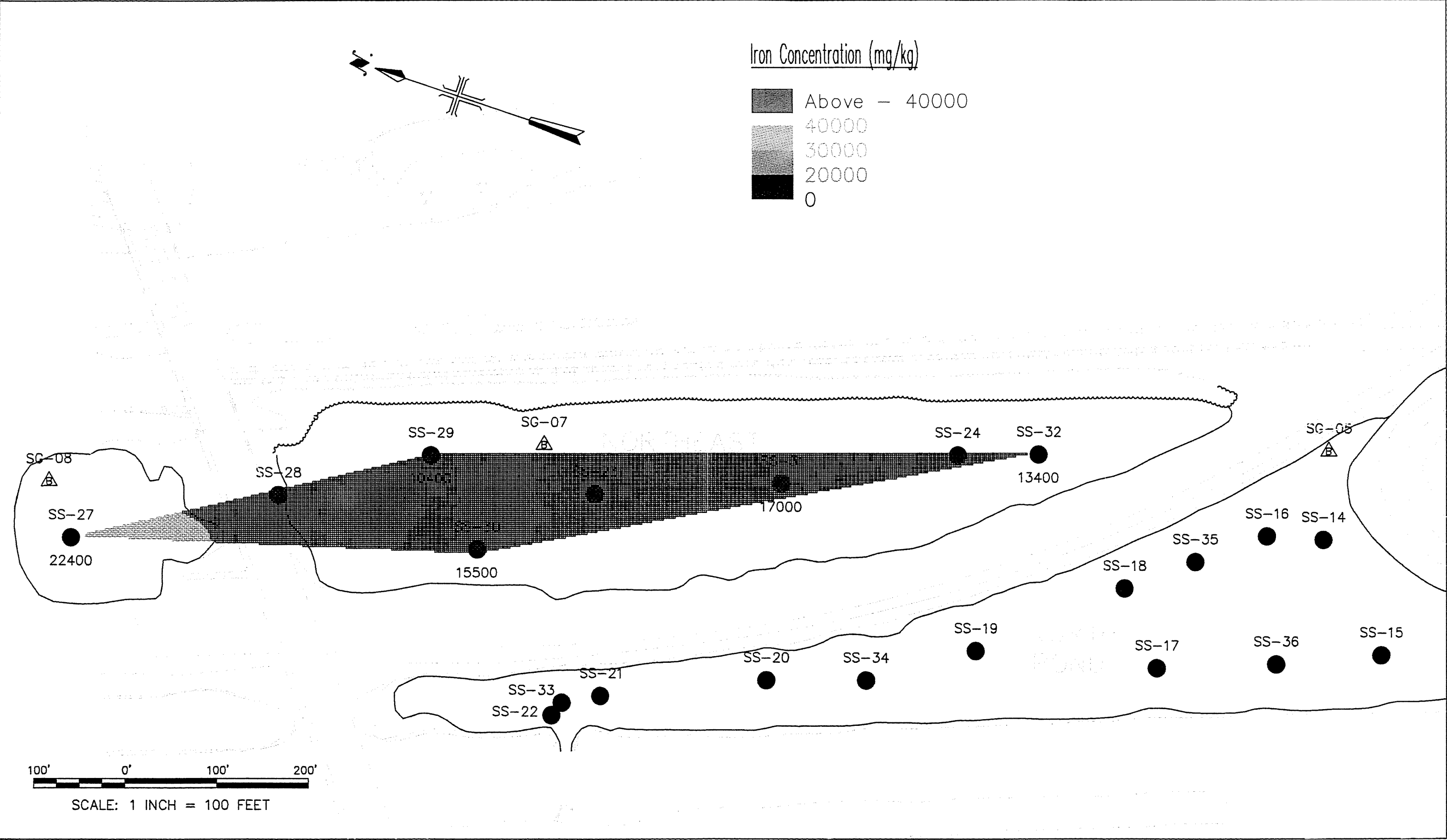


FIGURE E-5

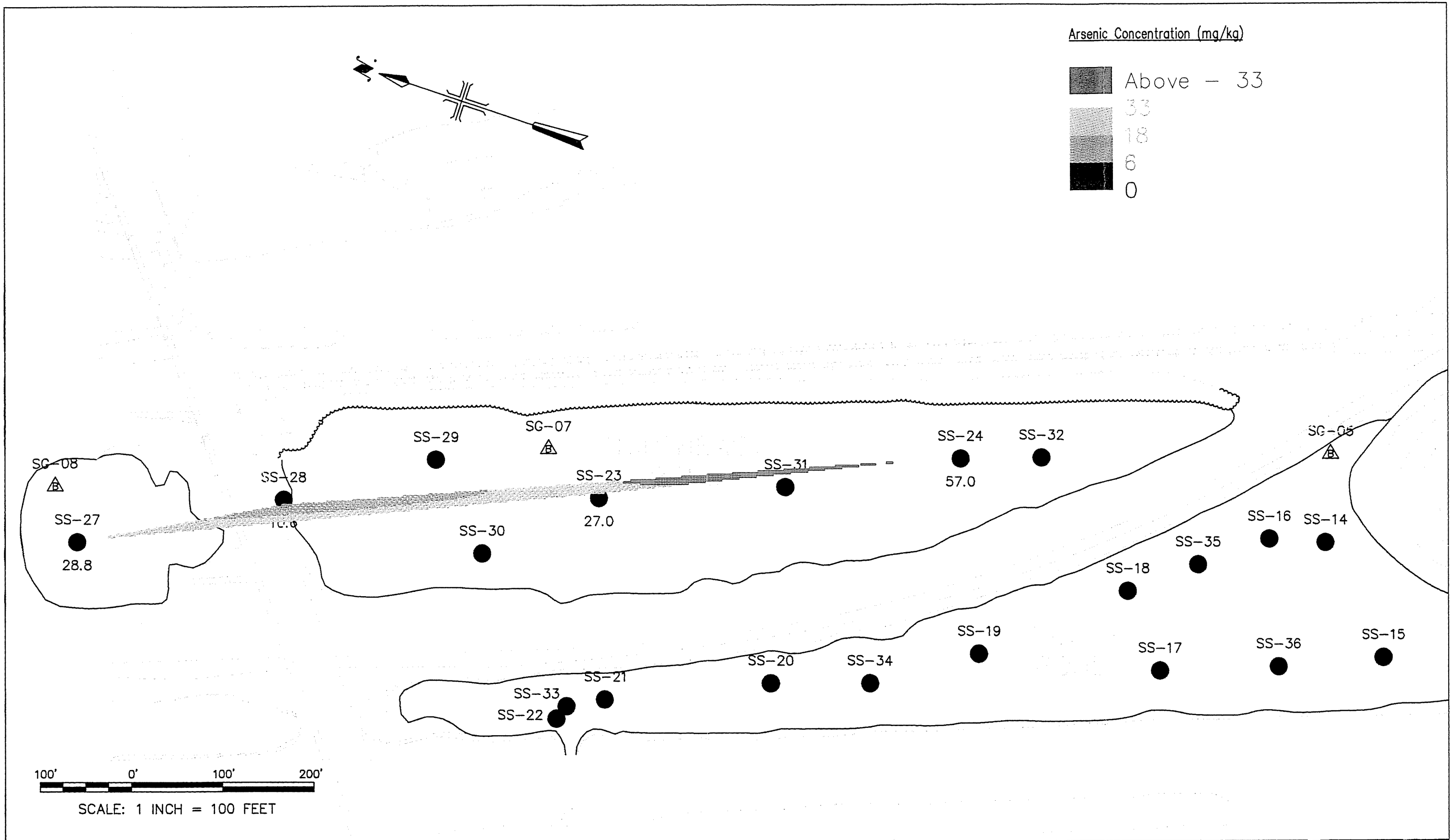
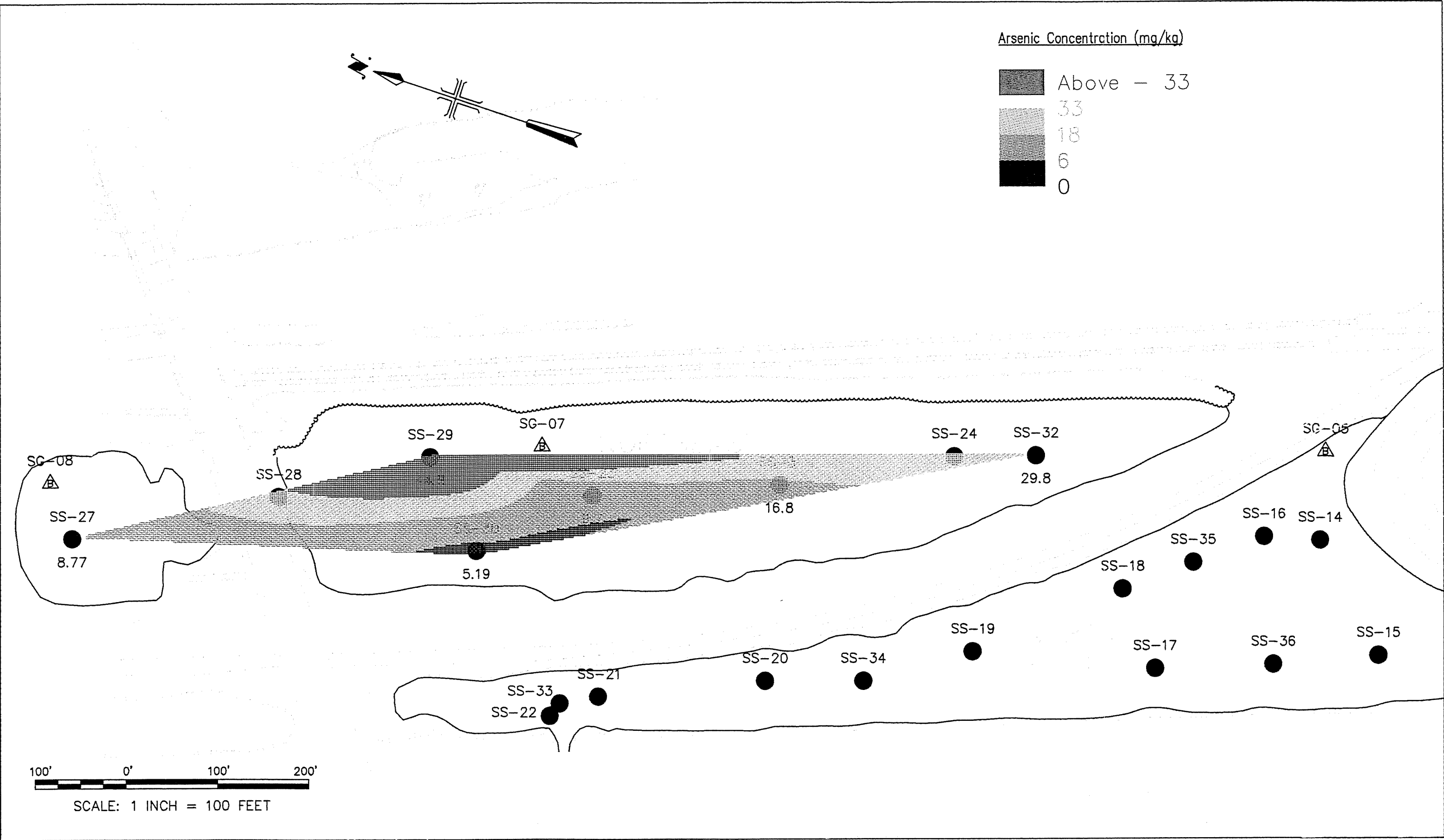
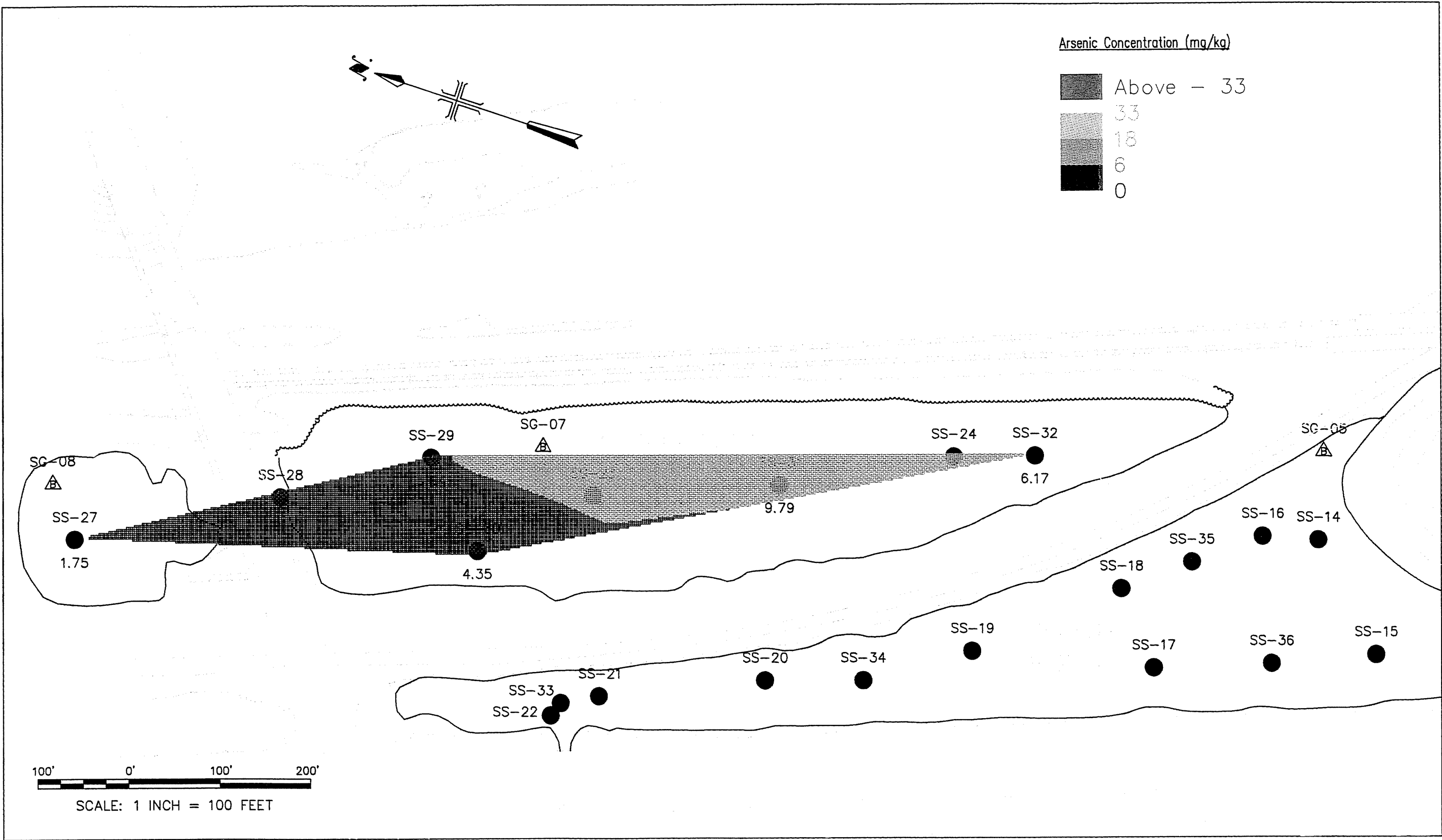
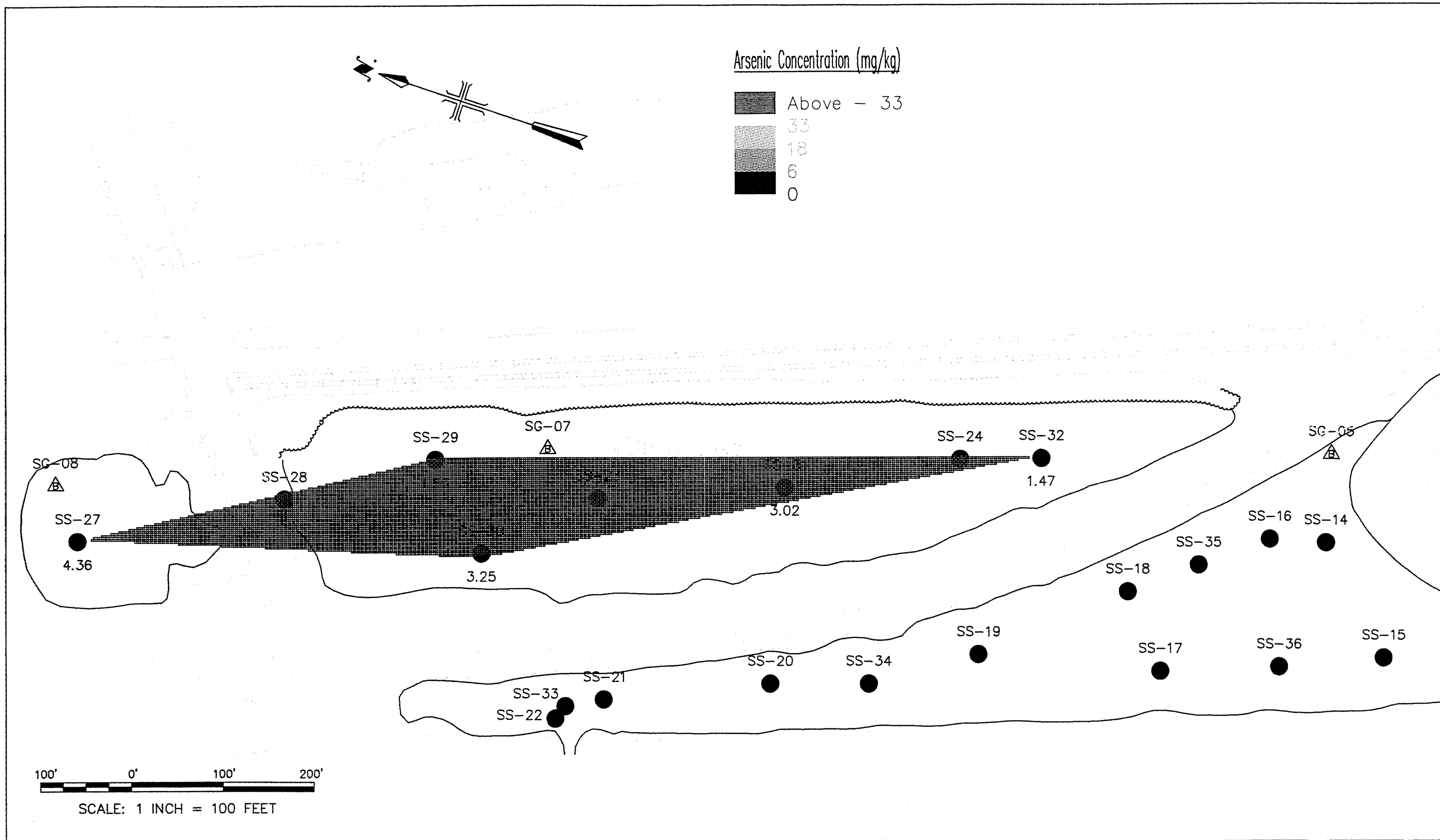


FIGURE E-6







**MALCOLM
PIRNIE**

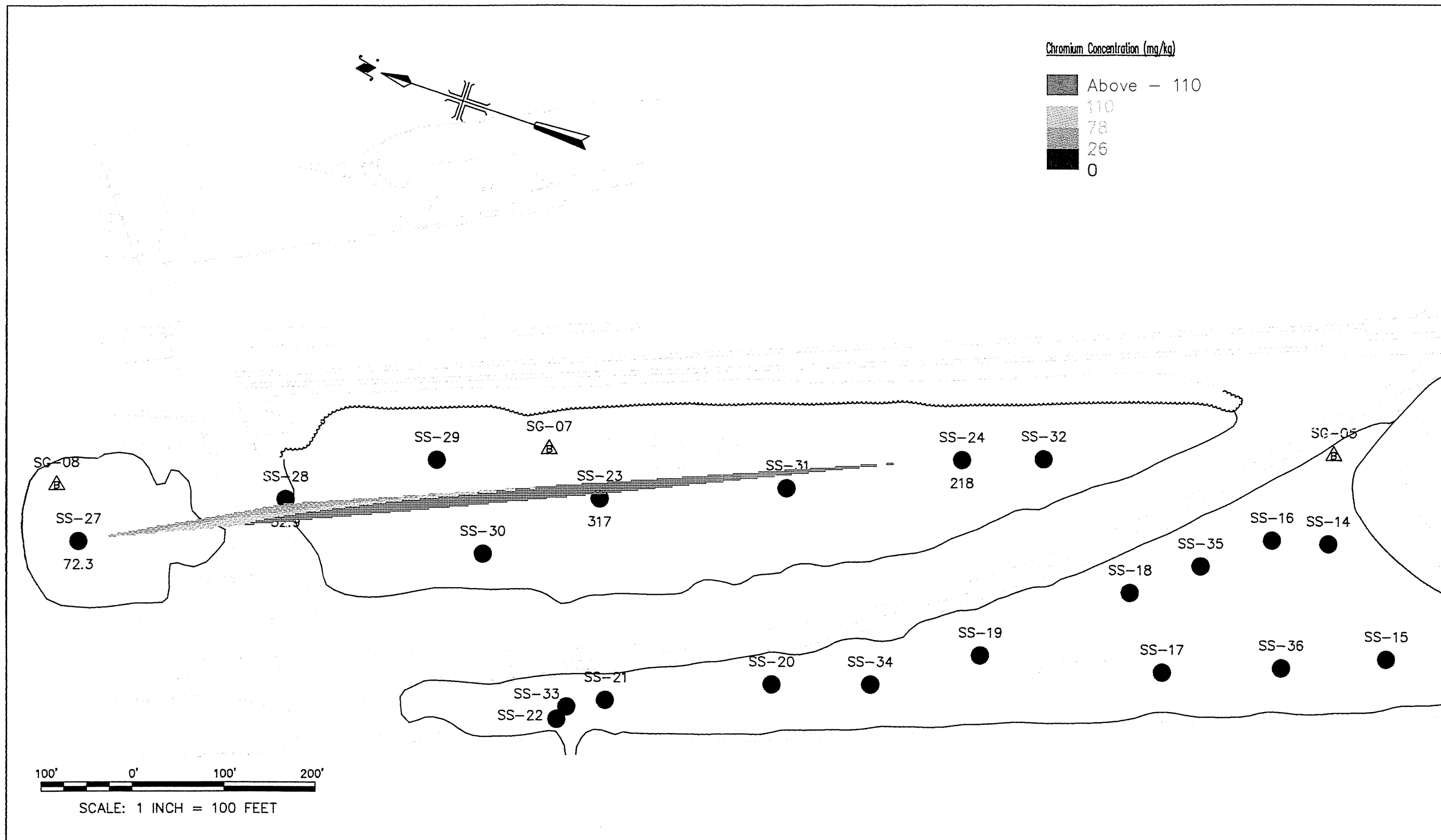
AS45NE.DWG

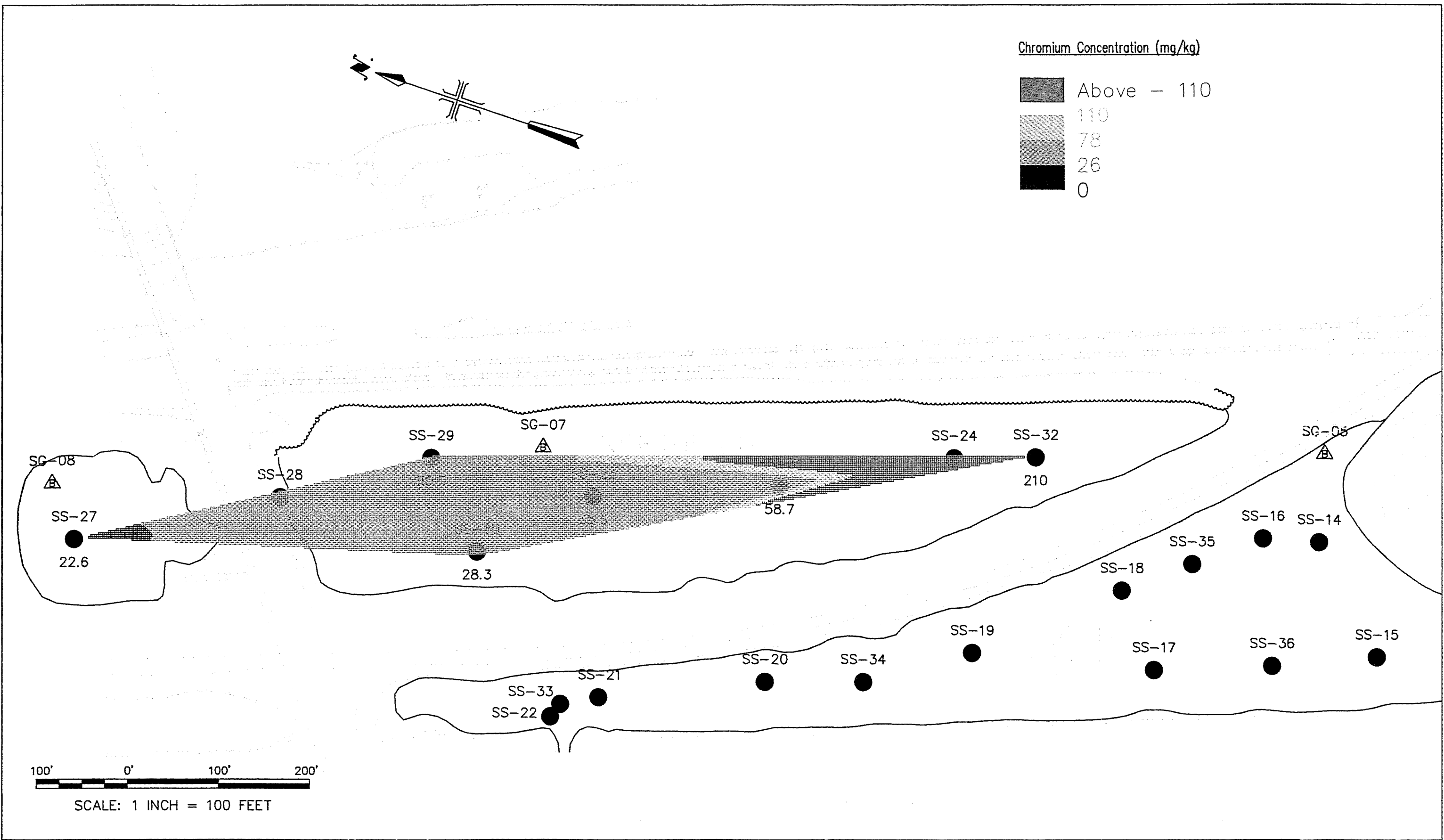
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTHEAST POND
ARSENIC CONCENTRATION: 4 - 5 FEET

