United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-88/046
March 1988

EPA

Superfund Record of Decision:

New Castle Steel, DE

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO. EPA/ROD/R03-88/046

2.

3. Recipient's Accession No.

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
New Castle Steel, DE
First Remedial Action - Final

5. Report Date 03/31/88

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The New Castle Steel site (NCS) is a 3-acre disposal dump, located in New Castle, Delaware. The site is divided into two parts by a city drainage channel. One portion of the site, the inactive disposal area, occupies 1.3 acres, and the active area occupies 1.7 acres. Since operations began in 1907, solid waste generated by the Deemer Steel Company (DSC), located immediately across the NCS site, was piled and periodically spread over the surface of the disposal areas. The waste consisted primarily of black sand which may contain small quantities of bentonite and corn flour. Approximately, [illegible]0 yd^3 or 2,430 tons of black sand were generated each year. Other waste materials were sent to the disposal areas and mixed with black sand. These materials included: slag, coke, iron oxide, fine sand dust, and metal scrap. Between 1973 and 1980, electric furnace dust was generated at the rate of 9.6 tons per year. This dust was mixed with black sand and spread over the active waste area. The adoption of the Delaware Regulations governing hazardous waste in November 1980 identified the electric furnace dust and any mixture of this material with solid waste as a RCRA listed hazardous waste (waste number K061). EPA subsequently changed the definition of K061, and none of the waste from DSC operations would qualify as a listed hazardous waste. In December 1980, the electric furnace dust was found to be EP-toxic for
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
New Castle Steel, DE
First Remedial Action - Final
Contaminated Media: sw
Contaminants: metals (arsenic, cadmium, chromium, lead, nickel)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 31

22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R03-88/046
Ne[redacted]Castle Steel, DE
F[redacted] Remedial Action - Final

16. ABSTRACT (continued)

cadmium, chromium, and lead. A June 1984 hydrogeological study reported the thickness of wastes in the fill section ranged from 8 to 13 feet, and the average thickness was approximately 10 feet. Wastes were placed over predominantly unconsolidated marsh sediments, which are underlain by approximately 50 feet of low-permeability clays. The uppermost Potomac aquifer, an important drinking water source, lies about 70 feet below the site, and is protected by the low-permeability clays. An Endangerment Assessment (EA) was prepared based on the data collected from the samples in January 1987. The EPA concluded that no significant risk to human health and the environment could be attributed to the site. Contaminant screening identified five indicator chemicals. They include: arsenic, cadmium, chromium, lead, and nickel.

The selected remedial action for this site is no further action. EPA will monitor surface wastes for lead until the site is deleted from the National Priorities List (NPL) and closed under the State closure law. There is no capital cost or O&M associated with this remedial action.

Declaration for the Record of Decision

Site Name and Location

New Castle Steel Site
City of New Castle
New Castle County, Delaware

Statement of Purpose

This decision document represents the selected remedial action for this site developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

The State of Delaware has concurred on the selected remedy.

Statement of Basis

This decision is based upon the administrative record. The attached index identifies the items which comprise the administrative record.

Description of Selected Remedy

Based on the current conditions at the New Castle Steel Site, I have determined that no significant risk or threat to public health exists. Therefore, I have determined that no further remedial actions under CERCLA are required.

EPA will continue to periodically monitor site conditions until the site is either deleted from the NPL or closed under the State of Delaware Solid Waste Disposal Regulations and monitoring is included as part of the site closure plan.

DECLARATION

I have determined that the selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost effective. However, because no significant risk or threat to public health exists and treatment is impracticable, this remedy does not satisfy the statutory preference for treatment as a principle element of the remedy.

DATE 3/31/88

James M. Seif
Regional Administrator

In January 1987, U. S. EPA's contractor, NUS, collected additional waste surface water, and sediment samples to characterize the extent of the contamination at the site.

After the completion of all the sampling, U. S. EPA tasked Versar, Inc. to write an Endangerment Assessment (EA) report to evaluate the magnitude and probability of actual or potential threat to public health or welfare or the environment posed by the hazardous substances present at the site.

Based on the evaluation of all available information and data on the New Castle Steel site, it was determined that there exists no significant threat to human health and the environment. This is supported by the review of the site's history and operations, an evaluation of the environmental setting and the data collected in the studies of the site.

Site Location and Description

The New Castle Steel Site is a 3-acre disposal dump located in an area of New Castle, Delaware. The site received foundry wastes from the Deemer Steel Company which is located immediately across the the site. The New Castle Steel Site is divided into two parts by a city drainage channel. One portion of the site, the inactive disposal area, occupies 1.30 acres and the active area occupies 1.75 acres. Primary access to the two disposal areas is through locked gates facing Ninth Street (See figure 2).

The New Castle Steel Site is located West of the City's business district and about 2000 feet Northeast of the property near Washington Avenue and Gray Street. In the direction of the river, near Seventh Street and South of the Penn Central tracks, the area is occupied by light industry. Most of this industrial area is situated on filled land and low marshy ground which lies further South towards the river.

Marshy grounds surrounds the disposal area on three sides and supports a grass and reed vegetation. The surface of the disposal area appears to be about 10 feet higher than original grade.

Site History

Since operations begun in 1907, solid waste generated by the plant has been piled and periodically spread over the surface of two disposal areas across the street from the Deemer Steel Company. The waste consisted primarily of black sand, which is non-reclaimable portion of sand molds used in steel casting. The black sand may contain small quantities of bentonite or corn flour which are uses as "binders" to allow the molds to be formed. About 1800 cubic yards or 2430 tons of black sand were generated each year. Other waste materials sent to the disposal areas and mixed with black sand included slag, coke from the old furnace operation, iron oxide scale from heat treatment, fine sand dust from the blasting room baghouse, and metal scrap.

In 1956, an electric furnace was put into operation, and in May 1973, a collection system and baghouse for pollution control dust from the furnace was installed. Electric furnace dust has been generated at a rate of 9.6 tons per year, between 1973 and 1980. This dust was mixed with black sand and spread over the active waste area.

With the adoption of the Delaware Regulations Governing Hazardous Waste in November 1980, the electric furnace dust and any mixture of this material with solid waste was defined as a RCRA listed hazardous waste (waste number K061). This category included "emission control dust/sludge from the production of steel in electric furnaces." The basis for listing materials from this source is the concentrations of lead, cadmium and chromium which are often found in the wastes.

EPA subsequently changed the definition of K061 to include only "emission control dust/sludge from the primary production of steel in electric furnaces."

As a result of this change, none of the wastes from Deemer's Steel operations would qualify as a listed hazardous waste. The hazardous/nonhazardous status of the waste materials under RCRA regulations would be determined solely on the basis of their characteristics.

In December 1980, the electric furnace dust was found to be EP toxic for cadium, chromium, and lead. Prior to receiving these analytical results, Deemer began recycling the electric furnace dust back into the furnace for metals recovery. Since that time, no electric furnace waste has been taken to the disposal areas.

On March 17, 1982, waste and surface water samples were collected and analyzed as part of a site inspection and a toxicological assessment of probable impacts. Subsequently, the site was placed on the CERCLA National Priorities List, which required further investigation and made them a potential candidate for remedial action under Superfund.

In June 1983, Deemer contracted Earth Data to prepare and implement plans for a hydrogeological investigation of the site. The plan was submitted to the Solid Waste Management Branch of DNREC on July 28, 1983. The objectives and details of the plan were refined in discussions with DNREC during September 1983. In December 1983, an agreement between Deemer and DNREC established a three phase program of actions. Phase I was the implementation of a ground water monitoring plan (hydrogeological study) which was to include only the shallow saturated zone. The hydrogeological report was to be submitted by July 3, 1984. Phase II included DNREC review of the report and recommendations to either pursue monitoring and investigation of the deeper Potomac Aquifer, and/or implement a landfill management program under Phase III. The landfill management program would require compliance with applicable regulations for hazardous waste facilities, and could allow continued use of the site under a Solid Waste Industrial Landfill permit.