LTV STEEL

FIGURE E-9



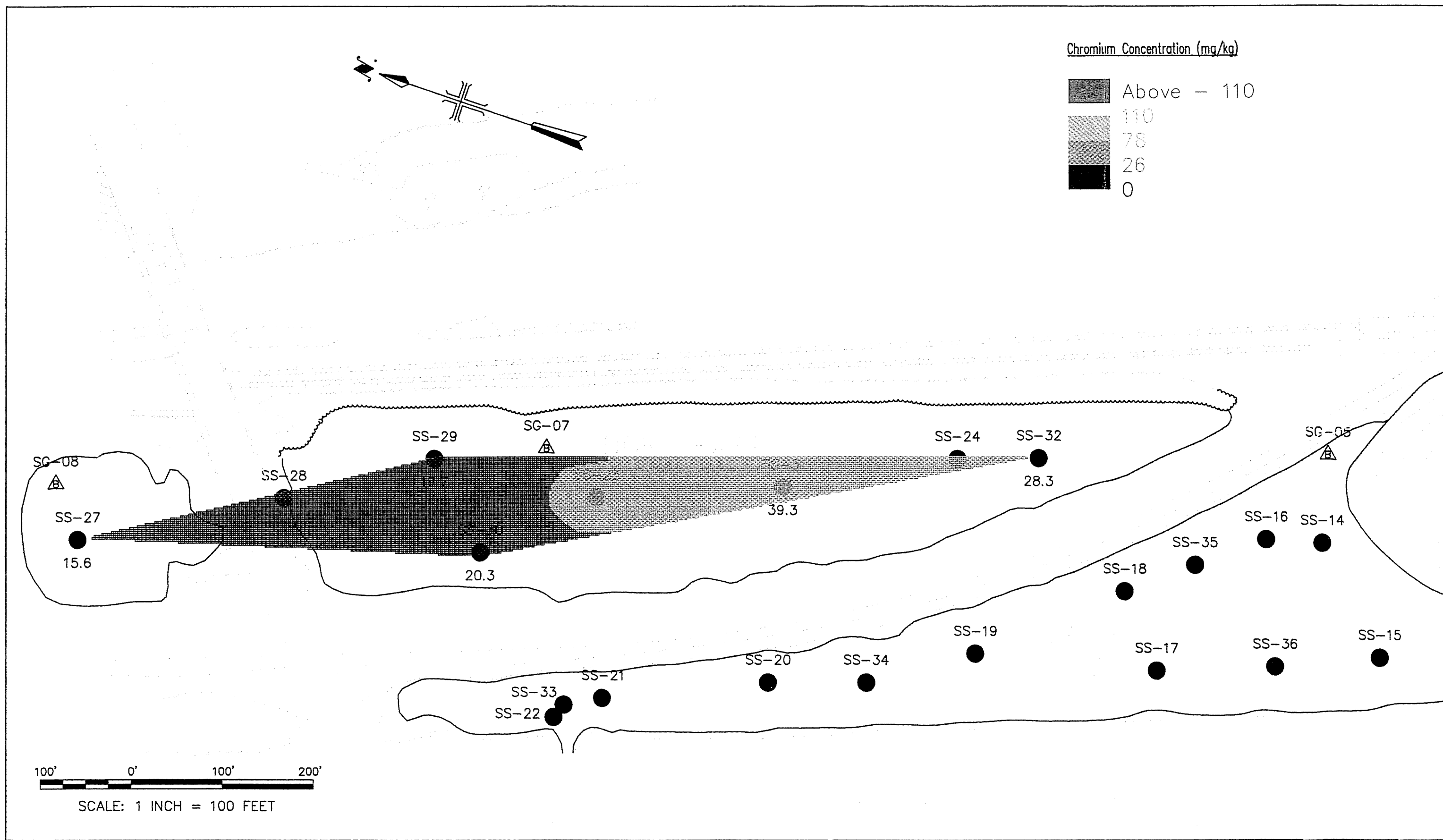


**MALCOLM
PIRNIE**

CR23NE.DWG

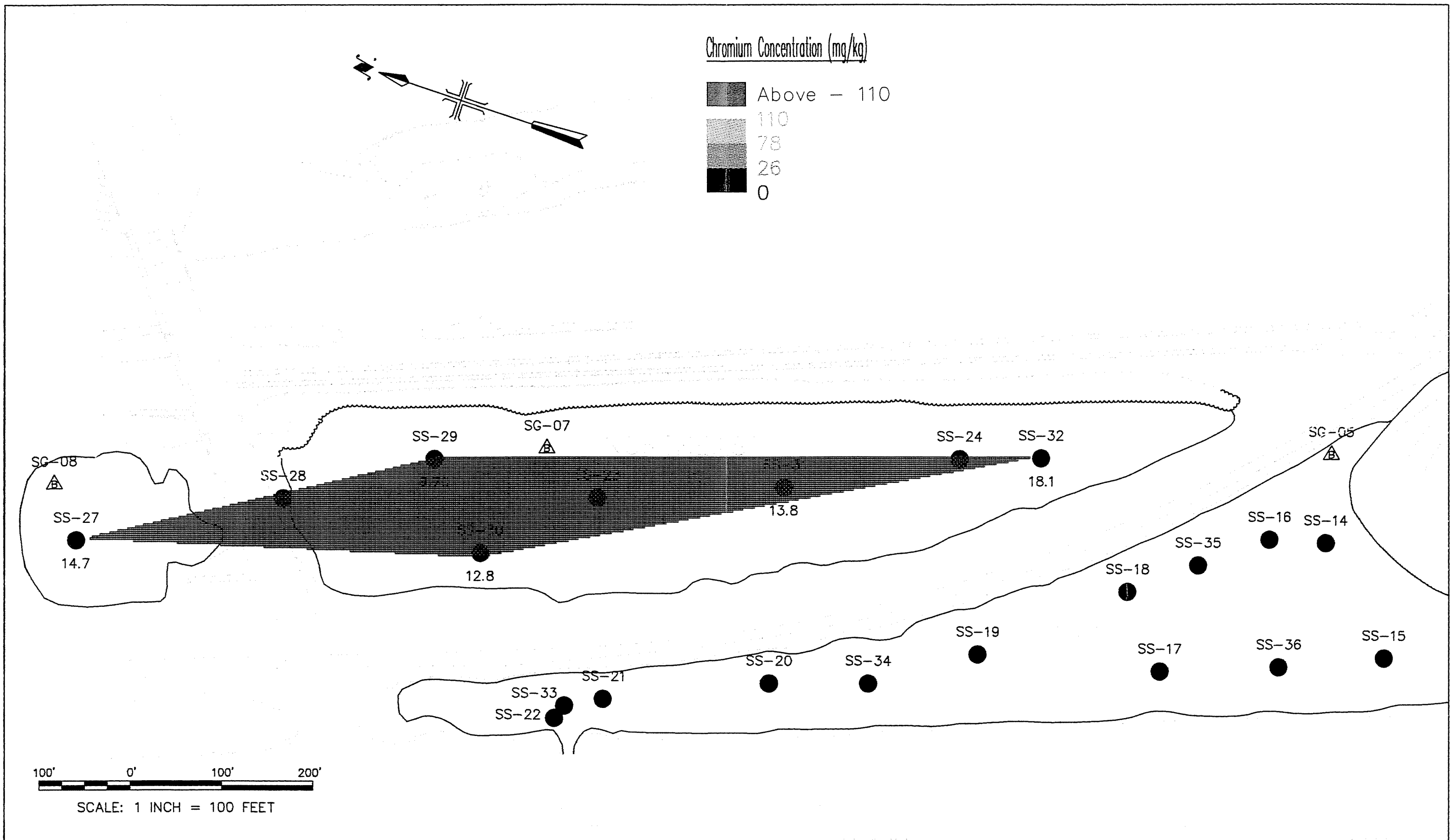
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTHEAST POND
CHROMIUM CONCENTRATION: 2 - 3 FEET
LTV STEEL



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-12



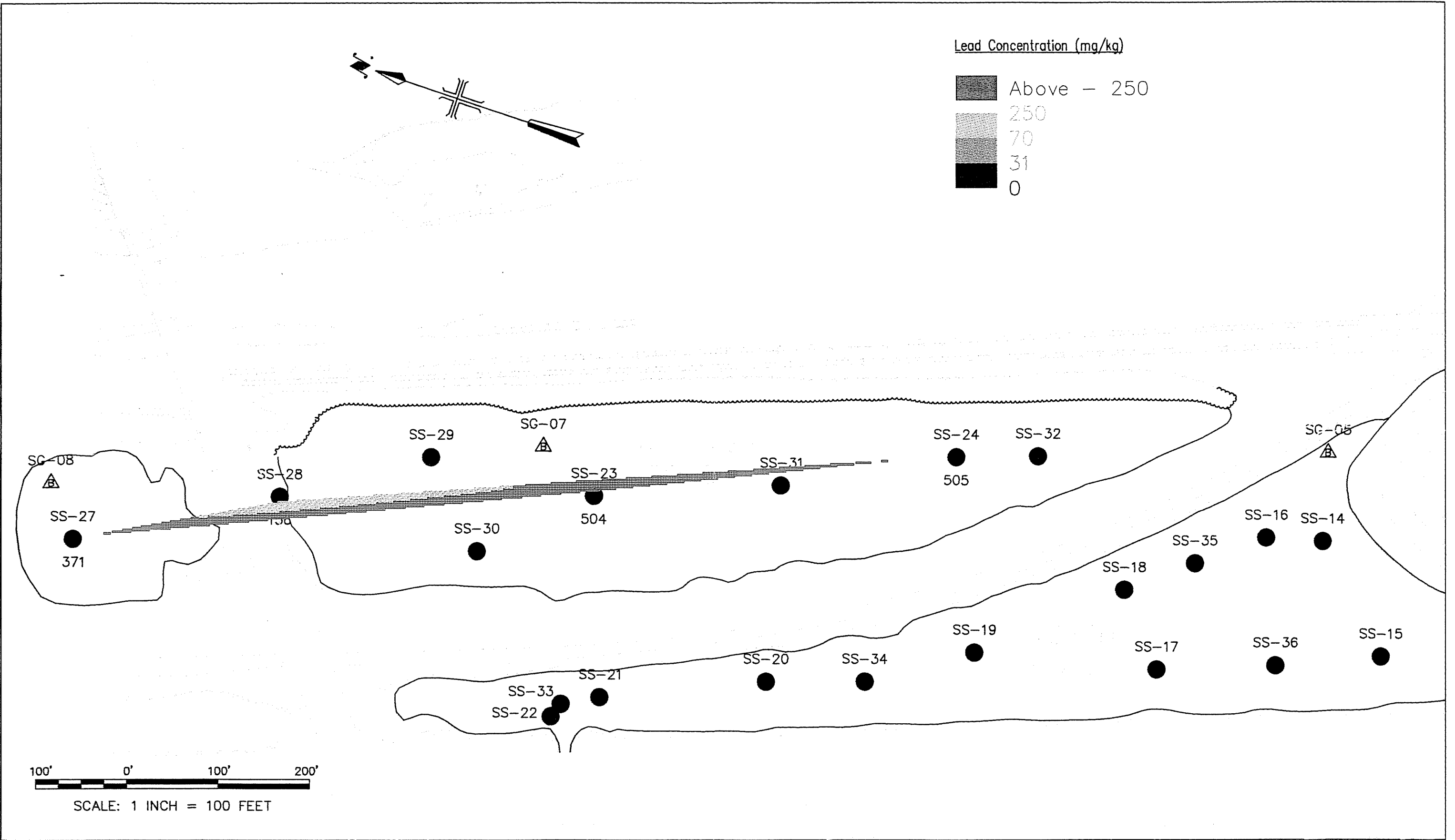
**MALCOLM
PIRNIE**

CR45NE.DWG

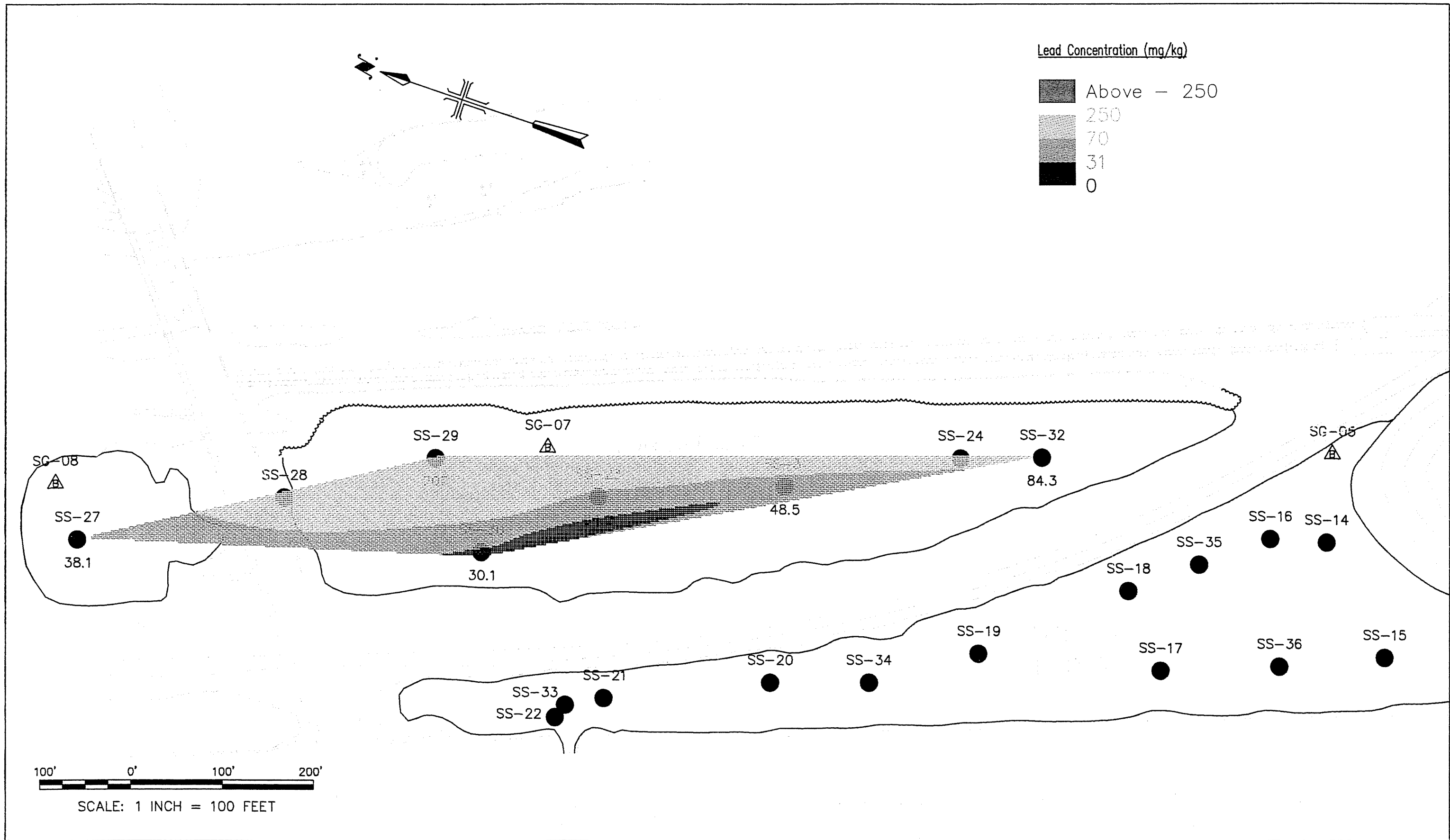
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

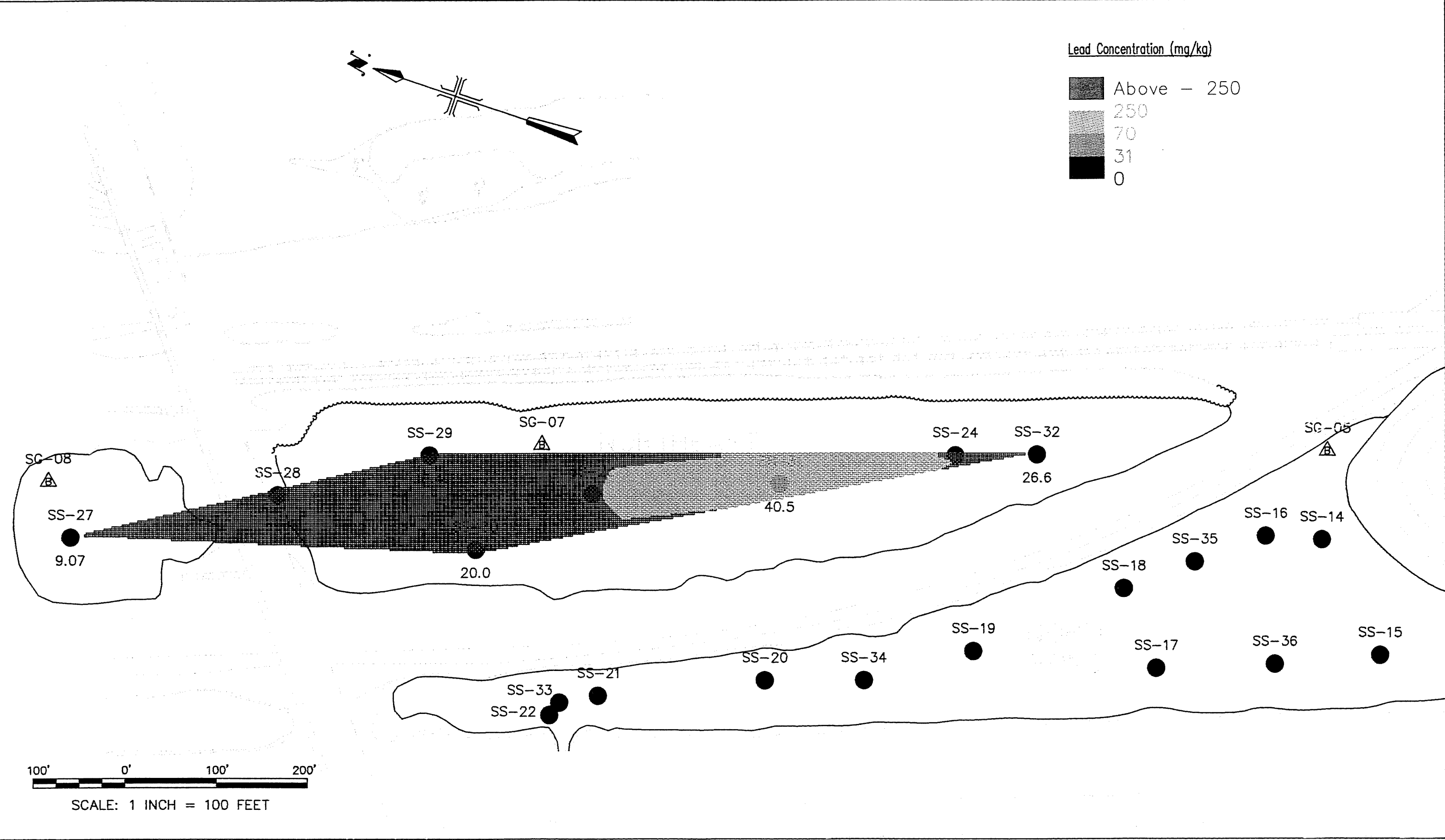
MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTHEAST POND
CHROMIUM CONCENTRATION: 4 - 5 FEET
LTV STEEL

FIGURE E-13



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.