On June 29, 1984, Earth Data submitted a completed hydrogeological study to EPA and the State for their review. According to the hydrogeological report prepared by Earth Data, the thickness of wastes deposited in the fill section ranged from 8 to 13 feet, and the average thickness was approximately 10 feet. Wastes were placed over predominantly unconsolidated marsh sediments, which are underlain by about 50 feet of low-permeability clays. The uppermost Potomac

Aquifer, which is an important drinking water source, about 70 feet below the site, is protected by the low permeability.

Based on the presence of the confining clay layer and recent laboratory analyses of the fill (dump) wastes, the State of Delaware proposed on January 22, 1985, that the New Castle Steel site be deleted from the NPL.

In 1986, Deemer Steel Company closed their plant down due to financial hardship. In January 1987, U. S. EPA's contractor NUS collected additional waste, surface water and sediment samples to characterize the extent of the contamination at the site.

After the completion of all sampling and analyses, the data was evaluated by the EPA's contractor Versar, Inc. in the Engangement Assessment (EA) report. The Endangerment Assessment characterized the magnitude and probability of actual or potential harm to public health or welfare, or the environment by threatened or actual releases of hazardous substances from the New Castle Steel Site. The EA process analyzed the expected environmental fate and transport of indicator chemicals identified through contaminant screening, and estimated potential routes and extent of exposures.

Based on the evaluation of all available information and data on the New Castle Steel Site, it was determined that there exists no significant risks to human health and the environment.

Permit and Regulatory History

Deemer Steel had been notified by the State of several violations in connection with the disposal of solid waste at the site. These included violations of the following sections of Delaware Regulations Governing Hazardous Waste:

Section 265.253 (a)--cover must be provided to control wind dispersal
Section 265.253 (b)--an impermeable base must be provided
Section 265.1--piles must be protected from run-on

In addition, Deemer Steel had been notified of the following violations:

- operating a hazardous waste facility without receipt of interim status for 1 month after the Regulations Governing Hazardous Waste were promultated

- Operating without a permit from 1974 to 1980--Section 7.03 (g) of the Delaware Solid Waste Disposal Regulatins.

- Operating a disposal site for non-hazardous waste without a permit.

In December 1983, an agreement between Deemer and DNREC established a three phase program of actions in order to address past violations. Phase I was the implementation of a ground water monitoring plan. Phase II included DNREC review of the report and recommendations to either pursue monitoring and investigation of the deeper Potamac Aquifer, and/or implement a landfill management program under Phase III.

Community Relations

The preferred alternative for the New Castle Steel Site was published in the Wilmington News-Journal papers on March 8, 1988. A public meeting was held on March 17, 1988. The only responses at the meeting about the site concerned the use of the site after it was delisted. The responses are shown in the transcript of the meeting attached to this ROD. The State replied that the site would be closed up under the Solid waste regulations requiring the owner to cap the site. The statement was in response to Jeff Mack, Delaware State Representative from New Castle County.

No telephone calls or written communication in response to the public meeting or advertisement have been received. Representative Mack sent a follow-up letter of his meeting comment to the State of Delaware. His meeting comment was adequately responded to in the transcript.

Geology

The site is located on the Atlantic Coastal Plain, a thick wedge of unconsolidated sediments of Cretaceous to Quarternary age. The sedimentary wedge is thinnest near the fall line, about 45 miles north of New Castle, where it is in contact with the outcrop area of crystalline bedrock comprising the Appalachian Piedmont Province. The coastal plain sediments become thicker toward the southeast and are 2400 feet thick in southeast New Castle County.

Bedrock lies at a depth of between 500 and 600 feet below the site. In northeastern New Castle County, sediments of the Potomac Formation overlie bedrock and are mantled by a thin layer of Pleistocene and Quarterary sediments. The Potomac Formation was deposited by streams during early to late Cretaceous time, and consists of variegated clay and silt with interbedded sands. The Pleistocene and Quarterary sediments (Columbia Formation) overlie the Potomac Formation. The Columbia sediments were deposited by rivers fed by melting glaciers to the north and are mostly poorly sorted sands, gravels, silts and clays.

Hydrogeology

Permeable sand layers in the Potomac Formation are an important source of water for municipalities and industries in the New Castle area. The Potomac aquifer consists of many separate sand aquifers with variable degrees of hydraulic interconnection. These aquifers are highly variable in hydraulic characteristics. The vertical hydraulic conductivities of the confining layers separating the sands have been measured in few cases, and are between the low permeability values of 2.9×10^{-6} cm/s and 1×10^{-5} cm/s.

Recharge to the Potomac aquifer is primarily through the overlying Columbia Formation. Depending on local stratigraphy, the Columbia and Potomac aquifers may be isolated or function as a single hydrologic unit.

In order to determine the relationship between the Potomac and Columbia aquifers the drilling logs from the four monitoring wells and test holes were recorded and interpreted. The well logs show that sandy and silty sediments are 10 feet or less thick west of the site, and are underlain by Potomac clays to a depth of 55 or 60 feet. Below this depth, sand aquifers alternate with layers of clay or sandy clay. East and northeast of the site Columbia sediments may 35 to 60 feet thick in places and underlain by Potomac clays to a depth of approximately 90 feet. Thus it appears that about 30 to 50 feet of clay overlies the uppermost Potomac aquifer in the area within one mile radius of the Deemer Steel Site. Near the Deemer disposal area, the uppermost Potomac aquifer would be expected at a depth of about 70 feet and should be overlain by about 50 feet of low permeability clays.

Remedial Sampling Investigation

The Remedial Sampling Investigation consisted of two phases. A hydrogeological study was conducted by Earth Data in 1984 who was hired by the responsible party Deemer Steel. This study was followed by an analytical sampling in 1987 to determine the impact of the waste material caused by the other transmission routes including soils, air and surface waters. An endangerment assessment (EA) based on the complete sampling results of the two studies was made by Versar Inc. who was hired by the Environmental Protection Agency. The EA concluded that no significant risk to human health or the environment could be attributed to the site. The results of the studies are summarized in the following paragraphs:

A. Waste Characterization

In May 1984 Earth Data Inc. collected waste samples from six excavated pits at three different depths. The near-surface samples were taken between 0.5 and 3.0 feet from the ground surface, the intermediate depth samples ranged from 5.0 to 6.8 feet, and the deep samples ranged from 8.5 to 13.0 feet. Near surfa samples were taken at two additional locations, (See Figure 3).

The analytical method employed was the EP (Extraction Procedure) toxicity test as described in 40 CFR 261, Appendix II and the comparable Delaware Regulations. The analysis was expanded to include the entire list of 18 metals. Two composite samples were prepared, from both active and inactive areas. The analytical results for the two composite samples are summarized in Table 1. Concentrations of the eight metals used to define the characteristic of EP toxicity are all between two and three orders of magnitude lower than the established limits for EPA toxicity (See Table 1). On the basis of the analyses, it was concluded that the fill material in both areas is not considered EP toxic.

In January 1987, the NUS Corporation conducted waste sampling at the site to characterize the air migration potential of lead in the soil. A total of eight samples were taken for use in the Cowherd model. This model is used to assess the health effects of airborne constituents from soil on a site. The airborne concentration determined from the model was compared to a reference level. The reference level is that level for non-carcinogenic constituents below which there is no toxic effects. The exposure levels was 1.96×10^{-5} mg/kg/day compared to a reference level of 4.3×10^{-4} mg/kg/day. The observed level was well under the reference indicating no toxic levels from the airborne lead.