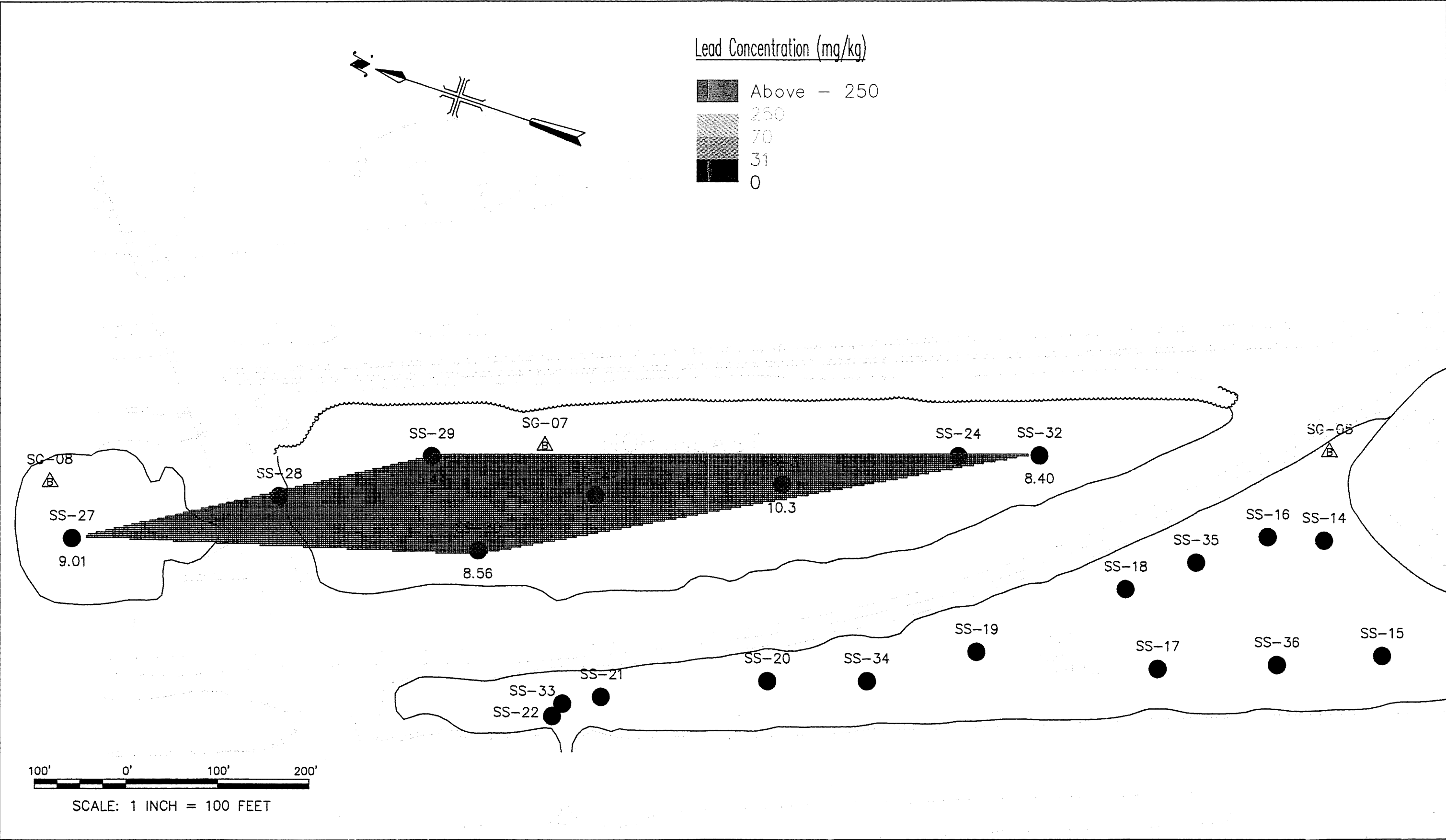
**MALCOLM
PIRNIE**

PB34NE.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTHEAST POND
LEAD CONCENTRATION: 3 - 4 FEET
LTV STEEL

FIGURE E-16



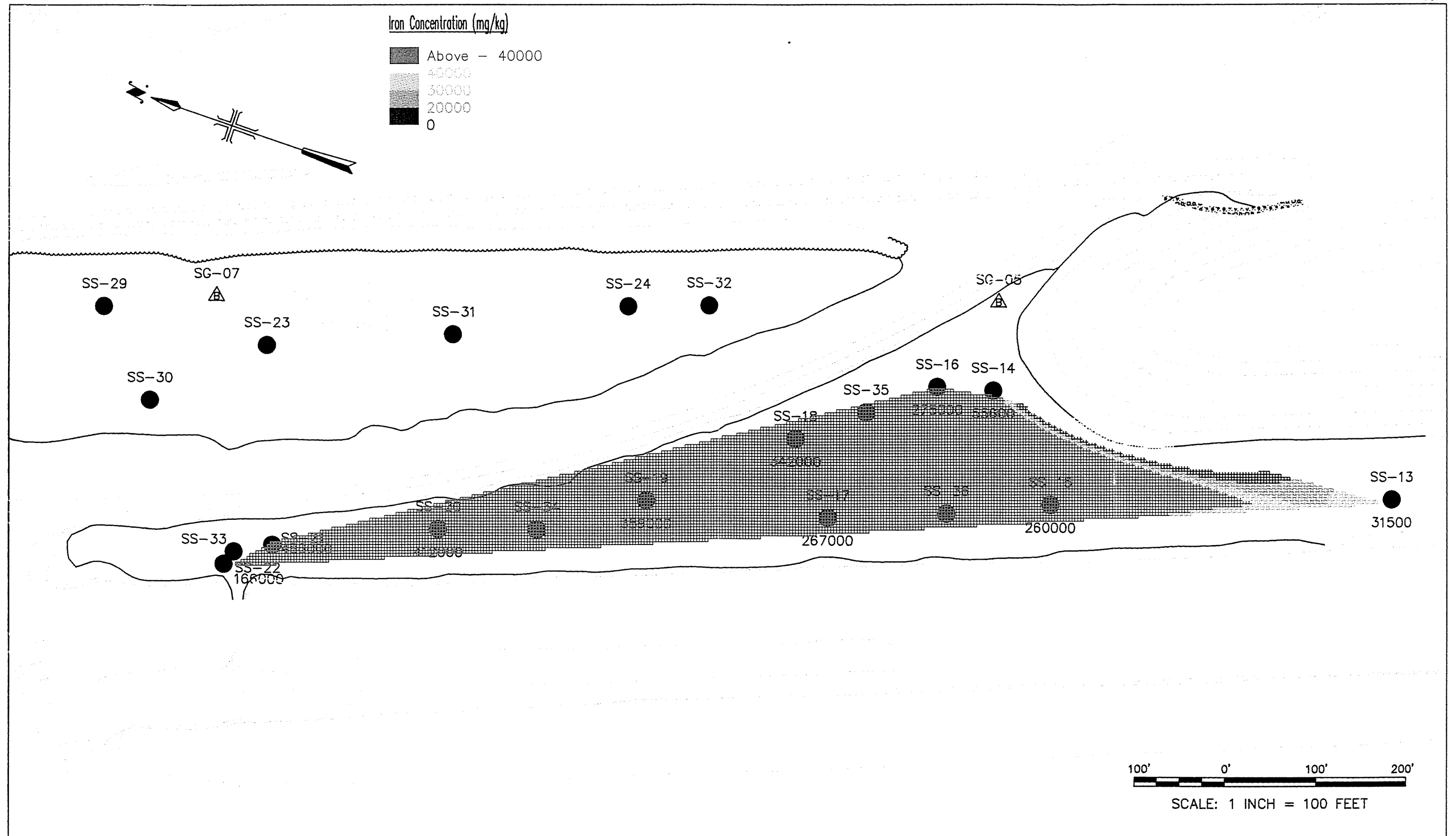


FIGURE E-18



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

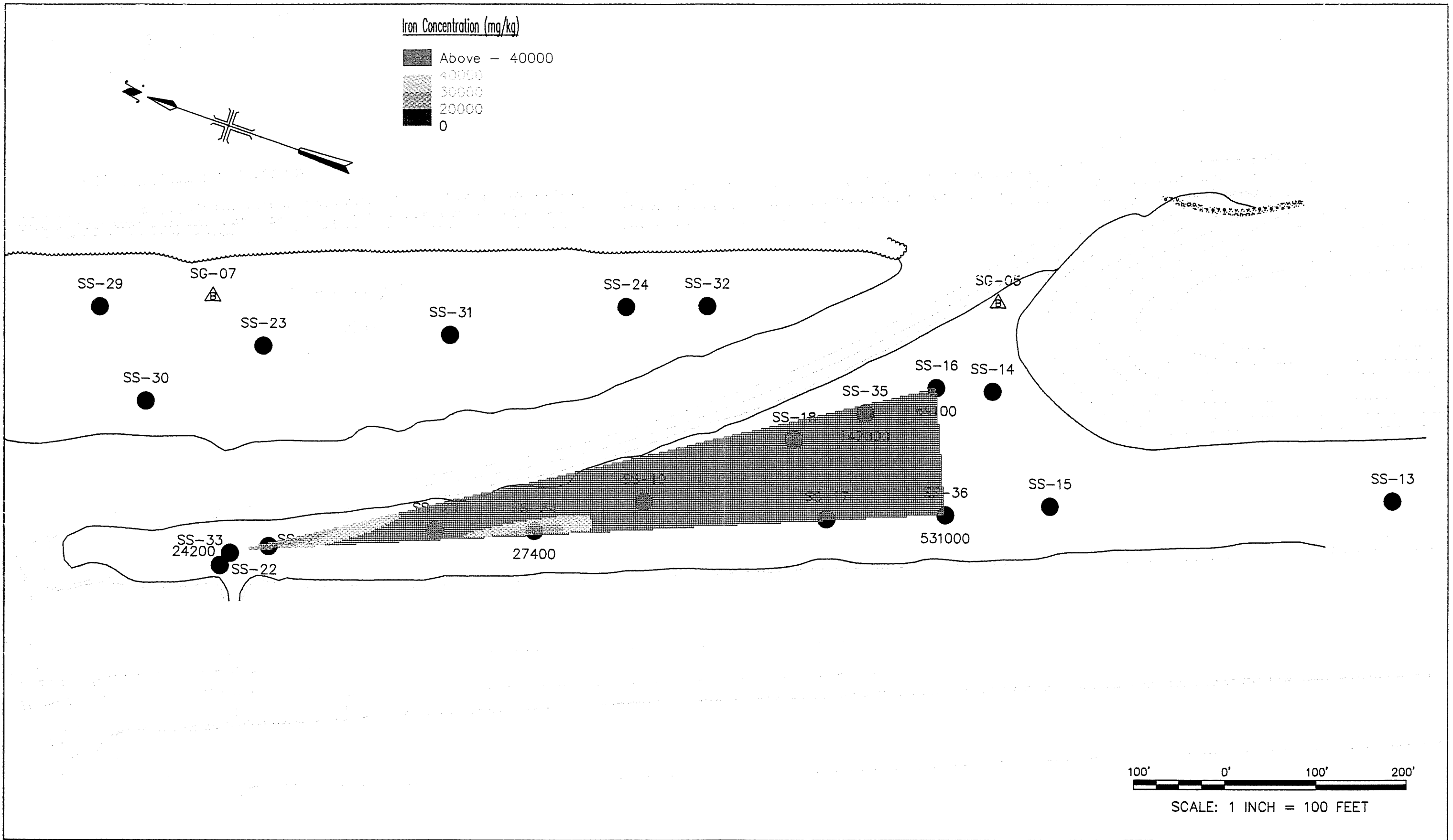
**MALCOLM
PIRNIE**

FE23N.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
IRON CONCENTRATION: 2 - 3 FEET

LTV STEEL

FIGURE E-19



**MALCOLM
PIRNIE**

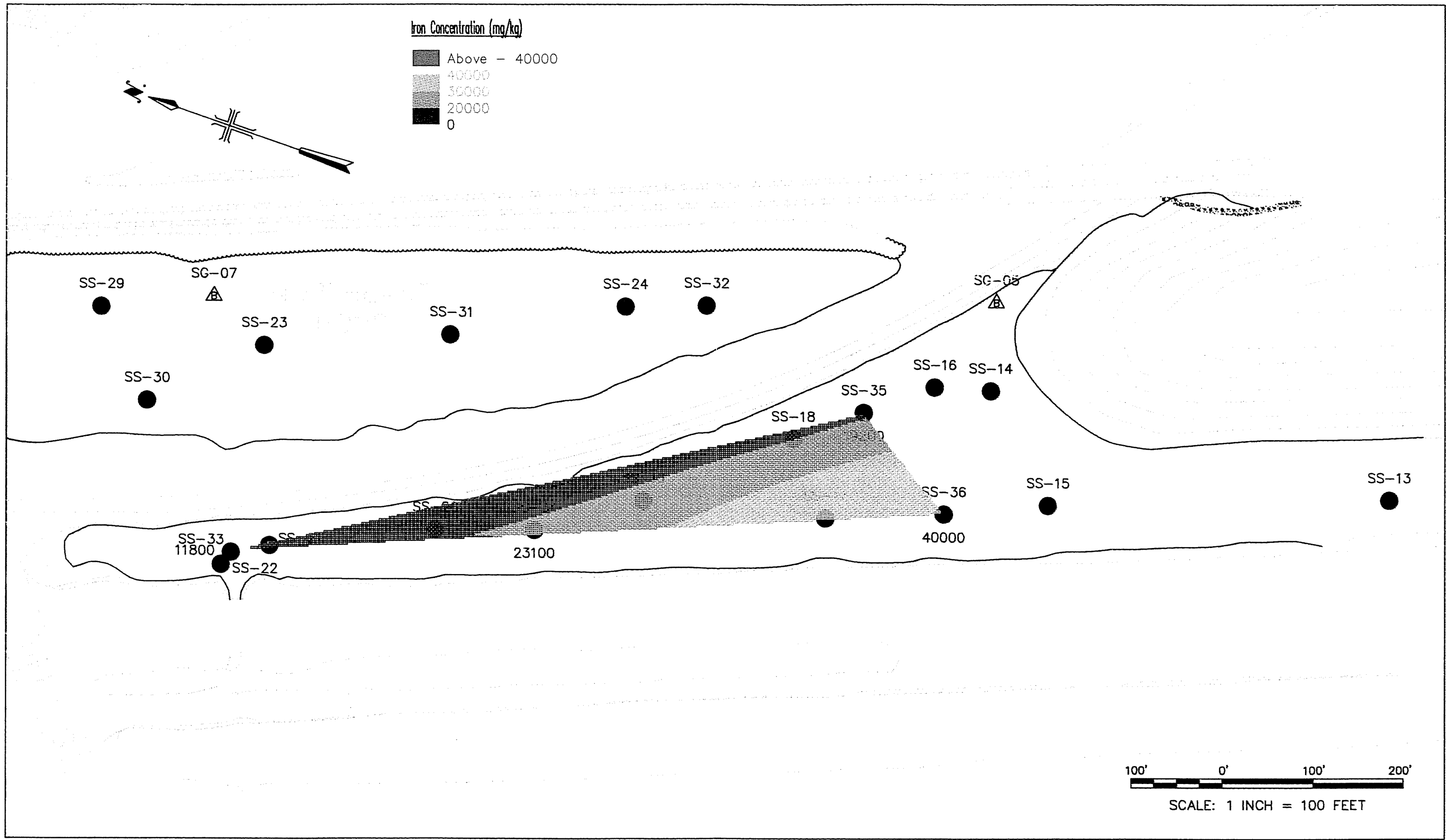
FE34N.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
IRON CONCENTRATION: 3 - 4 FEET

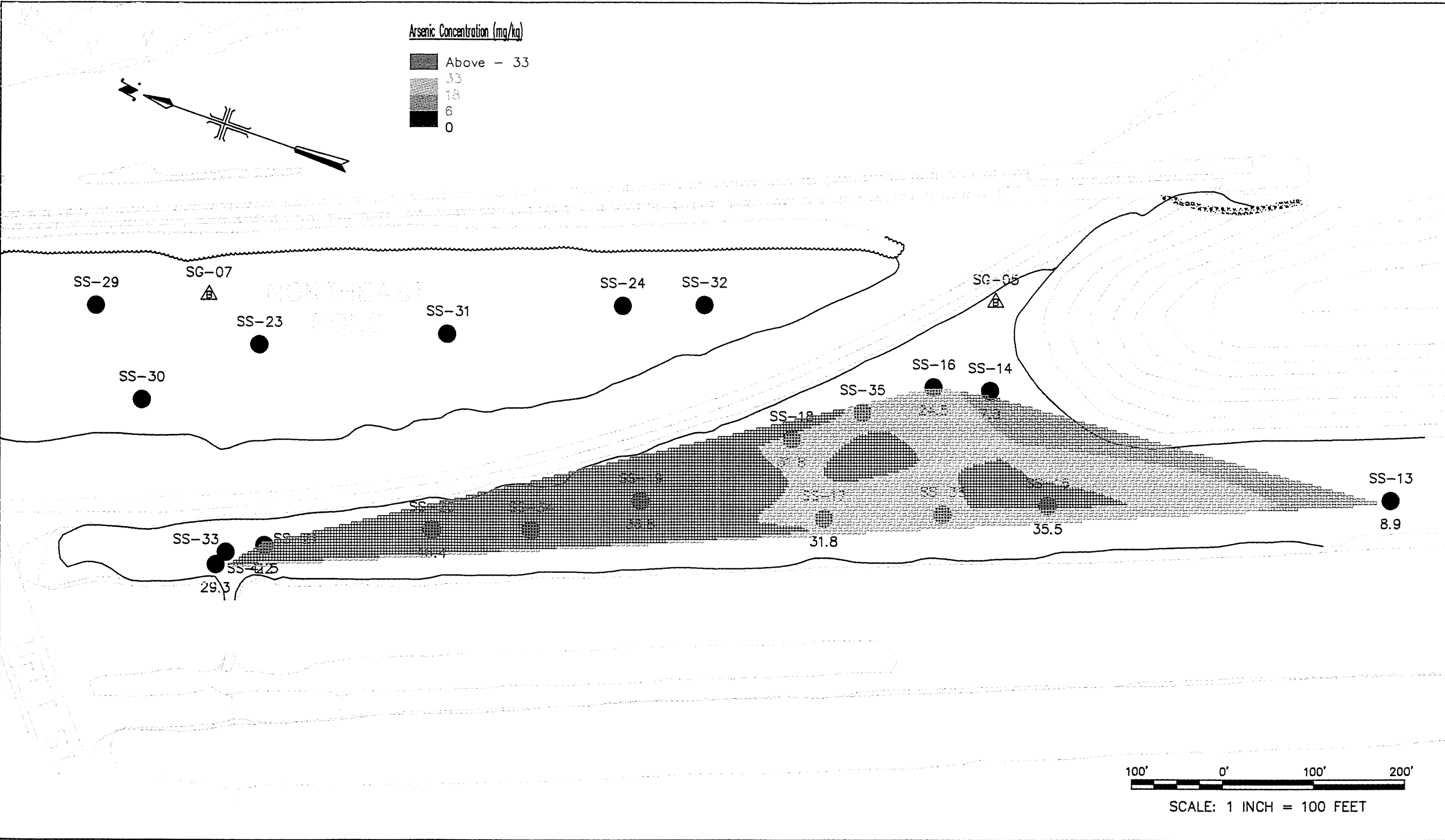
LTV STEEL

FIGURE E-20



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-21



**MALCOLM
PIRNIE**

AS01N.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
ARSENIC CONCENTRATION: 0 - 1 FEET
LTV STEEL

FIGURE E-22



FIGURE E-23



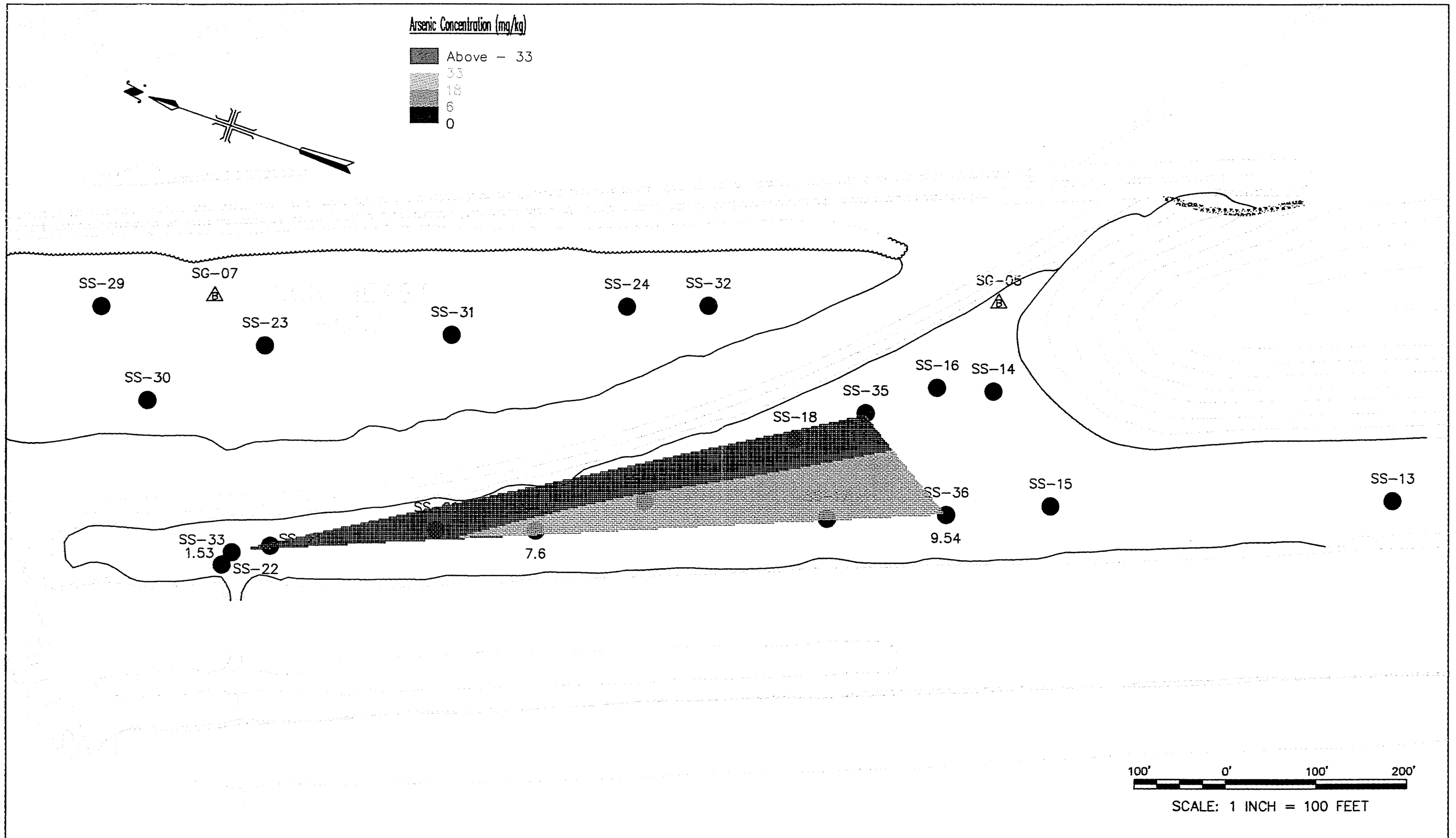
**MALCOLM
PIRNIE**

AS34N.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
ARSENIC CONCENTRATION: 3 - 4 FEET
LTV STEEL

FIGURE E-24





Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

**MALCOLM
PIRNIE**

CR01N.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
CHROMIUM CONCENTRATION: 0 - 1 FEET
LTV STEEL

FIGURE E-26

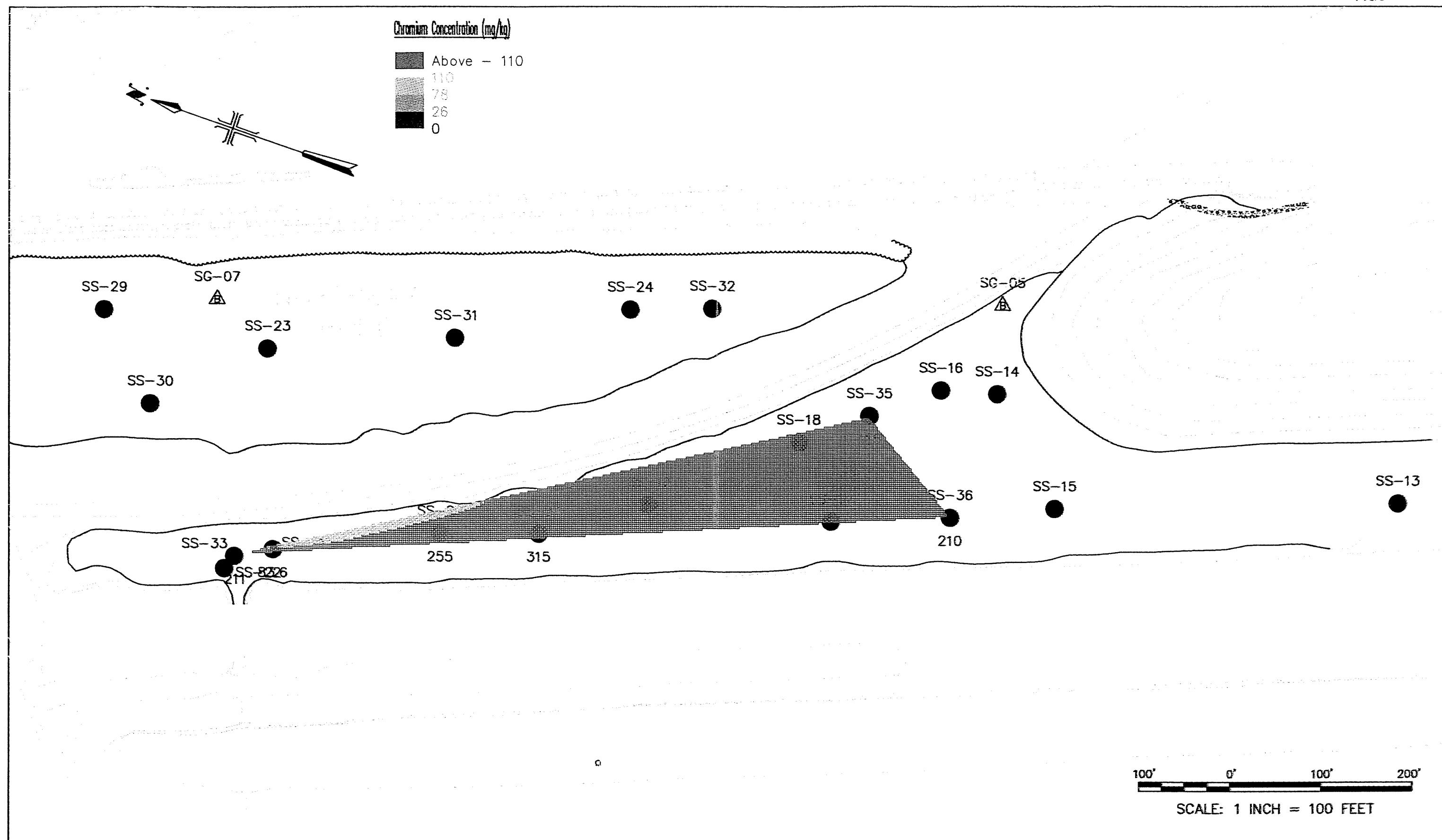
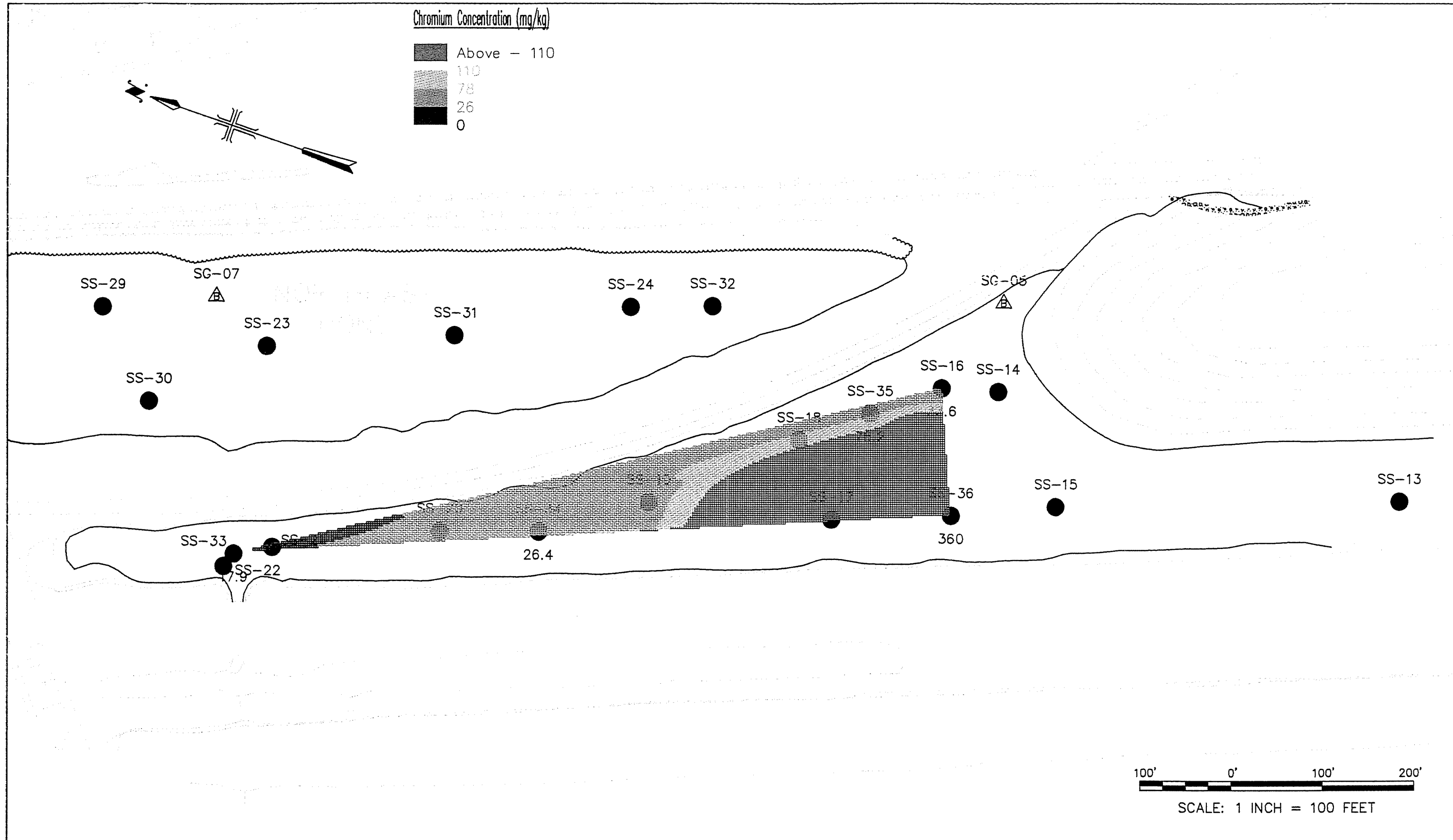


FIGURE E-27



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

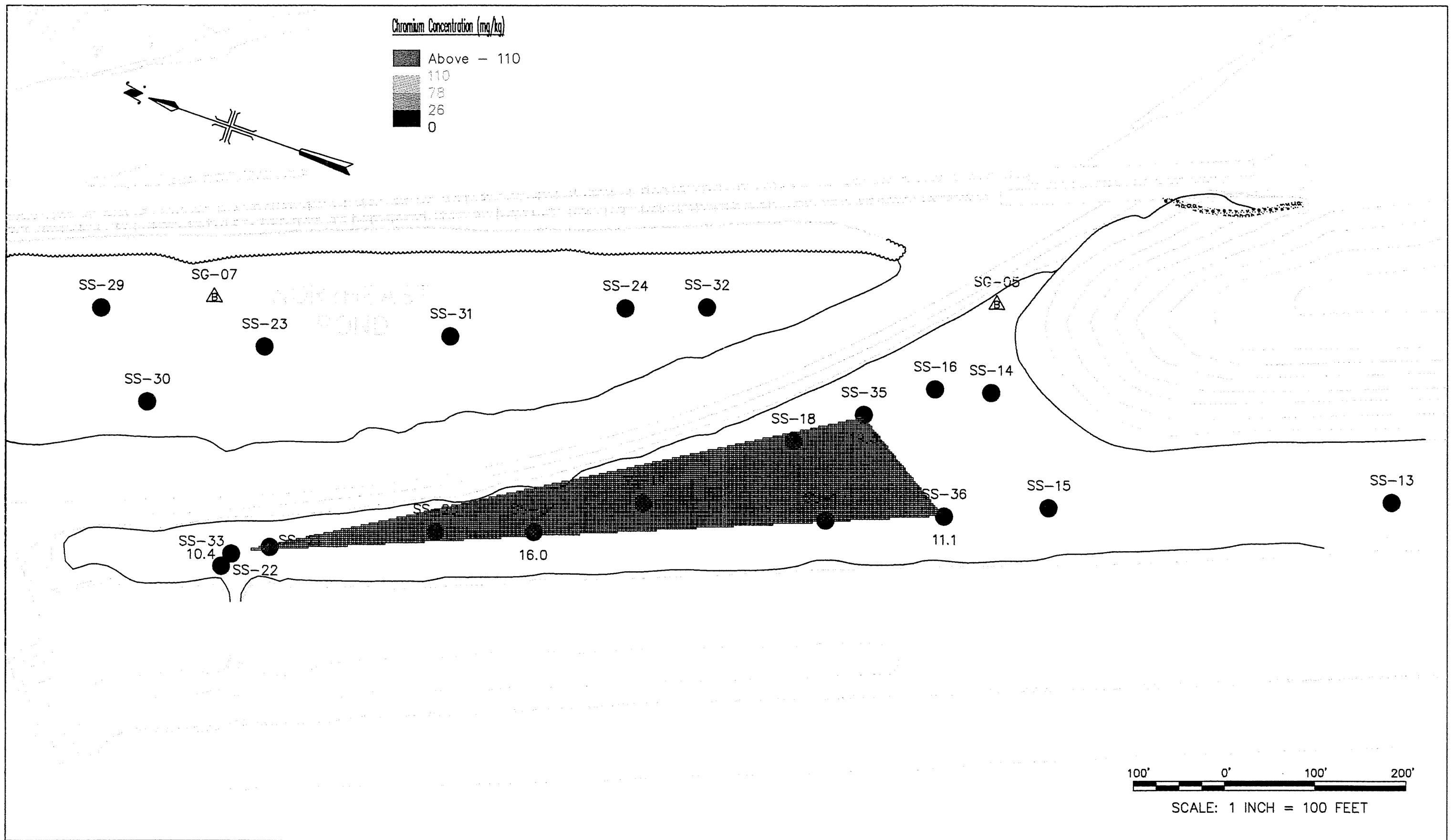
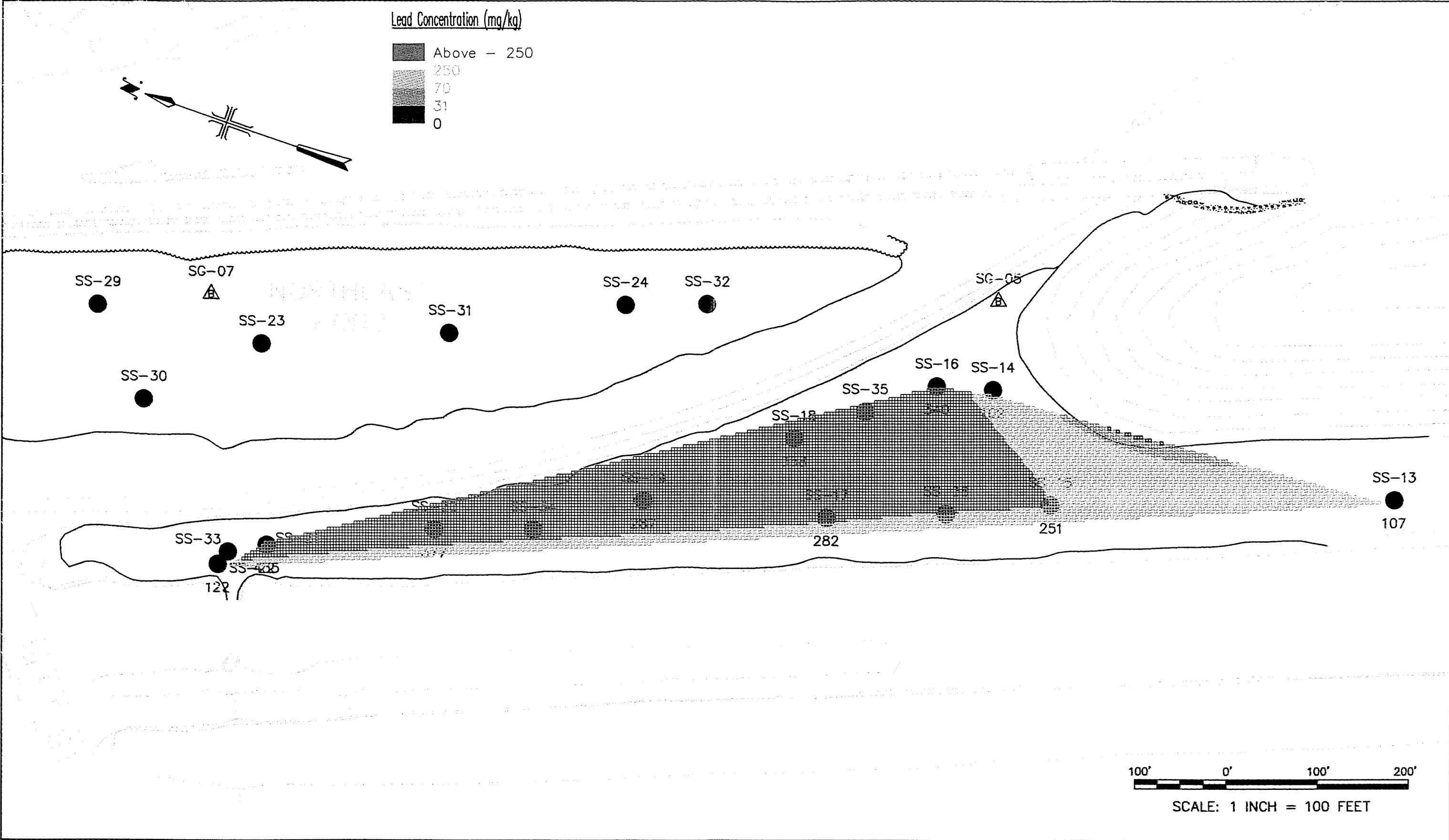
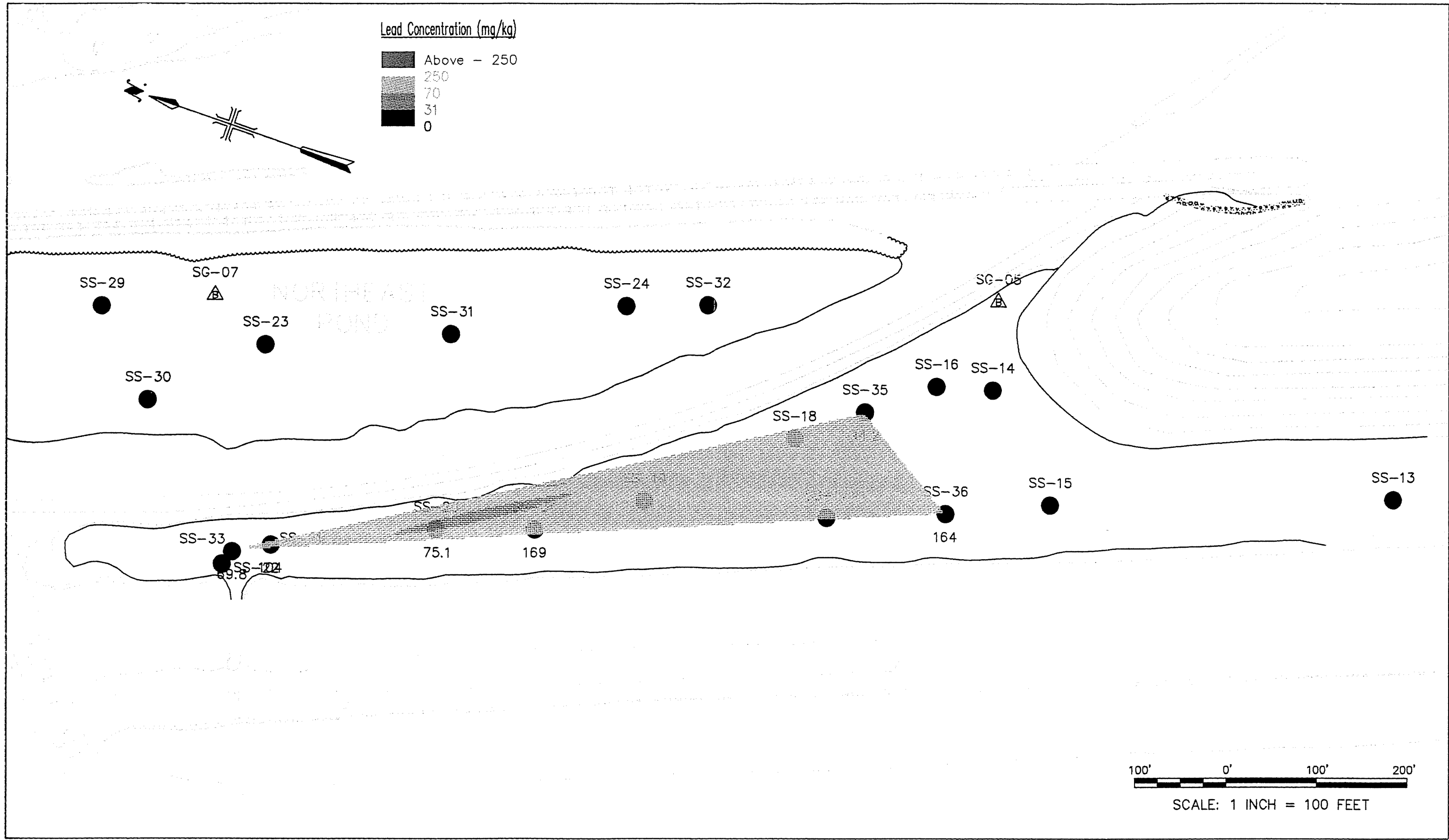


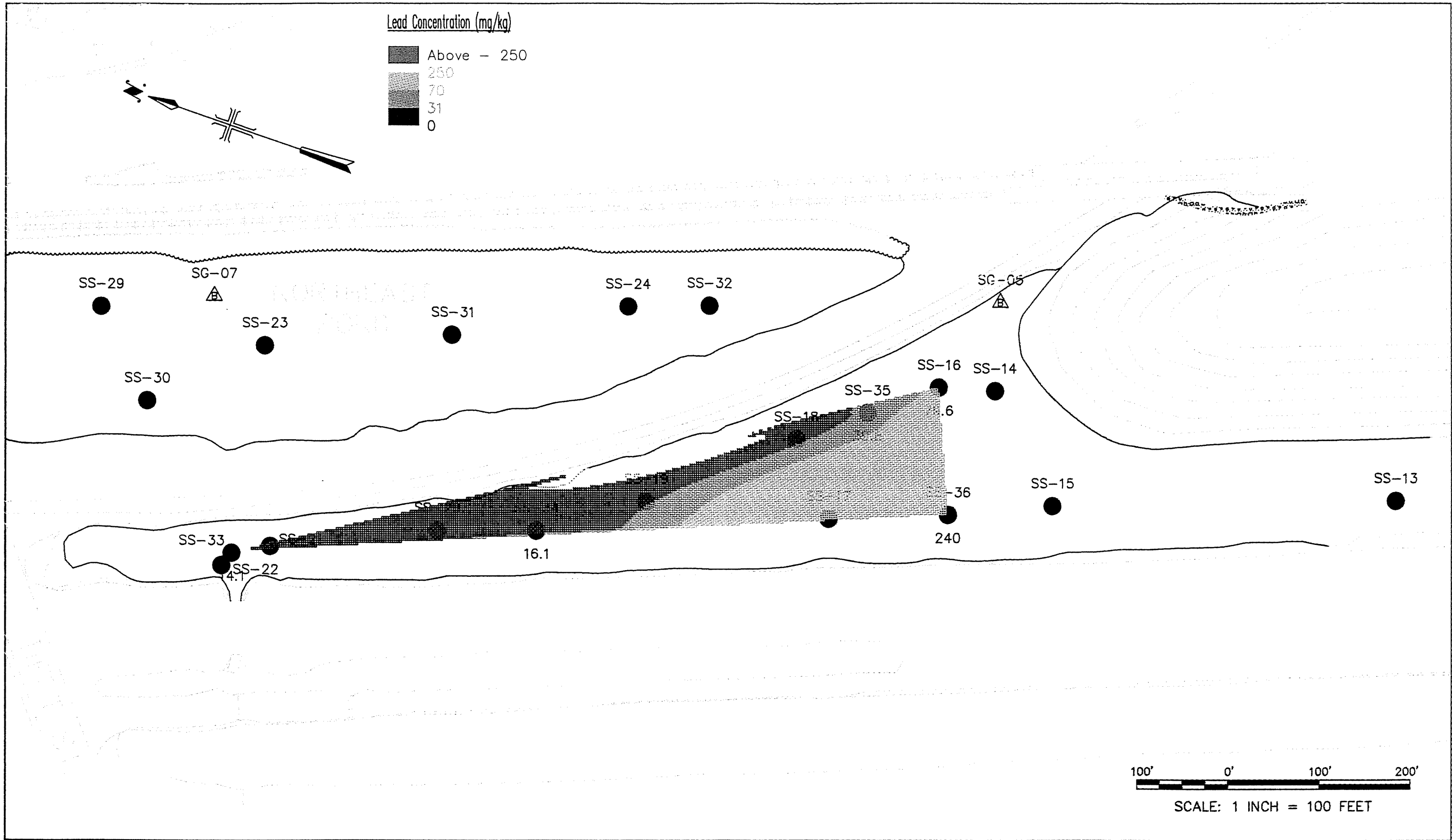
FIGURE E-29





Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-31



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

**MALCOLM
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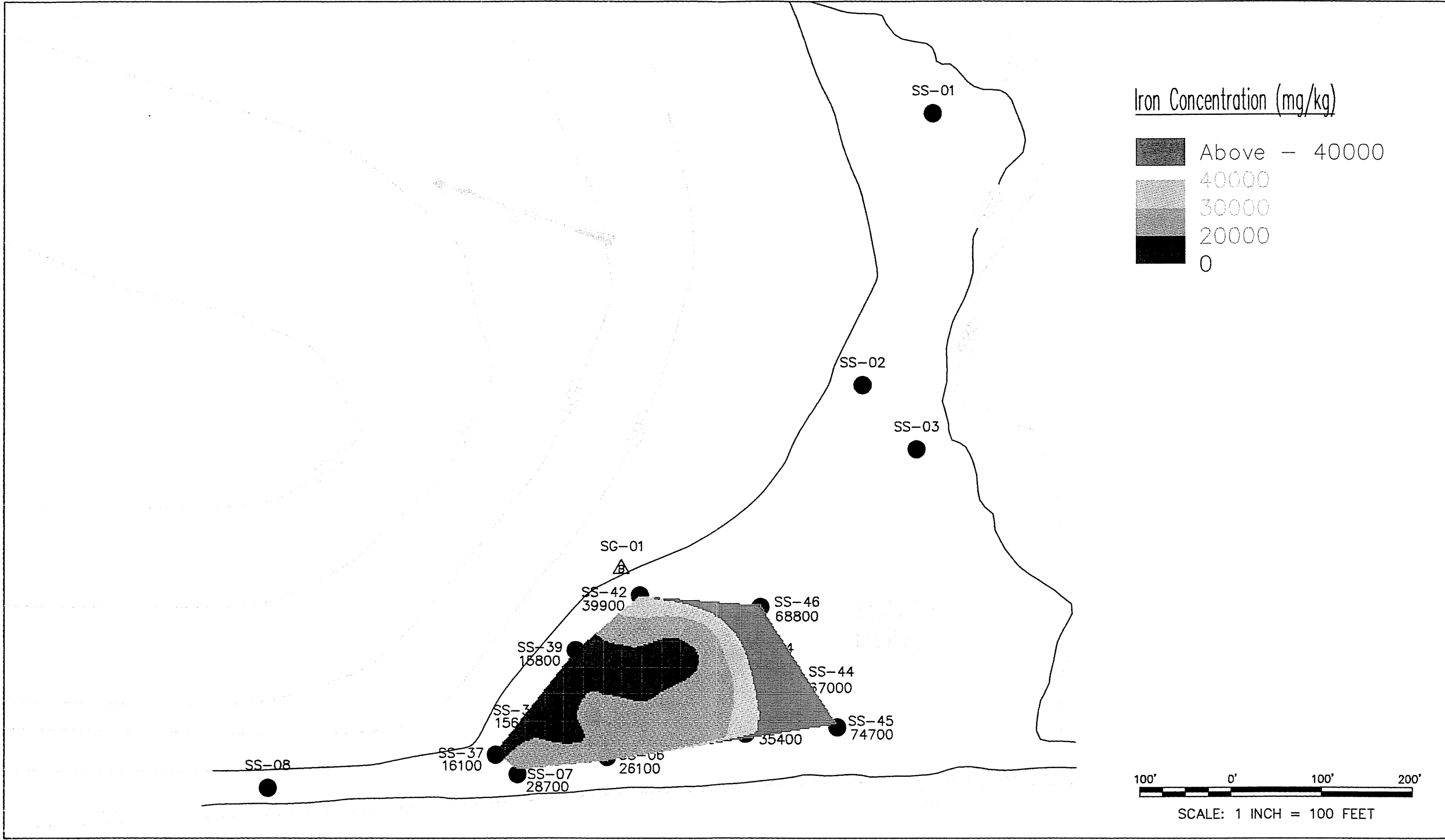
PB34N.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
NORTH POND
LEAD CONCENTRATION: 3 - 4 FEET
LTV STEEL