A total of 21 samples were obtained from seven test pits (see figure 4, Table 2 and 3) to determine the potential for toxic effects from ingestion. The levels for cadmium, chromium and nickel were compared to a reference level since the ingestion effects are not carcinogenic. The worst-case assessment for these metals is summarized below:

Metal	Exposure Level mg/kg/day	Reference Level mg/kg/day
Cadmium	3.3×10^{-6}	2.9×10^{-4}
Chromium	3.4×10^{-5}	5.1×10^{-3}
Lead	1.5×10^{-3}	1.4×10^{-3}
Nickel	6.53×10^{-5}	1.0×10^{-2}

These levels do not indicate any problem for public health; these were determined as worst-case values, if the most probable case was used, the exposure levels would be much lower.

Arsenic was not included in the above list because it is considered a carcinogen. The risk due to ingestion exposure for using the highest observed concentration based on a single sediment sample was calculated to be 2.94×10^{-5}. Average concentrations of arsenic found on site are within ranges of arsenic found in natural soil.

These estimates were based on a no-action remedial response and assumed that the fill area will remain uncovered for seventy years. The assessment of exposure and risk were computed conservatively so any potential risk to human health would be identified.

The total number of samples obtained during the investigation was forty-eight waste and sediment samples, which were analyzed for inorganic constituents, five of these samples were composited and analyzed for organic constitutes.

B. Hydrogeological Investigation

During the Spring, 1984 hydrogeological investigation conducted by Earth Data, Inc., four monitoring wells were installed in the Columbia Formation (See Figure 1). After the installation, the monitoring wells were developed to assure an adequate flow for sampling purposes. One-half inch piezometers were installed at 5 locations shown in Figure 2. The piezometers were used to gather additional water-level information, but not used for collecting ground water samples.

During the investigation, water level measurements were taken from the monitoring well locations and the piezometers. The water level contour map was constructed based on the water level measurements. It appears that the flow in the shallow saturated zone is strongly influenced by the drainage channel separating the inactive and active disposal areas. Flow directions are toward the channel with a southerly component of flow near the southern margin of the fill adjacent to the marsh. Much of the ground water in the shallow flow system beneath the site is likely to discharge into the channel and flow southeast toward the marsh and eventually into the marshy area bordering the fill on the south. Discharge of ground water flowing beneath the site into the drainage ditch to the west or into the marshy area to the east is likely to be minimal.

During the hydrogeological investigation, a number of shallow well and test borings were drilled. Earth Data, Inc., obtained well and test hole drilling logs near New Castle from the files of the Delaware Geological Survey. Based on the existing well and test hole drilling logs, it was determined that low permeability clays underlie the shallow aquifer at a depth of 15 to 20 feet below the surface. These clays have low vertical hydraulic conductivities based on published reports. Approximately, 50 feet of clays are estimated to separate the shallow aquifer from the upper most confined Potomac aquifer beneath the site (See Figure 5 and 6).

Ground water samples were obtained from each of the four monitoring wells and at two of the surface water gauging stations in May, 1984. Analysis of ground water samples was done for all of the Group 1,2 and 3 parameters as specified under Delaware Regulations Governing Hazardous Waste, Section 265.92 (6), with the exception of the pesticide parameters listed under Group #1. These parameters, along with the analytical results for the six samples are shown in Table 4.

Ground water in the shallow saturated zone is generally good in quality. Based on the analysis of samples from monitoring wells, the ground water beneath the [illegible]er disposal areas would meet most criteria for drinking water except for moderately high levels of iron and manganese. The two metals, in the concentrations reported, are not of concern with regard to toxicity. The concentrations of other constituents, including lead, cadmium and chromium, are well below the levels established as Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act.

C. Surface Water and Sediments Investigation

During the Spring, 1984, investigation performed by Earth Data, Inc. two surface water samples were taken at two locations in the city drainage ditch. The analytical results are shown in Table 4.