FIGURE E-32

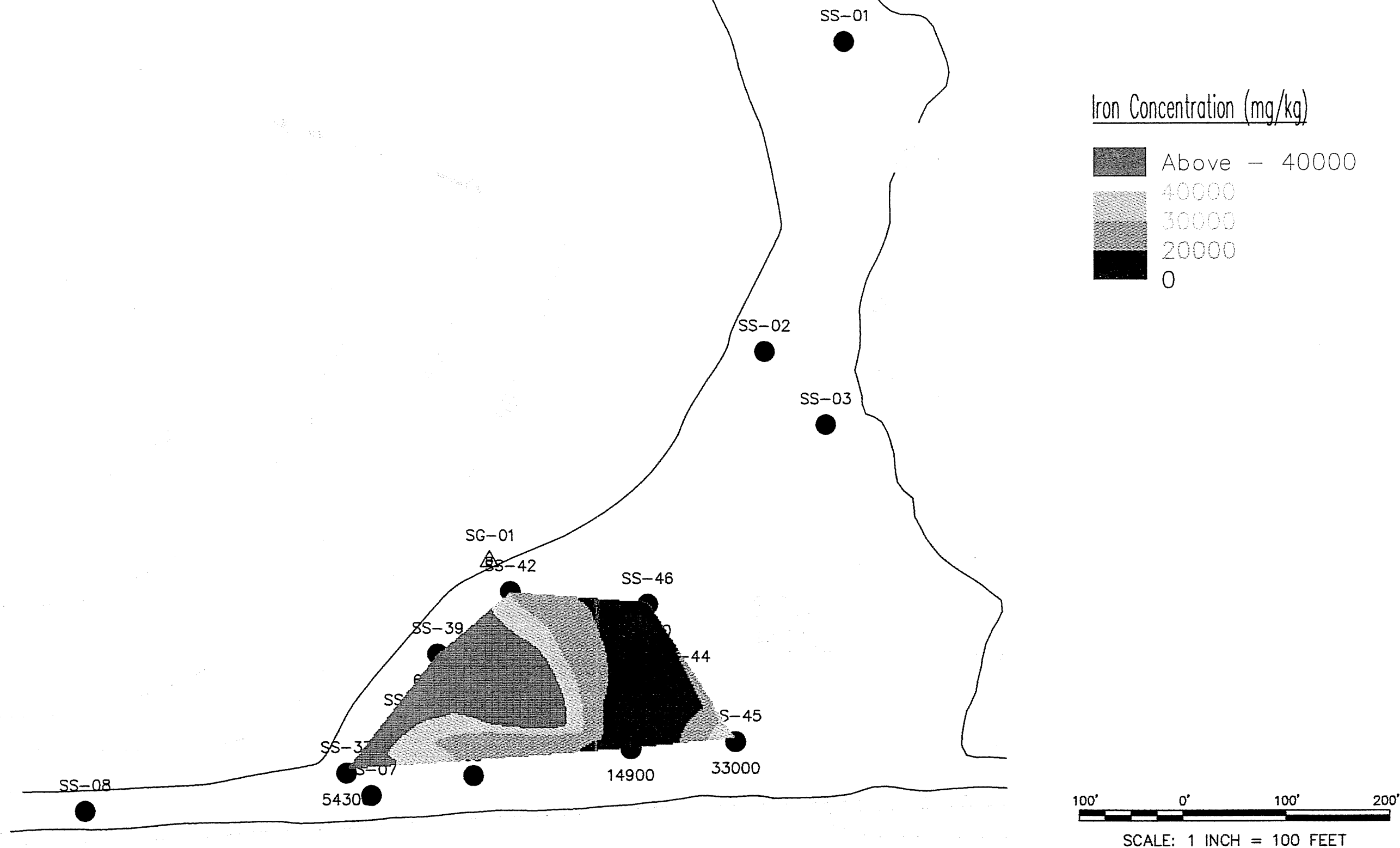


Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-34



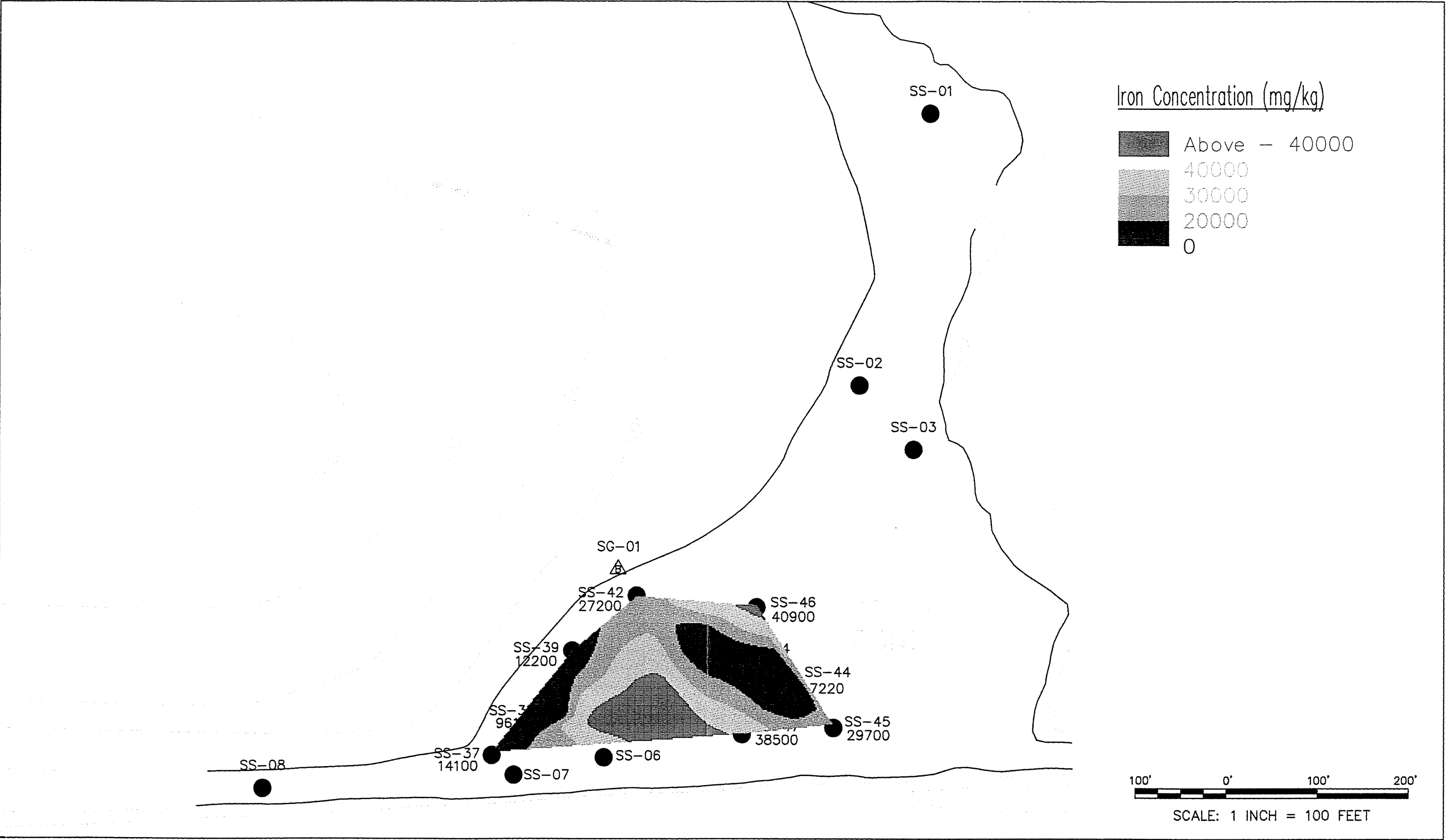
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

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FE12S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
IRON CONCENTRATION: 1 - 2 FEET

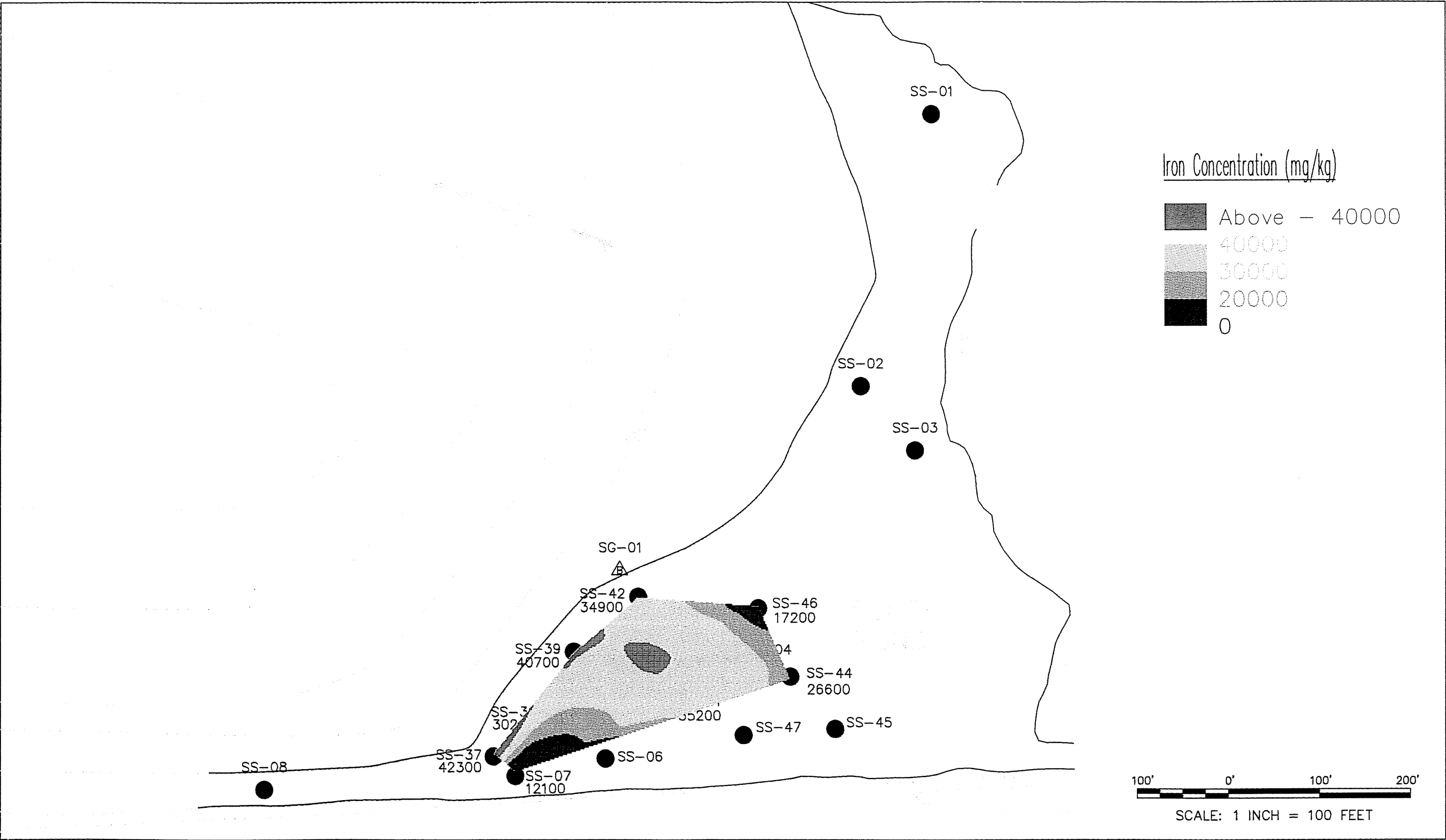
LTV STEEL



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
IRON CONCENTRATION: 2 - 3 FEET

FIGURE E-36



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-37



FIGURE E-38

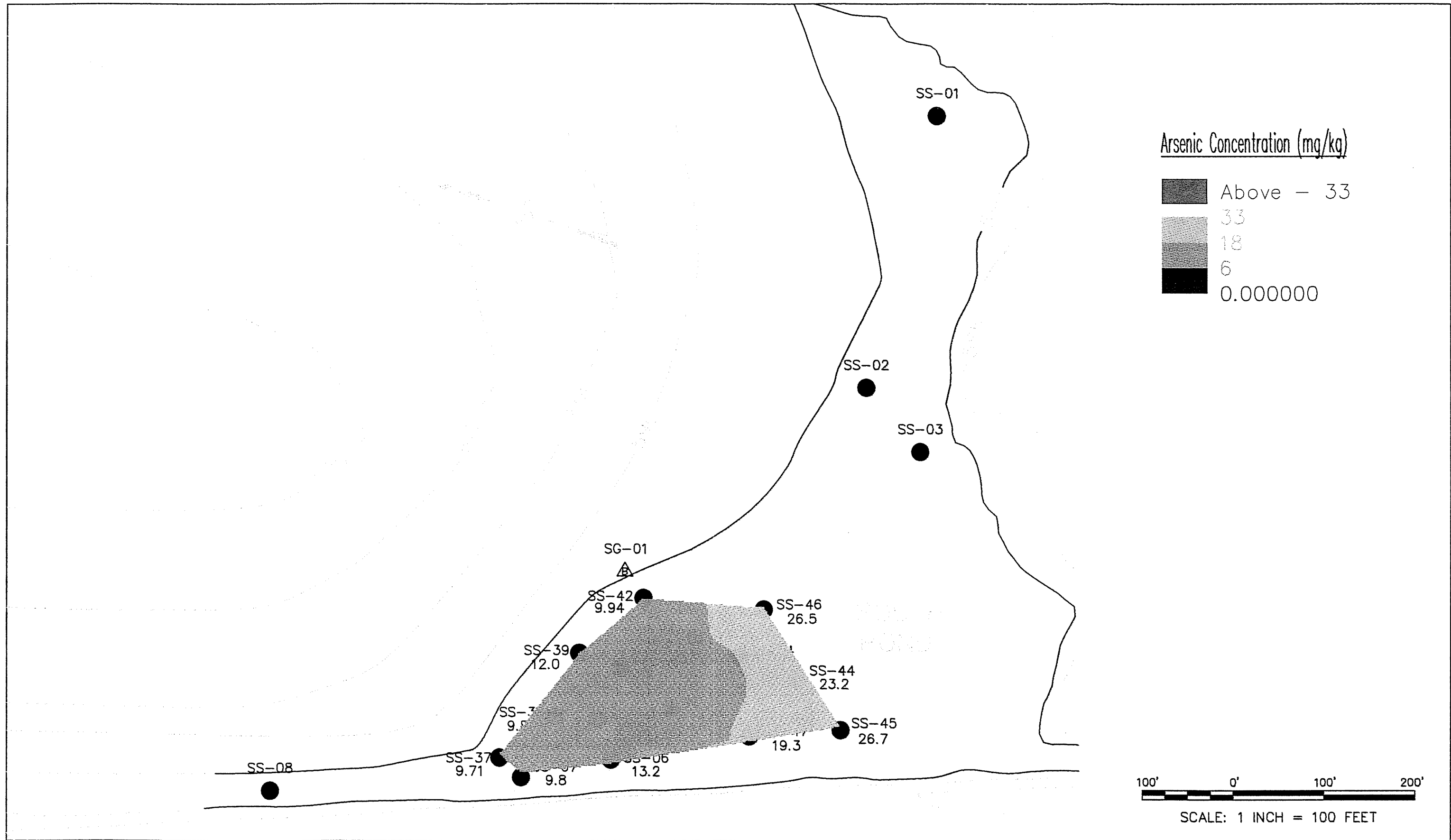
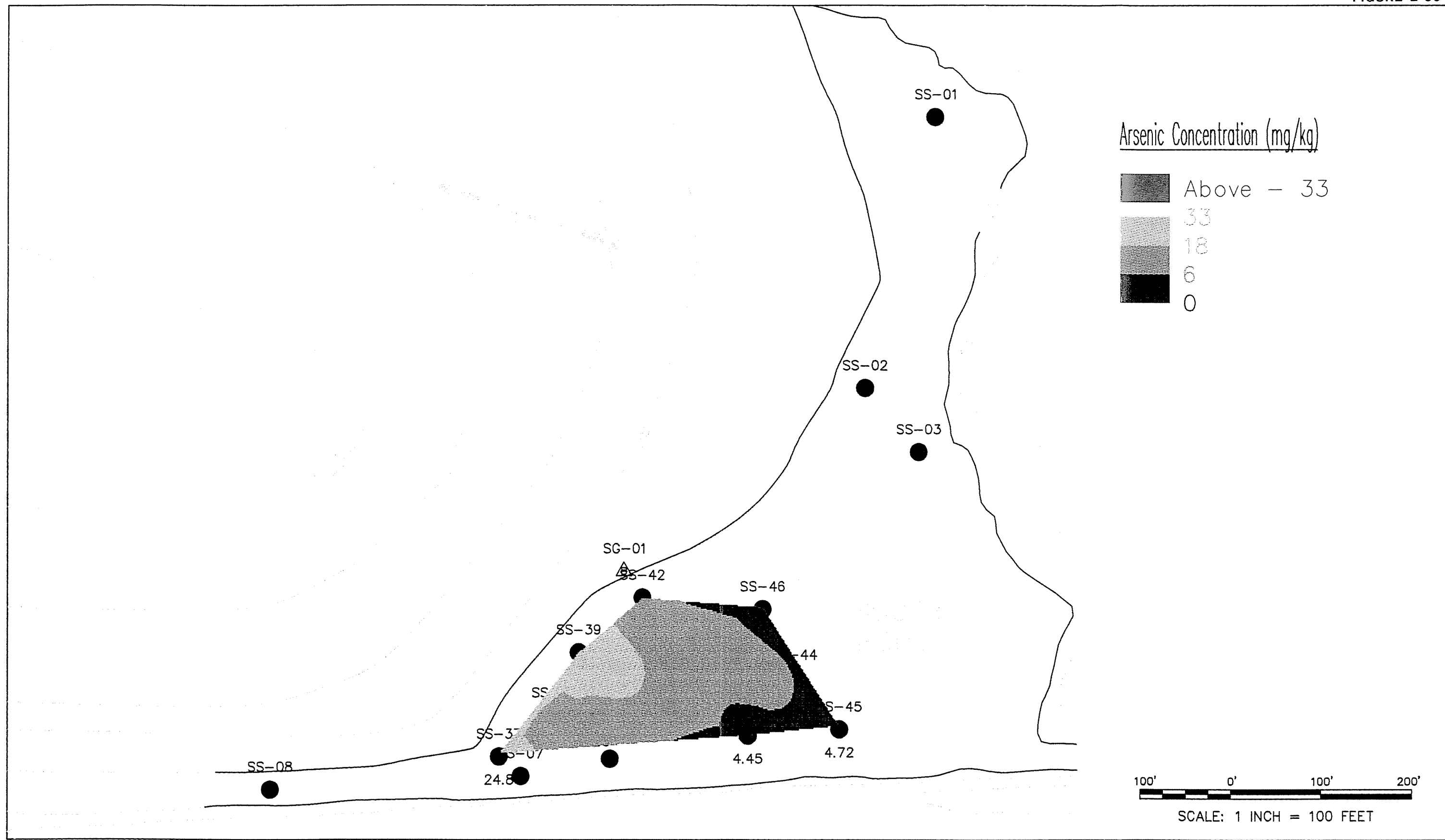
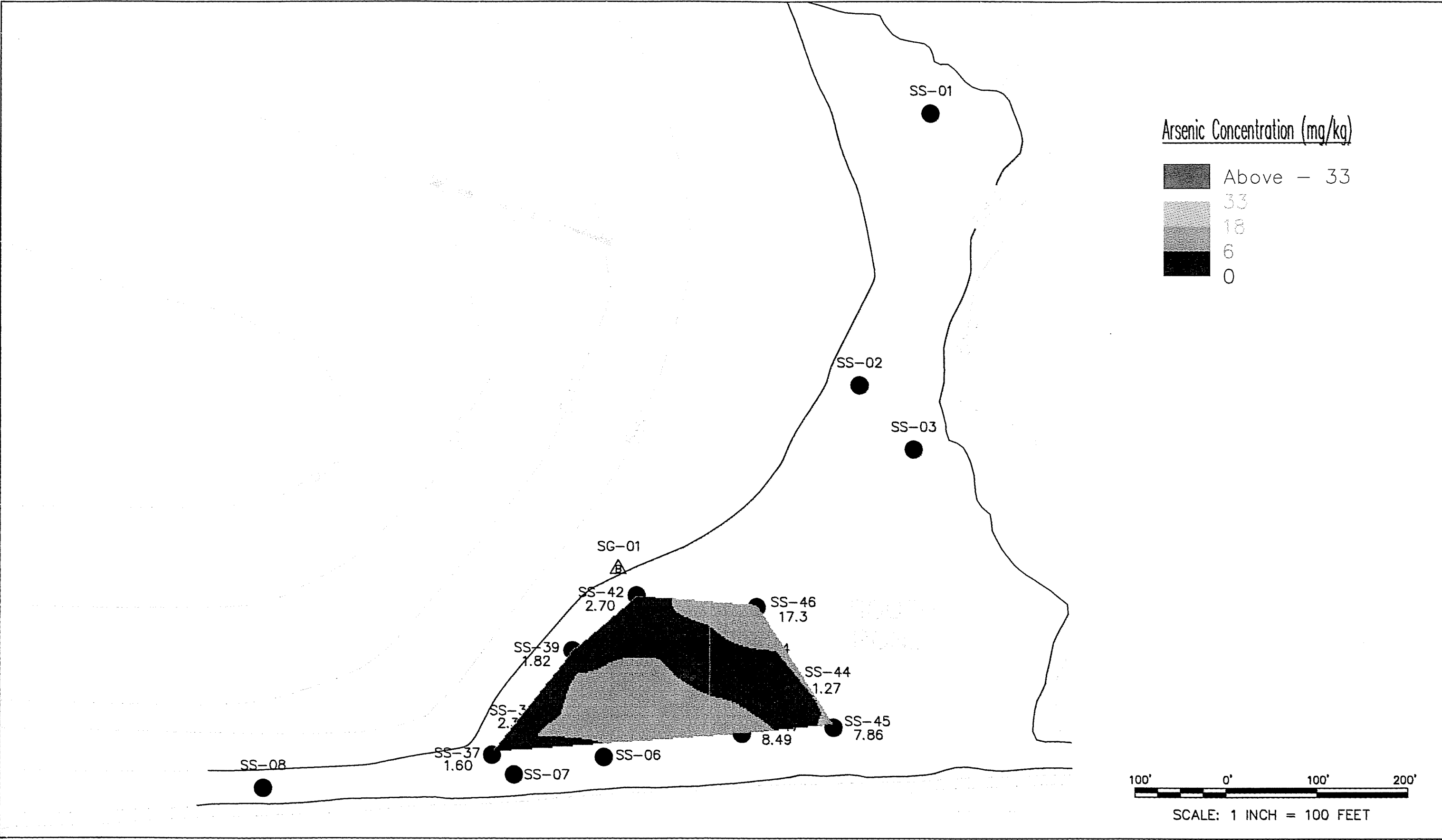


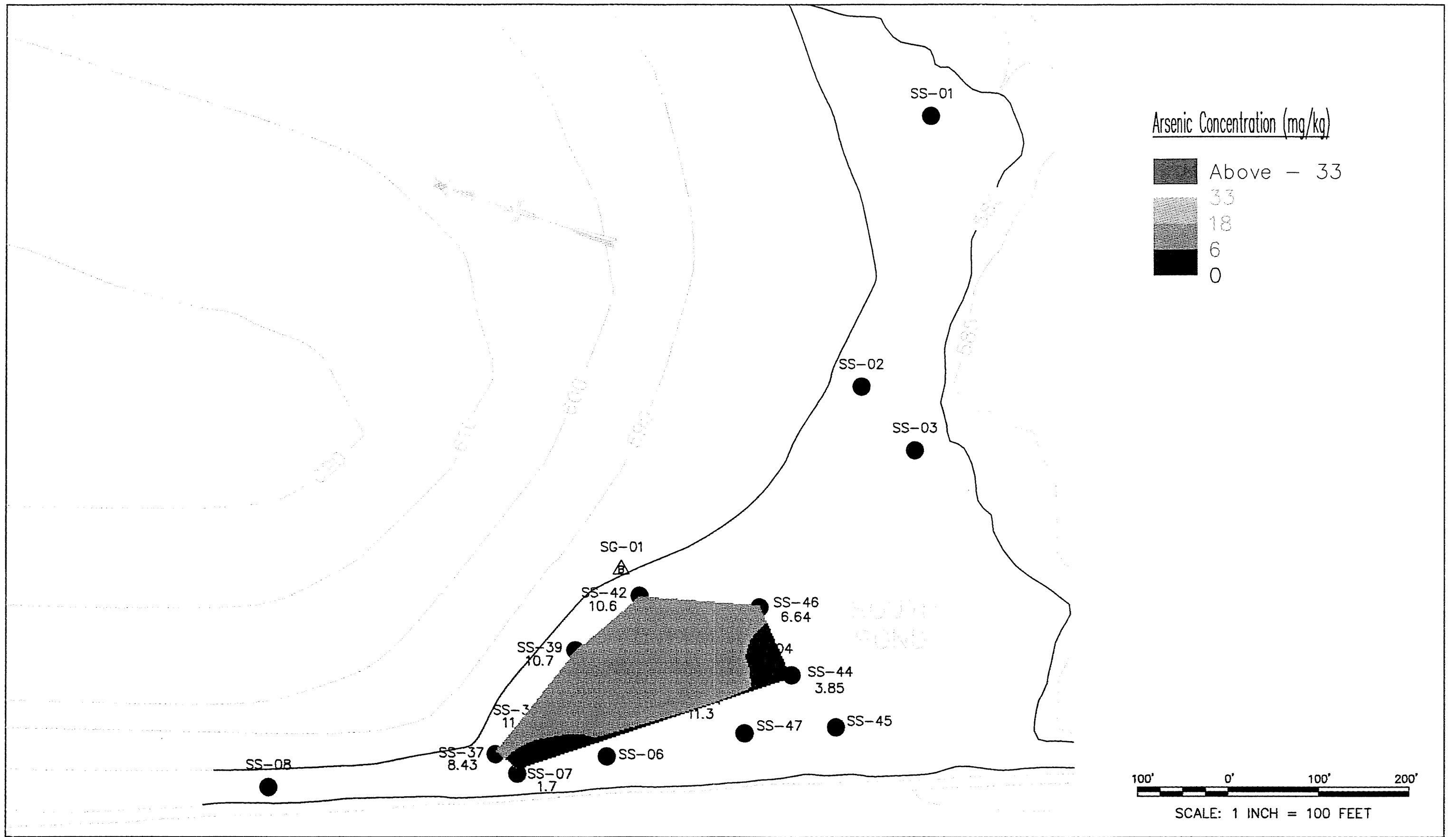
FIGURE E-39





Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-41





Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

**MALCOLM
PIRNIE**

CD01S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
CADMIUM CONCENTRATION: 0 -1 FEET
LTV STEEL

FIGURE E-43

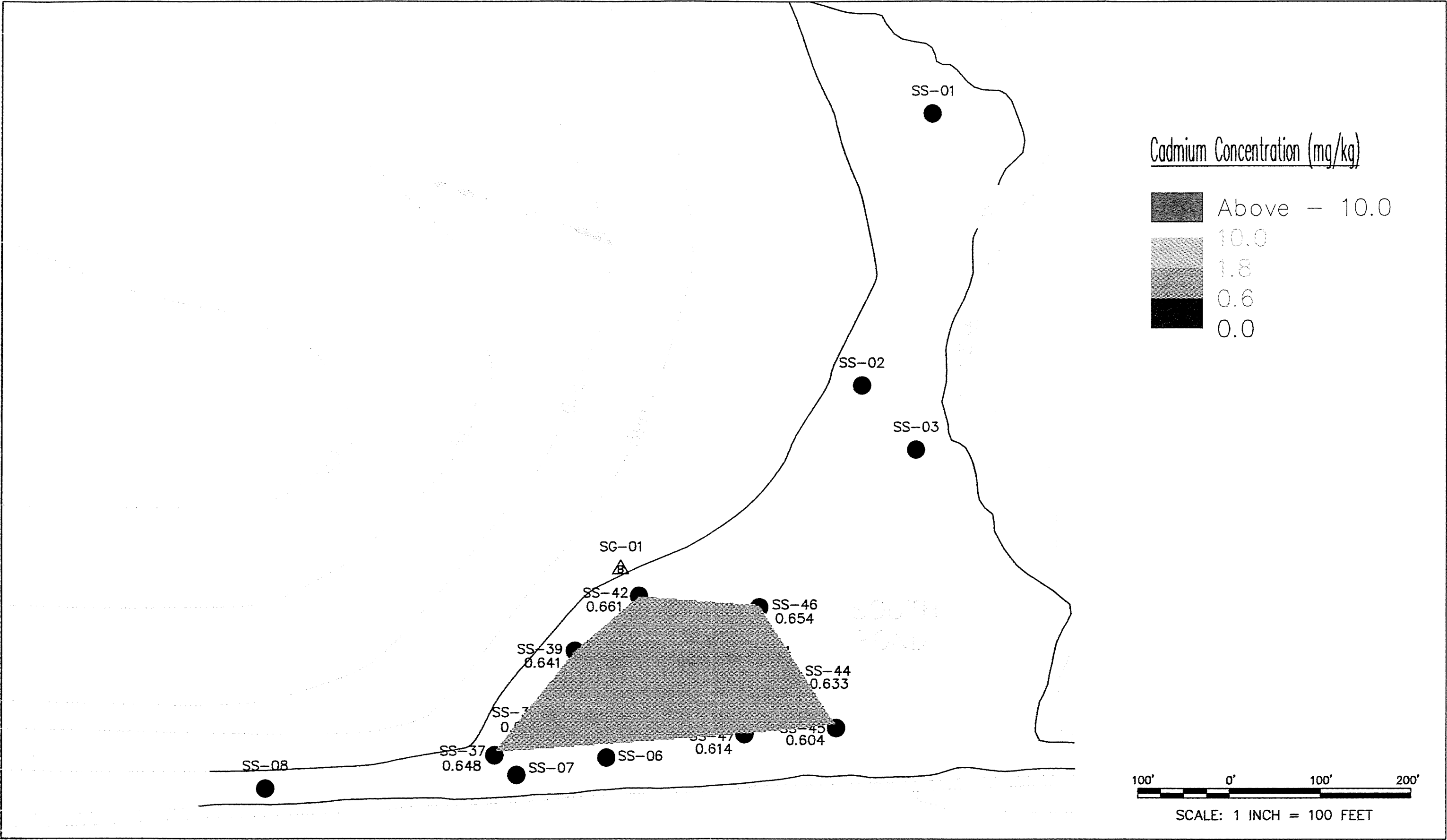


**MALCOLM
PIRNIE**

CD12S.DWG

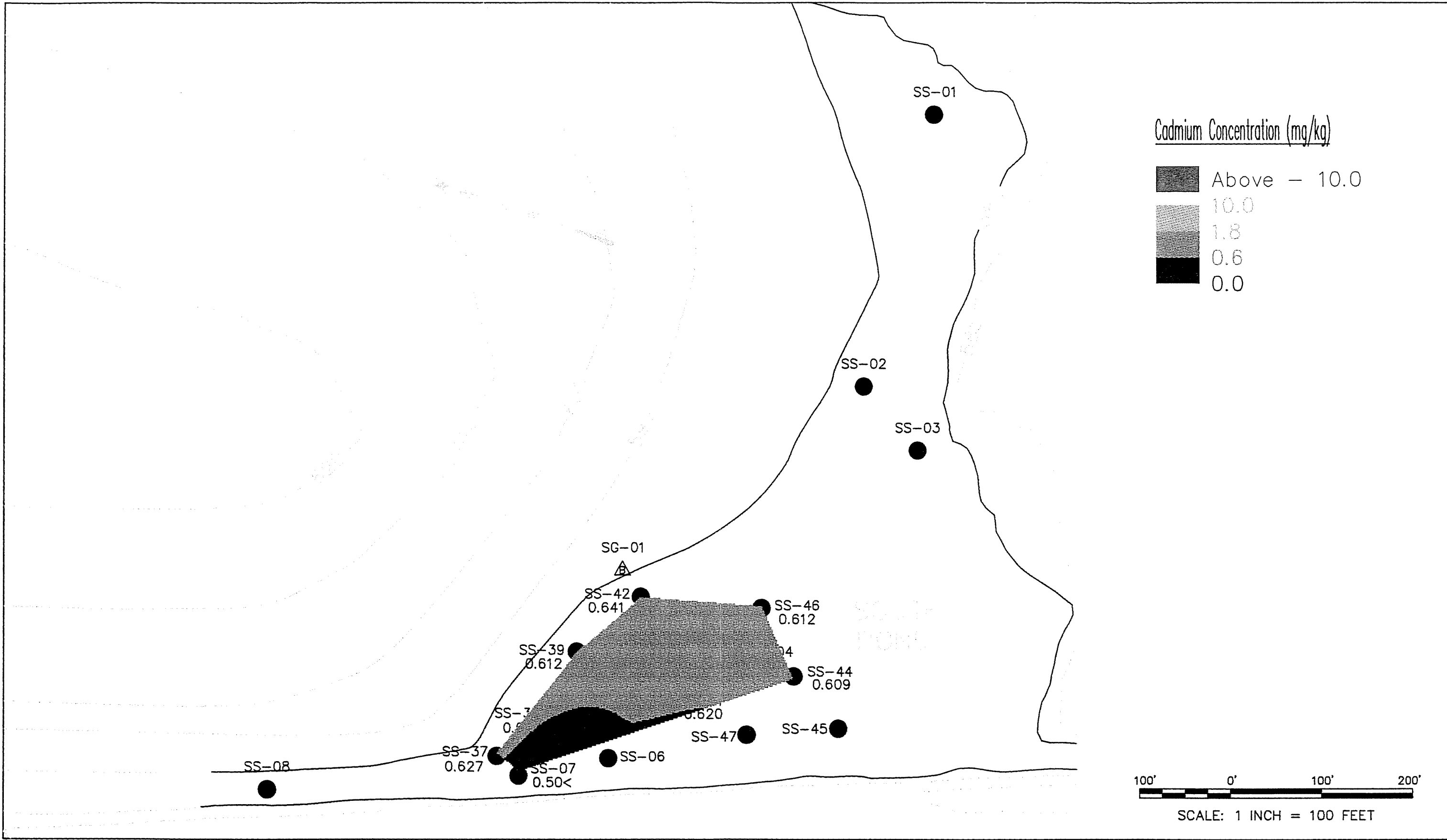
Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
CADMIUM CONCENTRATION: 1 - 2 FEET
LTV STEEL

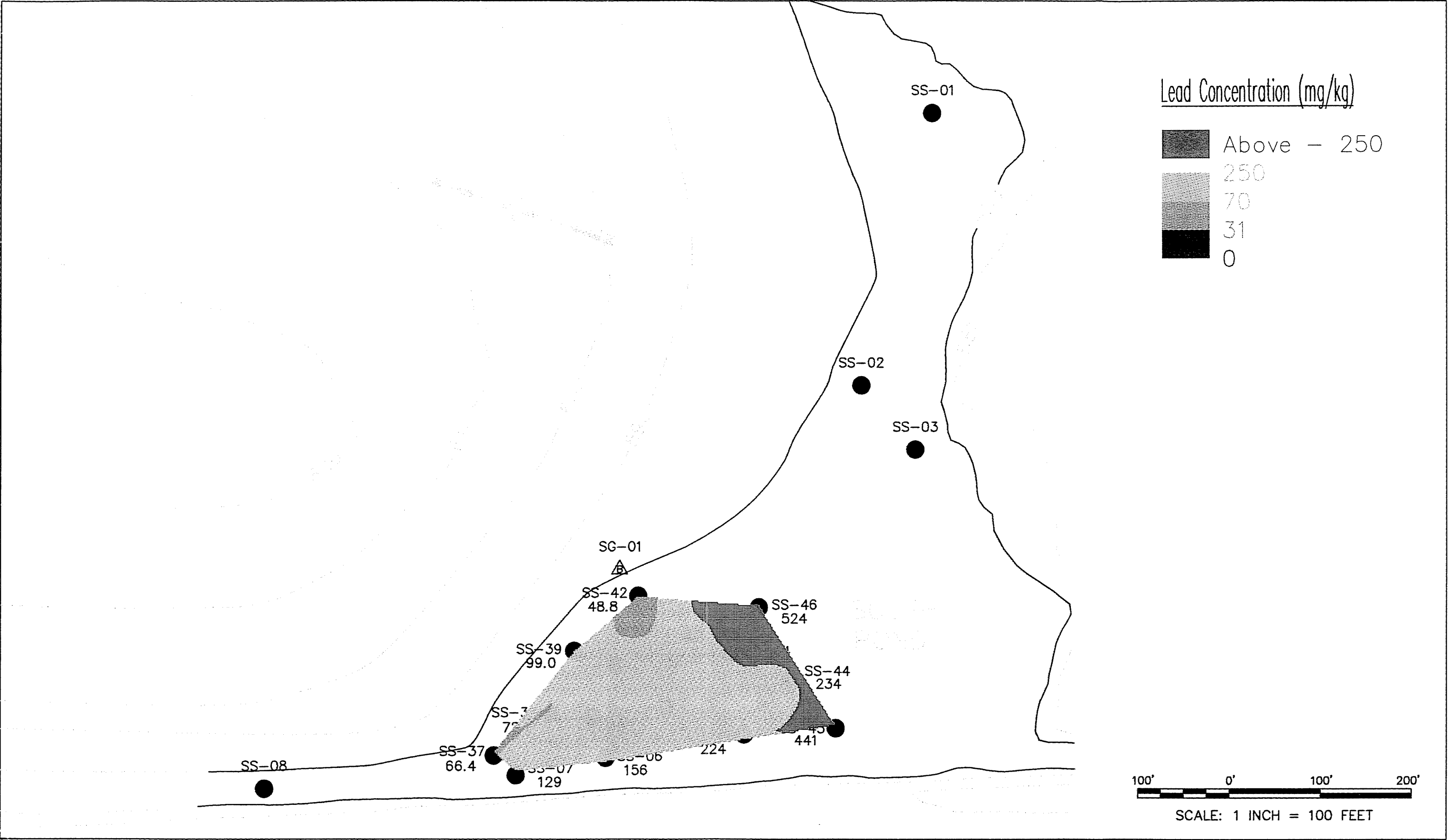


Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-45



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

FIGURE E-47



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

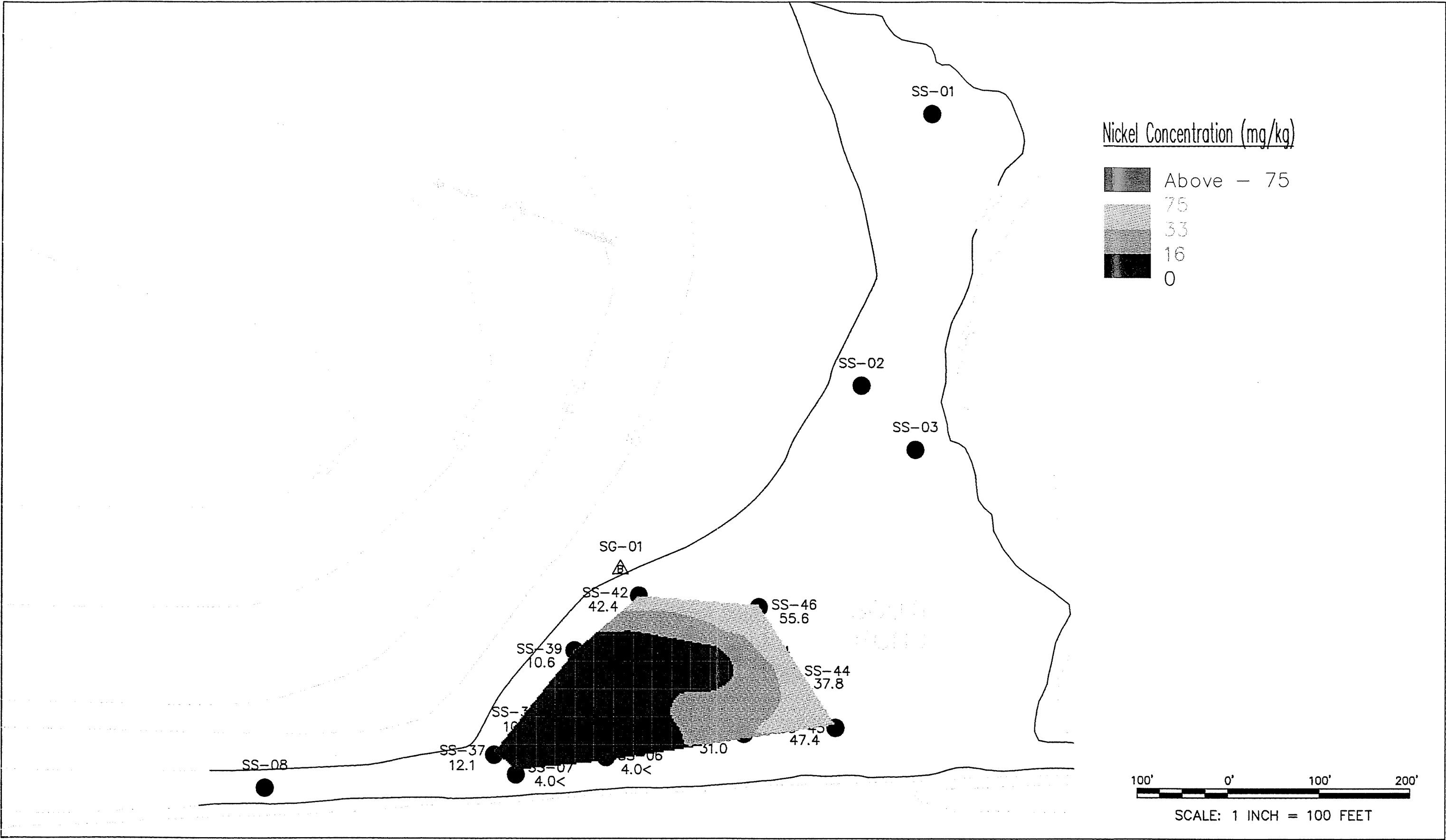
**MALCOLM
PIRNIE**

PB23S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
LEAD CONCENTRATION: 2 – 3 FEET
LTV STEEL



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.



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NI01S.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
NICKEL CONCENTRATION: 0 - 1 FEET
LTV STEEL

FIGURE E-51

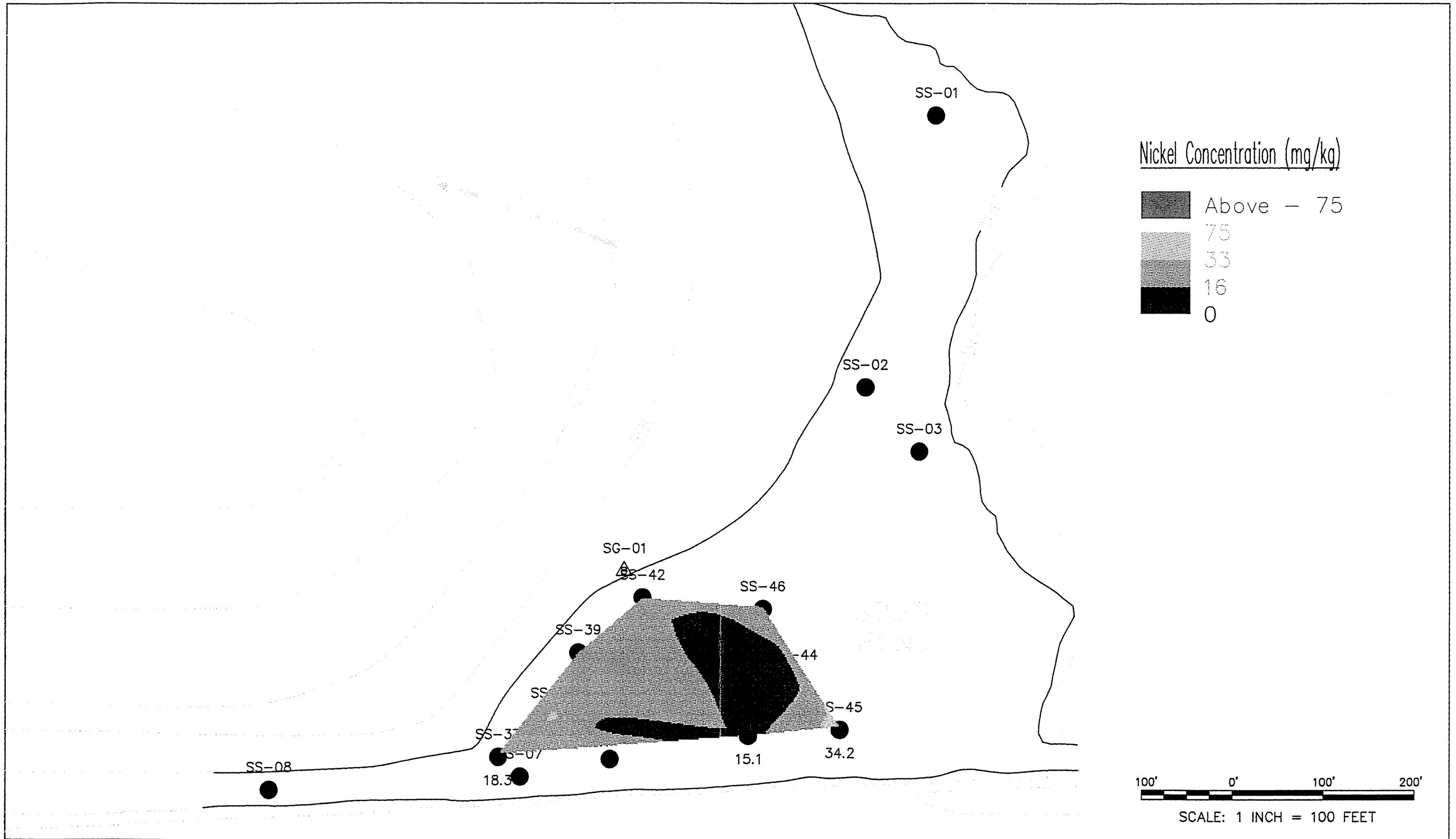
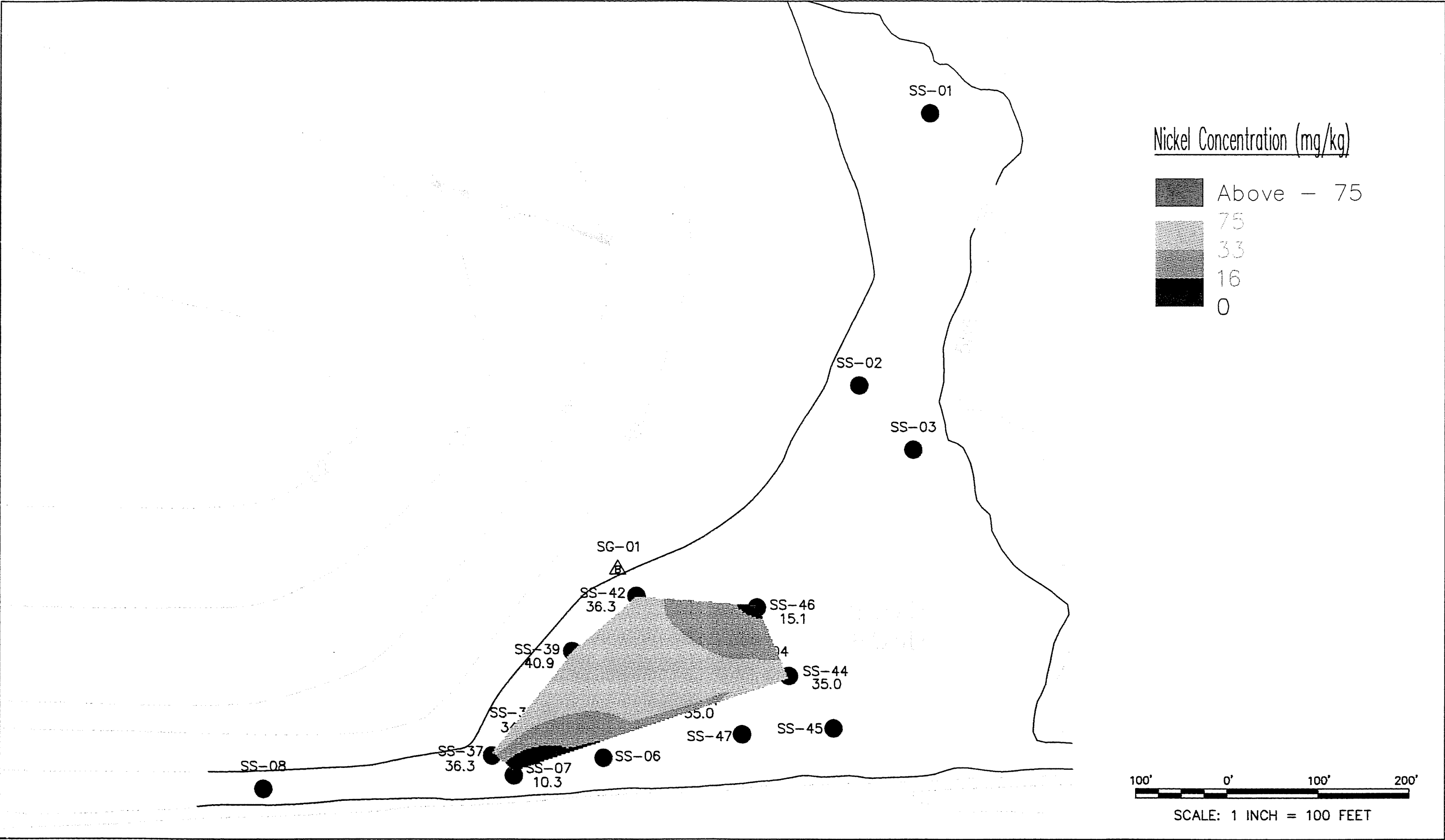




FIGURE E-53



**MALCOLM
PIRNIE**

NI34S.DWG

Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
NICKEL CONCENTRATION: 3 - 4 FEET
LTV STEEL

FIGURE E-54



Note: GIS contouring occurs between data points. Extrapolation of isoconcentration data to pond perimeter can be inferred.

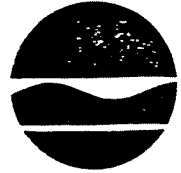
**MALCOLM
PIRNIE**

NI45S.DWG

MARILLA ST. LANDFILL
WETLANDS FOCUSED FS ADDENDUM
SOUTH POND
NICKEL CONCENTRATION: 4 - 5 FEET
LTV STEEL

APPENDIX F
NYSDEC SITE-SPECIFIED SEDIMENT LEVELS

New York State Department of Environmental Conservation
270 Michigan Avenue, Buffalo, New York 14203-2999
(716) 851-7220



Michael D. Zagata
Commissioner

September 17, 1996

Mr. John Etchison
LTV Steel Company
Corporate Environmental Department
3100 East 45th Street
Cleveland, Ohio 44127

Dear Mr. Etchison:

Republic Steel/ LTV Site # 915047
Buffalo(C), Erie County

This letter will clarify the Department's understanding of items discussed in your letter of August 12, 1996 [*Etchison to Walia*], and meetings held on August 2, 1996, and September 6, 1996, which included representatives of New York State Department of Environmental Conservation (NYSDEC), LTV, Army Corps of Engineers (ACOE), Malcolm Pirnie and the City of Buffalo (August 2, 1996). The agreements reached at the meetings can be summarized as follows:

1. The vegetated areas in the South Pond containing emergent vegetation in general do not require excavation or covering. The actual delineation of excavation areas will be defined by further sampling as outlined by Malcolm Pirnie.
2. The barrier wall along the South Pond/landfill interface will be extended to enclose the West Ditch to mitigate the possible migration of contaminants.
3. The West Ditch will be maintained as an open channel with emergent wetland restoration after covering the contaminated sediments with 12 inches of clay. The ditch will be replanted and maintained as emergent growth with an open channel. Filter fabric or some other mechanism will be used to determine the contaminated soil/clay interface.