The only parameter above the Ambient Water Quality Criteria found in the Marsh area was lead. The other metals used as indicators for contaminants of concern included arsenic, chromium, nickel and cadmium. The arsenic, chromium and nickel were below all acute and chronic ambient water quality criteria while cadmium was below the acute and not significantly different than the chronic criteria.

In January, 1987, NUS Corporation took 11 surface water samples at the New Castle Steel Site (See Figure 7). Two of the eleven samples taken were the background samples. The analytical results are shown in Table 5. Three of the nine downstream samples exceeded U.S. EPA Ambient Water Quality Criteria (AWQC) for lead and eight of the nine samples exceeded the lowest chronic levels for water of medium hardness. The background samples for lead also exceeded U.S. EPA AWQC. The highest lead samples were contaminated with sediment according to the field investigation report of NUS. Although nickel and hexavalent chromium compounds exhibit appreciable solubility in water, all nickel concentrations in samples from locations near or downgradient of the site are within U.S. EPA AWQC. A comparison of selected metal contaminants with Applicable or Relevant and Appropriate Requirements (ARARs) for groundwater and surface water is shown in Table 7.

In January, 1987, a total of 21 soil and sediment samples from off site locations were analyzed for total metals. The off-site locations included background locations not materially affected by the site, and locations near to the site or topographically downgradient from New Castle Steel Site.

For samples from the downgradient areas and background locations, analytical data (total metals) were compiled for arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), and nickel (Ni).

Arsenic concentrations in samples from downgradient areas (areas where direct contact exposures are most likely to occur owing to the proximity of the marsh and the Delaware River), range from just above the detection limit to 42 mg/kg, but ranges from 1 to 50 ppm (See Figure 8).

The cadmium concentrations range from below the detection limit to 7 mg/kg, and the mean concentration is 2.59 mg/kg, lower than the average value for cadmium at background locations, 4.34 mg/kg. Concentrations of cadmium in soil range from 0.01 to 7 ppm and generally average about 0.15 ppm (See Figure 9).

Chromium concentrations in downgradient areas were generally higher in concentration compared to arsenic and cadmium, from 11 to 74 mg/kg, and average 32.45 mg/kg of soil. Typical soil chromium concentrations may range from 20 to 100 ppm (See Figure 10).

Lead concentrations in the soil and sediments have the broadest range and are highest. Lead concentrations range from 21 to 3,260 mg/kg and average 419.64 mg/kg. The computed standard deviation of 955.29 mg/kg is notably high, suggesting that the maximum value of 3,260 mg/kg obtained at the Route 9 culvert is an outlier. Urban soils commonly have lead concentrations ranging from 150 to 300 mg/kg, and lead may exceed 2,000 mg/kg of soil near roadsides. These high levels are largely a result of the extensive use of leaded gasolines and the relative immobility of lead in sediments (See Figure 11).

Nickel concentrations range from 10 to 140 mg/kg, and the average nickel concentration on soil and sediment is 44.73 mg/kg. Nickel concentrations in soil generally average 40-80 ppm (See Figure 12).

It should be noted that in several instances, "background" concentration values for arsenic, cadmium, chromium, lead and nickel exceed "downgradient" values, indicating other source areas significantly contributed to these environmental concentrations (See Table 6).

Endangerment Assessment

After the completion of the January, 1987 sampling performed by NUS Corporation, U.S. EPA tasked Versar, Inc. to write an Endangerment Assessment (EA) report to evaluate the magnitude and probability of actual or potential harm to public health or welfare, or the environment posed by the hazardous substances present at the site.

The EA process analyzes the expected environmental fate and transport of indicator chemicals identified through contaminant screening, to estimate potential routes and extent of exposures. Each indicator chemical is further evaluated for its toxicological properties, and based on estimated doses incurred, relative risk is computed. The following represents a summary of the major findings of this report:

- Numerous organic and inorganic compounds were identified at the New Castle Steel Site. Contaminant screening identified five indicator chemicals which represent contaminants of primary concern from a public and environmental health standpoint. These contaminants were arsenic, cadmium, chromium, lead, and nickel.