4. At a minimum, the sediments exceeding the following concentrations will be considered "Hot Spots" subject to excavation. Areas requiring excavation will be restored using 12 inches of clean soil barrier overlain by 6 inches of topsoil. In the open water, only 3 inches of topsoil may be used.

Metal	Remedial Action Objective (ug/g -- ppm) **
Antimony	6
Arsenic	18
Cadmium	1.8
Chromium	78
Copper	48
Iron	3 %
Lead	70
Manganese	780
Mercury	0.20
Nickel	33
Zinc	195

** Except for iron, all concentrations in ppm

5. The excavation of the pond sediments will be done under dry conditions instead of dredging.
6. In lieu of off-site mitigation, the north ponds are to be expanded to incorporate the loss of wetland in the West Ditch. This expansion will be enhanced by creating islands of emergent vegetation.
7. The wetland area north of the Tift Street bridge is naturally connected to the north ponds and if contamination is found to be present from the LTV property, it must be included in the proposed wetlands restoration plan. LTV agreed to review this matter and include in the sampling plan scheduled for September 1996.

APPENDIX G

**ALTERNATIVE 9: HOT SPOT EXCAVATION/
ON-SITE WETLAND RESTORATION COST ESTIMATE**

LTV STEEL COMPANY MARILLA STREET LANDFILL WETLAND RESTORATION				
<i>ALTERNATIVE 9: HOT SPOT EXCAVATION/ON-SITE WETLAND RESTORATION</i>				
Item	Quantity	Units	Unit Cost	Total Cost
Dewater Wetlands	10	Months	4,000	40,000
Siltation Control	—	L.S.	10,000	10,000
Excavate Sediment	68,500	cy	4	274,000
On-site Trucking	68,500	cy	2.50	171,250
Excavate/Stockpile Existing Cover	29,000	cy	4	116,000
Construct Berms	11,000	cy	15	165,000
Stabilize Sediments with Cement	68,500	cy	7	479,500
Backhoe for Mixing Cement	6	Months	17,000	102,000
Cover Sediment Basin				
18-in. Clay	17,500	cy	12	210,000
12-in. Topsoil (on-site)	11,500	cy	10	115,000
Resee Basin Area	7	acres	2,000	14,000
Toe-of-Slope Haul Road				
Soil	12,100	cy	12	145,200
Gravel	1,400	cy	20	28,000
Restoration	2.5	acres	2,000	5,000
Cover Pond Areas				
12-in. Clean Fill	28,500	cy	12	342,000
3-in. Top Soil	7,100	cy	12	85,200
General Site Restoration	—	ls	15,000	15,000
Wetland Vegetation Restoration	—	ls	40,000	40,000
Wetland Islands				
Clean Fill	6,500	cy	12	78,000
Topsoil	806	cy	15	12,090
Groundwater Cutoff Wall				
Excavation	925	cy	2.50	2,313
Clay Barrier	925	cy	17	15,275

LTV STEEL COMPANY MARILLA STREET LANDFILL WETLAND RESTORATION				
<i>ALTERNATIVE 9: HOT SPOT EXCAVATION/ON-SITE WETLAND RESTORATION</i>				
West Ditch Remediation				
12-in. Clay	6,800	cy	17	115,600
6-in. Topsoil	3,400	cy	15	51,000
Filter Fabric	20,400	sy	2.25	45,900
Regrading	6,800	cy	2.50	17,000
Hauling	3,400	cy	2.50	8,500
North Ditch Remediation				
12-in. Clay	1,400	cy	17	23,800
6-in. Topsoil	700	cy	15	10,500
Filter Fabric	4,200	sy	2.25	9,450
Regrading	1,400	cy	2.50	3,500
Hauling	700	cy	2.50	1,750
Health & Safety	—	ls	110,000	100,722
Subtotal				2,853,000 ⁽¹⁾
35% Engineering & Contingencies				<u>998,500</u>
Total Cost				\$3,851,500

Notes: (1) Cost does not include installation of sheet piling along the landfill toe of slope at the north end of the Clarifier Sludge Area or excavation/restoration of vegetated areas in the South Pond. The necessity for these items will be determined during final design after additional field investigations have been performed. If determined to be necessary, an approximate cost of \$300,000 should be added to the construction subtotal for each item.

LTV STEEL COMPANY MARILLA STREET LANDFILL WETLAND RESTORATION				
ALTERNATIVE 9: HOT SPOT EXCAVATION/ON-SITE WETLAND RESTORATION				
OPERATION AND MAINTENANCE COSTS				
Item	Quantity	Units	Unit Cost	Total Cost
Wetland Vegetation Monitoring	1	Event	\$13,100	\$13,100
Sampling/Inspection Labor	200	Hours	\$55	\$11,000
Analytical Costs	2	Sampling Events	\$9,900	\$19,800
Report Labor	150	Hours	\$55	\$8,250
Mowing	1	Event	\$2,000	\$2,000
Replacement Plants	Lump Sum	—	—	\$500
Subtotal				\$54,650
30 Year PW for Above Capital Cost				\$615,250 <u>\$3,851,000</u>
Total Present Worth				\$4,520,900

APPENDIX H

**POST-CLOSURE MONITORING AND
MAINTENANCE PLAN**

**POST-CLOSURE MONITORING AND MAINTENANCE PLAN
FOR THE MARILL STREET LANDFILL**

**LTV STEEL COMPANY
CLEVELAND, OHIO**

NOVEMBER 1996

Prepared By:

**MALCOLM PIRNIE, INC.
P.O. Box 1948
Buffalo, New York 14219**

**POST CLOSURE MONITORING AND MAINTENANCE PLAN
FOR THE MARILLA STREET LANDFILL**

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1.0 INTRODUCTION

1.1 POST-CLOSURE MONITORING AND MAINTENANCE PLAN

This post-closure monitoring and maintenance plan describes the site activities to be performed upon completion of the wetland remedial actions at the Marilla Street Landfill site. Monitoring activities will continue for a period of 30 years. This draft document will be revised based on review comments received from the New York State Department of Environmental Conservation (NYSDEC) and unforeseen changes which may result during the remedial design or construction phase of the project.

The goal of the monitoring plan is to provide an orderly method of monitoring the quality of soil, surface water, biota and groundwater in the various areas of the site based on sound scientific judgement. This plan sets forth the sampling schedule, analytical requirements, sampling procedures, sampling equipment, and reporting requirements necessary to accomplish that goal.

1.2 DESCRIPTION OF AREAS

The remedial action within the Marilla Street landfill wetlands as recommended in the Addendum to the Focused Feasibility Study Report would occur in four areas of the site: West Ditch, North Ponds, South Pond and North Ditch.

1.2.1 West Ditch

The West Ditch encompasses approximately 4.2 acres. It is a manmade open water ditch with fringes of emergent vegetation. The remedial action proposed for this area involves the removal of all vegetation and regrading the ditch. The remaining sediments will be covered by 12 inches of recompact clay-type soil followed by a filter fabric and six inches of topsoil. The West Ditch would remain as an open channel upon completion of the remediation work to connect the South Pond and North Ponds. The ditch would be revegetated with facultative shrubs and emergent vegetation. Loss of approximately 0.40

acres of emergent wetland would be mitigated by the creation of emergent islands in the North Pond area.

1.2.2 North Ponds

The North Pond area consists of two wetland areas: Northeast Pond (4.27 acres) and Northwest Pond (3.64 acres). These ponds are generally described as open water/emergent wetlands. Sediments exceeding the NYSDEC established sediment clean up criteria would be dredged/excavated from the ponds. Approximately 50,000 cubic yards of contaminated sediment would be removed from the ponds and disposed of in the adjacent landfill.

To compensate for the loss of emergent wetland in the West and North Ditches, a 0.5 acre island of emergent vegetation would be created in each of the northern ponds after sediment removal. The islands would be constructed of clean off-site material to within 3 inches of the average water elevation in the ponds. The permanently flooded perimeter areas of each island (to a water depth of 12 inches) would be revegetated with cattails. The remaining portion of the island that is not permanently flooded but exhibits saturated conditions throughout the year would be revegetated with a wetland hummock mix comprised of sedges and wildflowers. The portion of each pond not covered by an island would be restored using 12 inches of clean off-site soils overlain by 3 inches of topsoil. The perimeter of each of the North Ponds would be revegetated with cattails to a water depth of 12 inches.

1.2.3 South Pond

The South Pond area is a 10.82 acre wetland complex located along the southern toe of the landfill. This wetland consists of four community types: a forested community, scrub-shrub/forested community, an emergent community and an open water community. The open water community is approximately 4.53 acres. Sediments exceeding the NYSDEC established sediment clean up criteria would be dredged/excavated from the open water portion of the pond. Approximately 18,300 cubic yards of contaminated sediment would be removed from the pond and disposed of in the adjacent landfill. The vegetated area of the

South Pond will not be disturbed. The open water area would be planted with spatterdock (*Nupher lutes*) upon completion of remediation activities.

A recompacted clay groundwater barrier wall would be constructed along the landfill/wetland interface. The purpose of the barrier wall is to connect the cover system barrier layer to the underlying native silty-clay layer along the landfill toe of slope to minimize the potential for shallow groundwater to enter the pond.

1.2.4 North Ditch

The North Ditch encompasses approximately 0.86 acres. It is a manmade ditch completely filled with emergent vegetation. Remedial actions proposed for this area include the removal of all vegetation and regrading the ditch. The sediments would be covered by 12 inches of recompacted clay-type soil followed by a filter fabric and six inches of top soil.

The ditch would be revegetated with facultative shrubs and emergent vegetation. Loss of 0.31 acres of emergent wetland would be mitigated by the creation of emergent islands in the North Ponds area.

2.0 SEDIMENT/SURFACE WATER SAMPLING AND ANALYSIS

2.1 SCOPE OF WORK

2.1.1 Wetland Areas

Post-closure monitoring of the wetland areas will emphasize those areas of the site which were shown to contain high concentrations of TAL metals during previous studies and which were subsequently remediated. Monitoring will be performed for a period of 30 years after completion of remedial activities.

Composite sediment samples will be collected. Each composite sample will consist of four discrete sediment samples collected in the general vicinity of the identified sample locations. Samples will be collected at a depth of 0 to 6 inches. The sample locations will be established via surveying and permanently marked for easy identification in the field.

Sampling frequency will be approximately one sample for every acre of open water/wetland for a total of 15 samples which includes:

- Three composite samples from the open water portion of the South Pond.
- Four composite samples from the West Ditch.
- Three composite samples from the Northwest Pond.
- Four composite samples from the Northeast Pond.
- One composite sample from the North Ditch.

All sediment samples will be analyzed for a site-specific inorganic parameter list (viz., antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc), total organic carbon and percent solids. Sediment sampling locations are presented on Figure 2-1.

Surface water samples will also be collected from each sediment location. The water sampled will be analyzed for pH, conductivity, hardness, alkalinity and the same 6NYCRR Part 360 parameters as groundwater including total organic carbon, total dissolved solids, sulfate, total recoverable phenolics and total iron, lead, chromium, cadmium, arsenic, manganese and mercury. Field filtering of samples will be performed for turbid surface

surface water samples. If turbid samples are collected, both total and dissolved metals will be analyzed.

The proposed sampling schedule will be semi-annually for years 1 through 5, and annual sampling during years 6 through 30. After year 5, the sampling frequency may be reduced, based upon the results of the first 5 years and NYSDEC approval.

2.1.2 Control Area

To establish regional background levels, one composite bottom sediment sample and one surface water sample will be collected from the South Park Pond located immediately south of the site. The sample location will be established via surveying and permanently marked for easy identification in the field. The sampling and analytical procedures will be consistent with other sediment and surface water samples collected. The control area will be sampled annually in conjunction with other sediment sampling activities. The frequency may be reduced after year 5 if other sampling activities are reduced.

2.2 SAMPLING PROCEDURES

2.2.1 Sediment

A Ponar dredge will be used to retrieve sediment samples from the approximate depth interval of 0 to 6 inches at the designated locations. The procedures used for collecting samples with a Ponar dredge are as follows:

1. Identify the sampling location and establish a staging area in the sampling boat. Measure water depth.
2. Collect the surface water sample first following procedure in Section 2.2.2.
3. Collect the sediment sample by carefully lowering and extracting the decontaminated Ponar dredge in accordance with the manufacturer's recommended procedures.
4. Place the recovered sample in a mixing container.

5. Repeat steps 2 and 3 for three other locations with a ten-foot radius of the first sampling location so that a composite sediment sample is obtained.
6. Homogenize the composite sediment sample using a decontaminated trowel or scoop and place in sample jar. When observed, remove coarse gravel and organic root material.
7. Decontaminate the sampling tools and equipment after each sample is collected according to the procedures described in Section 2.2.4.

2.2.2 Surface Water

One surface water samples will be collected from each composite sediment sampling location. The methodology listed below will be followed:

1. Identify sampling location and establish a staging area in the sampling boat. Measure water depth.
2. Submerge the sampling device and rinse several times.
3. After rinsing, submerge the device, collect and retrieve the sample and place into directly into proper sample containers for all analysis. Field filtering of samples for TAL Metals analysis may be appropriate if turbidity values exceed 50 NTU. It may be necessary to retrieve several volumes to perform the required analytical testing.
4. Decontaminate the sampling device and other equipment for re-use following the procedures described in Section 2.2.4.

2.2.3 Sample Containers

Sediment and surface water samples will be collected in glass jars/vials provided by the analytical laboratory. Sample bottles will contain, if necessary a trace-analysis grade preservative (HNO_3 with $\text{pH} \leq 2$) supplied by the laboratory.

2.2.4 Decontamination Procedures

Prior to sampling and between each sampling event, sample trowels, the Ponar dredge, the water sampling device and any other non-dedicated sampling tools used will be

decontaminated using the procedures identified in the Standard Operating Procedures provided in Appendix.

2.2.5 Sample Shipment

Immediately following sample collection, each sample container will be marked with the following information:

- Sample Code.
- Project Number.
- Date/Time.
- Sample Type.
- Sampler's Initials.

The sample code will indicate the site location, media samples and sample station.

Each sample will be covered with waterproof clear plastic tape to preserve its integrity. Samples will be immediately transferred to coolers and packed with ice or ice packs to maintain a temperature of 4°C.

All sediment and surface water samples for laboratory analysis will be shipped in protected containers to the selected laboratory. Each shipment will contain the original "Chain-of-Custody" form. All samples will be shipped within 48 hours of sampling.

3.0 GROUNDWATER SAMPLING AND ANALYSIS

3.1 BACKGROUND

LTV Steel has conducted quarterly groundwater monitoring at the Marilla Street Landfill since 1991. To date, wells 6B, 4B, 7B, 9B and 14B-R have been monitored in accordance with 6NYCRR Part 373 while wells 2A, 2B, 4A, 5A, 5B and 6A have been monitored in accordance with 6NYCRR Part 360. Subsequent to the landfill closure, the BOF Dust Area was removed from the 6NYCRR Part 373 program. Subsequently, 6NYCRR Part 373 monitoring is no longer required at the site. A summary of the monitoring program performed since 1991 is presented in Table 3-1.

Based on the Solid Waste Management Facility Program (SWMFIP), the Supplemental SWMFIP and the quarterly groundwater monitoring currently performed at the Marilla Street Landfill, the following groundwater monitoring plan will be performed at the site during the post-closure period. The monitoring will be conducted in accordance with the 6NYCRR Part 360 regulations. The objectives of the monitoring program are:

- To detect changes in shallow groundwater quality. Since the landfill is over 30 thirty years old, the groundwater chemistry is not expected to change significantly.
- To detect changes in deep overburden groundwater quality that may indicate downward leachate migration.

3.1.1 Groundwater Monitoring

A total of 31 monitoring wells were installed during both phases of the SWMFIP. MW-8B was destroyed during the closure of the landfill. Of the remaining 30 monitoring wells, the eleven wells will be monitored post-closure. Monitoring locations were selected based on the shallow groundwater isopotential map for June 1993 presented in the October 1993 SWMFIP Report. Monitoring wells MW-6A/6B are background wells for each water bearing zone. The remaining monitoring locations monitor the down gradient perimeter of the landfill along the wetland/landfill boundary. Proposed monitoring locations are presented in Figure 2-1 and include:

TABLE 3-1 MARILLA STREET LANDFILL 1991 THROUGH 1996 MONITORING PARAMETERS		
Parameter	6NYCRR Part 373 Monitoring for Wells 4B, 6B, 7B, 9B, 14B-R	6NYCRR Part 360 Monitoring for Wells 2A, 2B, 4A, 5A, 5B, 6A
pH ⁽¹⁾	X ⁽²⁾	X
Temperature ⁽¹⁾	X	X
Specific Conductivity ⁽¹⁾	X ⁽²⁾	X
Total Organic Halogens	X ⁽²⁾	
Total Organic Carbon	X ⁽²⁾	X
Total Dissolved Solids		X
Chloride	X	X
Fluoride	X	
Total Recoverable Phenolics	X	X
Sulfate	X	X
Tetrachloroethylene	X	
Inorganic Parameters ⁽³⁾		
Total Arsenic	X	
Total Cadmium	X	
Total Chromium	X	
Total Iron	X	X
Total Lead	X	X
Total Manganese	X	X
Total Mercury	X	X
Notes: (1) Field measured at the time of sample collection. (2) Four (4) replicate analyses per sampling event. (3) Soluble Metals (dissolved) will be analyzed for, in addition to total metals analysis if samples are turbid.		

- Shallow Overburden Wells: MW-6B, MW-16B, MW14BR, MW-15B, MW-18B and MW-3B.
- Deep Overburden Wells: MW-6A, MW-16A, MW-15A, MW-18A and MW-3A.

Based on a review of sampling results presented in the October 1993 SWMFIP Report, the shallow groundwater quality is characterized by low concentrations of ketones, chlorinated volatile organics, and phenols; elevated concentrations of common elements (calcium, potassium, sodium and iron) and an alkaline pH. Several trace metals were also detected above groundwater quality standards.

Based on the results of the SWMFIP, groundwater samples will be analyzed for the following:

- X ▪ Total Organic Carbon
- Total Dissolved Solids
- Sulfate
- Chloride
- Total Recoverable Phenolics
- Total (and dissolved, if necessary) iron, lead, chromium, cadmium, arsenic, manganese and mercury

Temperature, turbidity, pH and specific conductivity will be field measured at the time of sample collection. Metal samples will be field filtered and analyzed for dissolved metals if turbidity values exceed 50 NTU. Water level measurements will also be collected during each sampling event.

Changes in groundwater quality, if any, would be expected to occur slowly. Therefore, samples will be collected from each well semi-annually in the spring and fall. After year 5, the sampling frequency may be reduced, based upon the previous results, the trend analysis and NYSDEC approval.

3.1.2 Trend Analysis

LTV Steel will evaluate the groundwater quality data derived from post-remediation monitoring of the landfill by preparing concentration versus time plots for the parameters analyzed for in each monitoring well beginning with water quality data collected from 1991

(if applicable). These plots will be used to evaluate long-term trends in groundwater quality and will be updated as appropriate with new groundwater quality data.

Future groundwater quality data will be compared on an interwell basis to background water quality data for that parameter. Additional data analysis will be performed if the groundwater concentration for any parameter at any monitoring well exceeds the background water concentration for that parameter by 3 standard deviations.

Analytical data for all detected parameters will be entered into a computer spreadsheet (i.e., Excel). The spreadsheet will be used to generate graphs showing the changes in concentration over time for each monitoring well and to compare down gradient monitoring well concentrations to background (up gradient) monitoring well concentrations. Analytical results which are reported as "Not Detected" will be recorded in the spreadsheet at the detection limit of the analytical method used with notation indicating that the compound was not detected at the specified detection limit. Concentrations of a compound detected below laboratory quantitation limits will be recorded at the quantified value and footnoted as such. Tables will be generated for each parameter which summarizes parameter concentration for each sampling event number, NYSDEC exceedance value, laboratory detection limit, one year moving average, standard deviation and mean.

For parameters that exceed the background water quality concentration value by 3 standard deviations, a moving average trend test will be performed. Moving average trend tests are used with time dependant groundwater data to reduce the fluctuations in analyte concentrations due to seasonal variations in groundwater flow regimes. The use of moving average calculations with detected parameters will provide an indication of upward (or downward) trends over time.

The use of a moving average will provide information on long-term trend of constituent concentration levels while smoothing the normal seasonal fluctuations which occur. After the moving average has been plotted for several sampling events, a linear trend line will be fitted to the curve using a least squares analysis. If the trend analysis indicates an increasing concentration trend for two years, and this trend is contrary to up gradient groundwater quality trends, then the NYSDEC will be notified and additional statistical analysis may be performed to better evaluate the increasing trends.

3.2 SAMPLING PROCEDURES

The procedures to be used in the collection of groundwater samples are summarized below. Detailed procedures for well evacuation, sample collection, sample containers, preservation, decontamination and sample shipment are presented in Appendix A.

3.2.1 Well Evacuation

Subsidence
Prior to well evacuation, a synoptic round of groundwater level measurements will be obtained from all wells. A minimum of 3 to 5 times the standing water volume in each well will be evacuated prior to groundwater sample collection. Well evacuation will be accomplished a dedicated disposable polyethylene bailer. Purge water will be disposed of to the ground down gradient of the well.

3.2.2 Sample Collection

Groundwater samples will be collected using disposable polyethylene bailers within 24 hours of well purging. Each sample will be field tested for temperature, turbidity, specific conductance and pH. If sample turbidity values exceed 50 NTU, then groundwater samples requiring metals analysis will be field filtered. The filtered set of groundwater samples for dissolved samples will be field filtered prior to the addition of preservatives.

3.2.3 Sample Containers and Preservatives

Groundwater samples will be collected in either 40 ml glass vials or 500 ml polyethylene bottles, depending on the analysis. All sample containers will be provided by the laboratory. The bottles will contain, if necessary, a trace-analysis grade preservative (HNO₃ with pH ≤ 2) supplied by the analytical laboratory.

3.2.4 Sample Shipment

Immediately following sample collection, each sample container will be marked with the following information:

- Sample Code
- Project Number
- Date/Time
- Sample Type
- Sampler's Initials

The sample code will indicate the site location, media samples and sample station.

Each sample will be covered with waterproof clear plastic tape to preserve its integrity. Samples will be immediately transferred to coolers and packed with ice or ice packs to maintain a temperature of 4°C.

All groundwater samples for laboratory analysis will be shipped in protected containers to the selected laboratory. Each shipment will contain the original "Chain-of-Custody" form. All samples will be shipped within 48 hours of sampling.

4.0 ANALYTICAL PROGRAM

4.1 LABORATORY REQUIREMENTS

Analytical laboratories selected to perform analysis of the sediment, surface water and groundwater samples will be New York State Department of Health ELAP-approved. Laboratory analyses and QA/QC procedures will be in accordance with either the 1991 NYSDEC ASP Contract Laboratory Protocol (CLP) or the USEPA SW-846 methodology.

4.2 ANALYTICAL METHODS/PROTOCOLS

4.2.1 Sediment

Sediment samples will be analyzed for TAL metals, total organic carbon and percent solids. The sampling holding times, preservation and container requirements are presented in Table 4-1. Table 4-2 presents a summary of the analytical program for sediments.

4.2.2 Surface Water

Unfiltered surface water samples will be analyzed for total dissolved solids, chloride, sulfate, total recoverable phenolics and a site-specific list of total metals. Filtered samples will be analyzed for metals only. The sampling holding times, preservation and container requirements are presented in Table 4-1. Table 4-3 presents a summary of the analytical program for surface waters. In addition, pH, temperature and specific conductivity will be measured in the field.

4.2.3 Groundwater

Unfiltered groundwater samples will be analyzed for total dissolved solids, chloride, sulfate, total recoverable phenolics and a site-specific list of total and suspended metals. Filtered samples will be analyzed for metals only. The sampling holding times, preservation and container requirements are presented in Table 4-1. Table 4-4 presents a summary of the

TABLE 4-1

MARILLA STREET LANDFILL

SAMPLE HANDLING PROCEDURES

Parameter	Matrix	Holding Time	Preservative	Sample Container
Total Organic Carbon	Sediment	28 days	Cool to 4°C	40 ml glass jar
	Water	26 hours	Cool to 4°C	50 ml polyethylene bottle
TAL Metals	Sediment	Mercury 26 days, remaining 6 months	Cool to 4°C	8 oz glass jar with Teflon-lined cap
	Water	Mercury 26 days, remaining 6 months	Cool to 4°C HNO ₃ to pH <2	500 ml polyethylene bottle
Chloride	Water	28 days	none	500 ml polyethylene bottle
Sulfate	Water	28 days	Cool to 4°C	500 ml polyethylene bottle
Total Recoverable Phenolics	Water	28 days	Cool to 4°C H ₂ SO ₄ to pH <2	500 ml amber glass jar with Teflon-lined cap

TABLE 4-2 MARILLA STREET LANDFILL SUMMARY OF SEDIMENT ANALYTICAL PARAMETERS AND METHODS FOR EACH ROUND OF SAMPLING					
Parameter	Method	No. Of Samples	Quality Control Samples		
			Blind Duplicate	Matrix Blank	Equipment Blank
Total Organic Carbon	415.1	15	0	0	0
Percent Solids		15	0	0	0
Antimony	200.7	15	1	1	1
Arsenic	206.2	15	1	1	1
Cadmium	200.7	15	1	1	1
Chromium	200.7	15	1	1	1
Copper	200.7	15	1	1	1
Iron	200.7	15	1	1	1
Lead	239.2	15	1	1	1
Manganese	200.7	15	1	1	1
Mercury	245.1	15	1	1	1
Nickel	200.7	15	1	1	1
Zinc	200.7	15	1	1	1

TABLE 4-3 MARILLA STREET LANDFILL SUMMARY OF SURFACE WATER ANALYTICAL PARAMETERS AND METHODS FOR EACH ROUND OF SAMPLING					
Parameter	Method	No. Of Samples	Quality Control		
			Blind Duplicate	MS/MSD	MB
Total Organic Carbon	415.1	15	0	0	0
Total Dissolved Solids	160.1	15	0	0	0
Chloride	ASTM D51289B	15	0	0	0
Sulfate	375.4	15	0	0	0
Total Recoverable Phenolics	420.1	15	1	2	0
Total Iron	200.7	15	2	0	1
Total Lead	239.2	15	2	0	1
Total Chromium	200.7	15	2	0	1
Total Cadmium	213.2	15	2	0	1
Total Arsenic	206.2	15	2	0	1
Total Manganese	200.7	15	2	0	1
Total Mercury	245.2	15	2	0	1

TABLE 4-4
MARILLA STREET LANDFILL
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES FOR EACH SAMPLING EVENT

Parameter	Method	Total No. of Samples	Quality Control		
			Blind Duplicate	MS/MSD	MB
Total Organic Carbon	415.1	11	0	0	0
Total Dissolved Solids	160.1	11	0	0	0
Chloride	ASTM D51289B	11	0	0	0
Sulfate	375.4	11	0	0	0
Total Recoverable Phenolics	420.1	11	1	2	0
Total Iron	200.7	11	1	0	1
Total Lead	239.2	11	1	0	1
Total Chromium	200.7	11	1	0	1
Total Cadmium	213.2	11	1	0	1
Total Arsenic	206.2	11	1	0	1
Total Manganese	200.7	11	1	0	1
Total Mercury	245.2	11	1	0	1

analytical program for groundwater. In addition, pH, turbidity, temperature and conductivity will be measured in the field.

4.3 FIELD QUALITY CONTROL SAMPLES

4.3.1 Duplicate Samples

To evaluate the reproducibility of sample collection and laboratory analysis procedures, duplicate samples of sediment, surface water and groundwater will be collected and analyzed during each sampling event. Duplicate samples will be collected by splitting the recovered sample. For water samples, duplicates will be obtained for both filtered and unfiltered samples. Enough sample will be collected to fill both the regular and duplicate sample containers.

4.3.2 Equipment Blanks

Equipment rinsate blanks will be collected to ensure that sampling equipment is clean and that the potential for cross contamination has been minimized by the equipment decontamination procedures. Two equipment rinsate blanks will be collected for each sampling event. Equipment blanks will be collected following procedures provided in Appendix .

4.4 LABORATORY QUALITY CONTROL/REPORTING REQUIREMENTS

The laboratory will perform one matrix spike and one matrix spike duplicate analysis for each 20 organic samples of a similar matrix. The laboratory will perform one matrix blank for each 20 inorganic samples of a similar matrix. Matrix spike/blank samples will be carried through the entire analytical process from initial sample preparation to final analysis.

The laboratory will prepare and analyze one laboratory reagent blank (method blank) for each group of samples of similar matrix processed by a similar method, and a similar concentration level at the beginning of the day and after every ten samples.

Quality control sample analytical results will be reported on standard forms in conjunction with data acceptance criteria. The acceptance criteria applicable to this project are specified by the NYS ASP and in Table 4-5.

TABLE 4-5

MARILLA STREET LANDFILL

QUALITY CONTROL ANALYSIS AND THE ACCEPTANCE CRITERIA FOR THE LABORATORY

1. **Initial Calibration** - A 3-point initial calibration will be conducted on the analytical system prior to project initiation. The instrument will be calibrated and the correlation coefficient (r) checked for each analyte. For all analytes detected the (r) value is required to be greater than 0.990 or recalibration will be performed.
2. **Internal Standards Performance** - An internal standard will be conducted at the beginning of each day. The internal standard area count will not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard will not vary more than ± 30 seconds from the associated continuing calibration standard. Any values outside the control limits will be noted on the QC forms.
3. **Calibration Check Standards** - At the beginning of each day, after every 10 samples and at the end of each day a mid-point calibration check standard will be analyzed to verify that the analytical sensitivity did not change from the initial calibration. After running this standard the analyst will calculate the % Recovery (%R) value for each analyte and compare it to the 75-125% criteria. Any %R value outside the control limits will be noted on the QC form. If significant variances are observed, the system will be recalibrated.
4. **Contract-Required Detection Limit (CRDL) Standards for ICP and AA** - An ICP standard will be analyzed at a concentration two (2) times the CRDL [or at the CRDL for AA] or two times the instrument detection limit, whichever is greater. The standard will be analyzed at the beginning and end of each sample analysis run, or a minimum of twice per eight (8) hour shift, whichever is more frequent.
5. **QC Standards** - A QC standard will be analyzed on a daily basis and used to verify the accuracy of the calibration standards. The QC standard will be a standard from a second source, other than the calibration standards. %R values will be calculated and compared to the 75-125% criteria.
6. **ICP Interference Check Sample (ICS)** - An ICS will be analyzed at the beginning and end of each analytical run (or a minimum of twice per eight-hour work shift). The ICS consists of two solutions, A and AB. Solution A contains the interferences and solution AB contains the analytes mixed with the interferences. The solutions will be analyzed consecutively.
7. **Method Blanks** - A sample of analyte-free water will be processed at the beginning of the day and after every 10 samples analyzed to verify that the analytical system is contaminant-free. Concentrations of detected analytes must be less than half the method detection limit. Low concentrations of contaminants that have been detected in the blank are labeled with a "B". Significant contaminant levels necessitate corrective action, i.e., cleaning of the instrument.
8. **Surrogate Standards** - Surrogate standards will be added to all samples, standards and blanks to measure the potential for matrix interferences. %R values will be calculated (appear in comments sections of the data pages) and compared to the 80 to 120% criteria. Small deviations are marked as outside control limits while large deviations will necessitate reanalysis.
9. **Duplicates** - Ten percent (10%) of all samples will be analyzed in duplicate on a daily basis to determine the precision of the analyses. Relative Percent Difference (RPD) values will be calculated and compared to the 30% acceptance limit. Values over this level require corrective action if significant, otherwise they are highlighted as outside QC limits.
10. **Matrix Spike Analyses** - Twenty percent (20%) of the samples analyzed on each day will be spiked with a standard and %R values calculated. The %R values are compared against the 75-125% criteria.

TABLE 4-5

MARILLA STREET LANDFILL

QUALITY CONTROL ANALYSIS AND THE ACCEPTANCE CRITERIA FOR THE LABORATORY

11. **Laboratory Control Sample (LSC) Analysis** - An aqueous LCS will be prepared and analyzed for every group of aqueous and soil samples in a sample delivery group, or for each batch of samples digested, whichever is more frequent. The % recovery must fall within the control limits established by the EPA. If the % recovery does not meet criteria, the laboratory will take corrective action such as analyzing another LCS.
12. **Furnace Atomic Absorption (AA) QC Analysis** - All furnace AA analyses (As, Se and Pb) will be duplicate injections. The duplicate injection results must agree within 20% RSD. If the results do not agree within 20% RSD, the sample will be rerun. In addition, a post-digestion spike will be run for each sample. The recovery of the analyte is outside of this criteria, the analyte will be quantitated using the Method of Standard Addition (MSA), depending on sample absorbance. If the sample absorbance is >50% of the post-digestion spike absorbance and the spike recovery is outside the 85-115% control limit, the sample result will be calculated using MSA.

5.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

This Quality Assurance/Quality Control (QA/QC) Plan presents in specific terms , the policies, organizations, objectives, functional activities, and specific QA and quality control (QC) activities designed to achieve the data quality goals of the Marilla Street Landfill post-closure monitoring program. This plan describes the elements that are considered to be an essential part the QA/QC plan as defined by the USEPA Office of Research and Development.

The QA/QC applicable to both the field sampling activities and the laboratory analysis of these samples is addressed. Laboratory analyses and QA/QC procedures are discussed in Section 4.0.

5.1 QUALITY ASSURANCE OBJECTIVES

5.1.1 Accuracy and Precision

The QA/QC objective for accuracy and precision of laboratory analytical data is in compliance with the specific requirements for these criteria defined in the CLP Statement of Work (SOW) and USEPA SW-846. Accuracy will be determined on the basis of blank sample analysis and surrogate recoveries from spiked samples. Precision will be determined in terms of the coefficient of variance based on duplicate sample analysis. The procedures for these determinations are specified in the CLP Statement of Work and USEPA SW-846.

5.1.2 Completeness

The QA/QC objective for completeness is to collect and analyze all environmental samples in a manner such that valid data is obtained from 100% of the samples. Achievement of this objective will rely on the use of strict sample identification and custody procedures, use of standard reference materials, proper instrument calibration and maintenance, analysis of quality control samples, performance audits and corrective actions when QC acceptance criteria are exceeded.

5.1.3 Representativeness

An objective of the post-closure monitoring plan is the collection of samples that are representative of the matrix from which they were collected. Achievement of this objective will rely on the use of sampling procedures, as described in this report, that have been designed with the goal of obtaining representative samples.

5.1.4 Comparability

The QA/QC objective for comparability is the generation of site characterization data that can be used to make valid comparisons with other data that may be generated in the future at this or other sites. The objective also involves the analysis of the environmental samples collected during the post-closure monitoring in a manner that produces results comparable to the results that would be obtained by another laboratory using the same analytical procedure. The objective is achieved by the use of standard materials traceable to the National Bureau of Standards; the use of accepted procedures for sample collection and analysis; and analysis of quality control samples to validate the analytical results.

5.1.5 Data Usability

The method for evaluating data usability will be in general accordance with the procedures outlined in the USEPA publication "Guidance for Data Usability in Risk Assessment Interim Final". LTV will evaluate the ability to use the data based on the following criteria:

- Documentation.
- Data Sources.
- Analytical Method.
- Data Review.
- Data Quality Indicators (completeness, comparability, representativeness, precision and accuracy).

5.2 FIELD QUALITY ASSURANCE /QUALITY CONTROL(QA/QC)

QA/QC procedures used during the field investigation will include the collection of QA/QC samples for laboratory analysis. The collection of QA/QC samples was previously discussed in Section 4.3.

5.3 FIELD RECORDS

The results of all field measurements and associated calculations will be recorded on standard forms. These forms are presented in the Standard Operating Procedures included as Appendix A. Separate field logs will also be maintained during the collection of environmental samples (i.e., groundwater and soil).

During all activities, the following general information will be recorded in each log book or field log:

- Date.
- Crew members.
- Meteorological conditions.
- Brief description of field activities conducted for date indicated.
- Location where work is performed.
- Problems encountered and corrective actions taken.
- Field measurements or descriptions made.

The following information will be recorded by the sampling team leader and/or field technicians doing the collection of samples:

- Sample locations and summary of samples collected.
- Completeness of sampling effort (e.g., were all the samples collected that were intended to be collected and if not, what were the reasons?).
- Chain-of-custody information.
- Results of field measurements.
- Results of field instrument calibrations.

5.4 CHAIN-OF-CUSTODY RECORDS

Prior to shipping the samples to the analytical laboratory, a chain-of-custody record will be completed. The chain-of-custody form will be signed and dated by the person who collected the samples, the person the samples were relinquished to for transport to the laboratory, and the laboratory sample controller/custodian who receives the samples. Samples stored overnight will be kept in a lockable designated location. Chain-of-custody records will accompany the samples at all times. The original form will be sent with the samples to the laboratory. After receipt of the samples at the laboratory, the shipping container seal will be broken. The condition of the samples will be recorded by the receiver. The original copy of the chain-of-custody will be included with the sample results.

5.5 SAMPLE SHIPMENT

Samples collected for analysis will be shipped to the laboratory via Federal Express or similar service or picked up by the analytical laboratory's courier service. All samples will be shipped as environmental samples in accordance with the Department of Transportation (DOT) standard requirements for packages, as specified in 49 CFR 173.24 and 49 CFR 173.6. Individual sample containers will be packed to prevent breakage and/or thawing and transported in sealed ice chest or other suitable container. The chain-of-custody will be enclosed in a plastic bag and placed in the shipping container.

6.0 BIOLOGICAL MONITORING

6.1 WETLAND RESTORATION MAINTENANCE AND MONITORING

6.1.1 Maintenance

Maintenance inspections of the wetland plantings will be performed during the first two full growing seasons after remediation has been completed. At the end of the second full growing season, an 80% survival rate is required or else maintenance will be continued into the following growing season. Maintenance will include: replanting all transplants that have not survived, removing litter and debris throughout the site, applying fertilizers and inspecting for and removing to the extent practical unwanted plant species (i.e., phragmites and purple loosestrife). Damage related to insects and/or disease, wildlife depredation, ice/storm events, and erosion will be noted and corrective actions taken. Monthly maintenance visits will be conducted during the first growing season. During the second growing season and if needed the third, bimonthly visits will be conducted.

All plants that have not survived will be replanted with plants of equal size and age. Seeded sections which have not established 80 percent coverage by the end of the first growing season shall be reseeded at the appropriate planting time.

6.1.2 Monitoring

The activities as detailed in this section will be performed during the first five years following remediation. At that time, the data will be reviewed and the schedule and/or need for further sampling and analyses will be determined by the NYSDEC.

The re-establishment of plant species both in the three revegetated wetland areas will be documented. The South Pond requires no monitoring for vegetation. Permanent quadrants of various sizes will be established and inventoried annually during the peak of the summer growing season for all plant species present. These locations will be established via surveying and permanently marked for easy identification in the field. The inventory will include the types of species present, the estimated number and percentage of each

species, and the condition of the plants. The number and location of the quadrants is detailed below:

- **West Ditch** - One permanent 10 foot by 8 foot quadrant will be established within the shrub area along the toe of the slope. In addition, one permanent 3 foot by 3 foot quadrant will be established within the emergent area.
- **North Ponds** - One permanent 3 foot by 3 foot quadrant will be established on each island. The quadrant will overlap the two emergent community types. In addition, one 3 foot by 3 foot quadrant will be established along the perimeter of each pond.
- **North Ditch** - One permanent 10 foot by 8 foot quadrant will be established within the shrub area along the toe of the slope. In addition, one permanent 3 foot by 3 foot quadrant will be established within the emergent area.

6.2 MACROINVERTEBRATE MONITORING

Currently, the North Ponds do not appear to have a viable population of benthic macroinvertebrates and remediation of the two ditches will eliminate the benthic macroinvertebrate population. For five years post-remediation, these areas will be surveyed in order to determine if benthic macroinvertebrates have re-established. During the sediment monitoring program, a second sediment sample will be collected from each monitoring location. This sample will be screened for the presence or absence of benthic macroinvertebrates. If invertebrates are present, an identification will be done. No samples will be collected or preserved, therefore identification of the invertebrates extends no further than "order". At each location, observation on the substratum and water quality parameters (i.e., pH , turbidity, hardness and conductivity) will be recorded.

7.0 LANDFILL POST-CLOSURE MONITORING

This information is submitted to comply with 40 CFR 270.14(b)(13) and 6 NYCRR 373-1.5(a)(2)(xiii) and related Subparts.

7.1 INSPECTION AND MAINTENANCE

7.1.1 Site Inspections

Site inspection and maintenance will be performed by an experienced firm approved by LTV Steel. The site will be inspected on a semi-annual basis throughout the entire post-closure period. The landfill site will be inspected for:

- Visible debris, litter and waste.
- Integrity of drainage ditches including:
 - Sediment buildup.
 - Pooling or ponding.
 - Slope integrity.
 - Overall adequacy of surface runoff.
- Integrity of access roads, gates and fences.
- Integrity of groundwater monitoring system.
- Integrity of landfill cover system including:
 - Erosion of soil material.
 - Leachate breakthroughs.
 - Maintenance of existing bench marks.
 - Slope Integrity.
 - Signs of vegetation stress or lack of vegetation.

All records related to the site inspections will be submitted to the NYSDEC Region 9 Office, Attention Regional Solid and Hazardous Waste Engineer, on an annual basis.

**TABLE 7-1
Marilla Street Landfill**

Seed Mixture⁽¹⁾	
Perennial Ryegrass	10 lbs/acre
Kentucky Bluegrass	20 lbs/acre
Strong Creeping Red Fescue	20 lbs/acre
Chewings Fescue	20 lbs/acre
Hard fescue	20 lbs/acre
White Cover	10 lbs/acre
(1) Areas requiring vegetation will be reseeded with 100 lbs/acre of seed conforming to this mix.	

7.1.2 Cover Maintenance

Cover maintenance will be performed as necessary over the entire post-closure care period. Any signs of erosion, settling, cracking or other site maintenance problems detected during routine site inspections will be corrected as soon as possible. All eroded areas will be brought back to original grade according to the procedures described for constructing the final cover. Settling which results in ponding of water will be regraded and revegetated as necessary to eliminate the ponding. All bare spots in the final cover will be reseeded and fertilized as necessary, but no less than once every year. Seed and fertilizer will be of the same type and quality as specified in Table 7-1. Mowing will be done once a year in late fall. This mowing schedule will provide an open field habitat attractive to grassland bird species, small mammals and raptors, and control the establishment of woody vegetation. Mowing annually during late fall is preferred as it will allow ground-nesting species to nest and raise young undisturbed and will permit grasses and forbs to form seeds to generate the next season's plants which are an important food item for native and migratory birds and small mammals. A 10-10-10 fertilizer mix will be applied each fall after mowing to assure maintenance of good grass cover. Any undesirable species (i.e., large tree growth) will be removed if their presence is suspected to have the potential to deteriorate the integrity of the final cover.

The need for cover repairs due to subsidence and/or settling will be determined based on an evaluation of whether the functions of the final cover in the affected area has been impaired. Those areas will be repaired to ensure the integrity of the final cover is maintained. These repair actions may include, but will not be limited to:

- Strip and stockpile topsoil from the affected area.
- Regrade the affected area in accordance with the grading plan.
- Using clay or a bentonite-soil admixture, fill cracks and re-establish the recompacted low permeability soil layer to a depth of eighteen inches at a maximum permeability of 1×10^{-7} cm/s.
- Replace topsoil and revegetate affected area in accordance with Table 7-1.

Access roads to the landfill site will be maintained in good condition so that routine inspections and required maintenance activities can be carried out. Gates will be kept in good repair to prevent unauthorized access onto the landfill site.

7.1.3 Contingency Plans

The objective of the contingency plan is to address events which occur outside the scope of the routine maintenance program. The contingency plan will be implemented following the discovery of a condition at the landfill which is not covered by the routine maintenance plan.

Natural occurrences such as storms, drought and subsidence should be considered as “expected occurrences” addressed in the maintenance program and therefore are not addressed in this contingency plan. Certain problems which cannot be reasonably expected to occur, such as earthquakes or war, are also not addressed in this contingency plan.

The following problems may be discovered during a routine post-closure inspection and monitoring program:

- Leachate significantly impacting groundwater or surface water quality
- Failure of the final cover integrity which may be a result of, or indicated by:
 - Fill material protruding through the final cover.
 - Soil erosion or other drainage problems.
 - Uncontrolled burrowing pests.
- Vegetative cover missing despite repeated efforts at revegetation.

The following guidelines are offered to determine when the contingency plan should be implemented and to determine possible corrective actions when responding to a contingency. All corrective actions, where appropriate, will be executed in a timely fashion after notifying the appropriate regulatory agencies.

7.1.3.1 Leachate Breakout Repair Procedure

Leachate breakouts through the landfill cover system are not expected at this site due to the nature of the fill material however, they may be discovered during regular scheduled

site inspections. Should such a breakout occur, the damage will be repaired as quickly as possible. Repairs will be made with materials and methods as specified in the closure plan. Areas where leachate breakouts have occurred will receive additional cover material which shall be compacted and overlaid with topsoil for vegetative growth.

If the approved consultant or the NYSDEC believes a substantial threat of water pollution exists as a result of leachate draining from the site, the approved consultant will prepare a work plan to determine appropriate response efforts including:

- Whether leachate should be contained and treated on-site.
- Whether leachate should be collected and transported to an off-site treatment facility.
- Actions to control, minimize or eliminate the conditions which are contributing to leachate production.

7.1.3.2 Fire

A fire at the landfill will be immediately reported to the local fire department. Appropriate response measures, including personnel safety, will be the responsibility of the fire department. Fires will be quenched according to approved fire department protocol. Damage to the final cover will be repaired where these systems have been compromised.

7.1.3.3 Vandalism

Vandalism will be reported to the local enforcement authorities. If vandals have gained entry to the landfill, appropriate measures will be taken to eliminate or restrict future access. Vandalism to monitoring wells will be repaired as appropriate. Damage caused by off-road vehicles will be repaired, where the damage is determined to have compromised the integrity of the final cover.

7.1.3.4 Unauthorized Dumping or Disposal

Unauthorized dumping or waste disposal by other parties will be reported to the NYSDEC, and local enforcement officials. In the event that such disposal occurs, efforts will be taken to eliminate further dumping and to restrict subsequent entry to the site. LTV

Steel will assist the NYSDEC and/or USEPA in the prosecution of persons found in the act of illegal dumping and in seeking reimbursement from the responsible party for all costs incurred in the removal and disposal of the waste.

7.1.3.5 Quality Assurance /Quality Control

To assure the performance of site inspections and maintenance, a reporting procedure will be established. A site inspection checklist and maintenance schedule is provided in Appendix B. The site inspection checklist was developed in accordance with the parameters identified in Section 7.1. The approved consultant will provide fully qualified personnel to perform the site inspections and supervise maintenance operations. The site inspection checklist and maintenance schedule will be signed by authorized personnel. Maintenance and repair work shall conform to the requirements set forth in Section 7.0 of this report.

7.2 MAINTENANCE OF BENCHMARKS

A benchmark is located on the Hopkins Street Bridge. This benchmark will be maintained throughout the post-closure period.

7.3 SITE SECURITY

Following remediation, the property will not be used for any purpose that may jeopardize the integrity of the cover or monitoring system. As long as LTV Steel owns the property, site access will be restricted except for those vehicles and personnel necessary to provide routine inspection and maintenance. Any potential future site uses must first be approved by the NYSDEC.

8.0 REPORTING

8.1 SAMPLING REPORTS

8.1.1 Sampling Event Reports

A brief letter report will be issued at the completion of each sampling event (e.g., sediment/surface water sampling, groundwater sampling, biological sampling). The purpose of these interim reports is to inform all parties of the most recent observations and analytical results. The report will also include comments regarding any unusual or inconsistent results or observations.

8.1.2 Annual Report

An annual report will be issued at the end of each calendar year which will include all of the sampling and monitoring activities performed during the year. The format of the report will be established at the end of the first year of monitoring and will be standardized for ease of comparison. In general, the format will include the following:

- Summary of field observations and occurrences.
- Photographs (if obtained).
- Sample location plans.
- Analytical results.
- Evaluation of data.
- Comparison to previous long term monitoring results and to background analytical results obtained from a correlated project database and the review of prerediation data.
- Summary of routine site inspection results and maintenance activities performed.

8.2 REPORT SUBMISSION

Two copies of each report will be submitted to:

NYS Dept. of Environmental Conservation - Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Attention: Mr. Martin L. Doster, P.E.

One copy of each report will also be submitted to:

Mr. Gary MacDannel
US Army Corp of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

APPENDIX A

SAMPLING PROCEDURES

**(Details of sampling procedures will be
included in the final Post-Closure
Monitoring and Maintenance Plan)**

APPENDIX B

POST-CLOSURE MONITORING FORMS

**(To be submitted in final Post-Closure
Monitoring and Maintenance Plan)**