- Based on the available data, fate and transport studies indicate that each of the contaminants of concern are adsorbed to an appreciable extent by soil particles and therefore dominates its movement in the environment.

- Two exposure routes were identified: inhalation of lead-contaminated particulates emitted from the active disposal area of the site; and direct contact of contaminated surface water, soil, and sediment in drainageways from the site and in the topographically lower marsh areas.

- Potential health risks were identified for ingestion exposure to lead (noncarcinogen) and arsenic (carcinogen) using the highest observed concentrations.

- Some high lead concentrations were detected in surface water samples collected on the site. The highest values were found in samples that were unfiltered and observed to have sediment. The clear samples were slightly above the lowest water quality criteria (chronic) for water with a hardness of 100 mg/l. The values in the marsh are not significantly higher and can be partially attributed to the urban environment and tidal influx from the river. The values of clear samples from the marsh did not exceed acute water quality values.

- The only parameter of concern in the wetland samples was lead. Some lead in surface water samples near the site exceeded EPA's Ambient Water Quality Criteria (acute) for fresh water on site and may be adversely impacting a localized wetlands area. There is no evidence to link the levels of lead in the wetlands to the site. Background values taken upgradient of the site show higher levels than the lead values in the marshland. The levels of lead in the wetlands were increased by many other factors in addition to the site. These include drainage from the urban area, total influences in the marsh, and runoff from other sites including roads and another foundry in the area. EPA will periodically monitor the site conditions until the site is deleted from the National Priorities List or until the site is closed under the State of Delaware's Solid Waste Disposal Regulations.

- Some lead in surface water samples collected near the site exceeded EPA's Ambient Water Quality Criteria (acute) for fresh water, and may be adversely impacting a localized wetlands area.
- When background concentrations and waste analyses were compared with remaining environmental samples, it is evident that other contaminant sources were contributing to the environmental concentrations found.
- Virtually all concentrations of arsenic, cadmium, chromium, lead, and nickel were within typical concentration ranges found in urban, industrialized settings.

Bases on an evaluation of all available information and data on the New Castle Steel Site, there exists no significant threat to human health. This supported on a comprehensible review of the site's history and operations, an evaluation of the site's environmental setting, recent waste analyses performed on material known to have been disposed at the site, and finally, on analytical data collected in January 1987, which was used to assess any exposure hazards present.

CONCLUSION

A. Recommended Alternative

Based on the conclusions of the Endangerment Assessment prepared by Versar, Inc., for U.S. EPA, it is recommended that no further remedial actions under CERCLA should be implemented at the site. U.S. EPA will monitor the surface waters for lead until the site is deleted from the National Priority List and closed under the state closure law. A no action alternative is the most reasonable and cost effective alternative for protection of public health, welfare and environment. It is recommended that New Castle Steel Site is proposed for deletion from the National Priorities List.

B. Deletion of New Castle Steel Site from NPL

"No action" sites are considered as completions once the determination is made that no further remedial actions are necessary to be protective of public health and the environment and the no-action ROD is approved. Once a site is considered as a completion it becomes a candidate for deletion from the NPL. The deletion process is separate from the ROD action and involves several steps including public notices and deletion docket preparation.

Deletion of a site from the NPL does not preclude eligibility for subsequent Fund-financed or PRP activities. Section 300.66(c)(8) of the NCP states that Fund-financed actions may be taken at sites that have been deleted from the NPL if future conditions warrant such actions.

C. Recommendations Outside the Scope of the New Castle Steel ROD

Once the New Castle Steel Site is deleted from the NPL, the State of Delaware will proceed with a closure of the disposal area in accordance with the Delaware Solid Waste Disposal Regulations. The State will require the owner of the site to implement such measures as surface drainage controls, surface capping, and ground water and surface water monitoring. Such measures will control wind dispersal, protect piles from run-off and monitor the surface water and ground water for potential contamination.

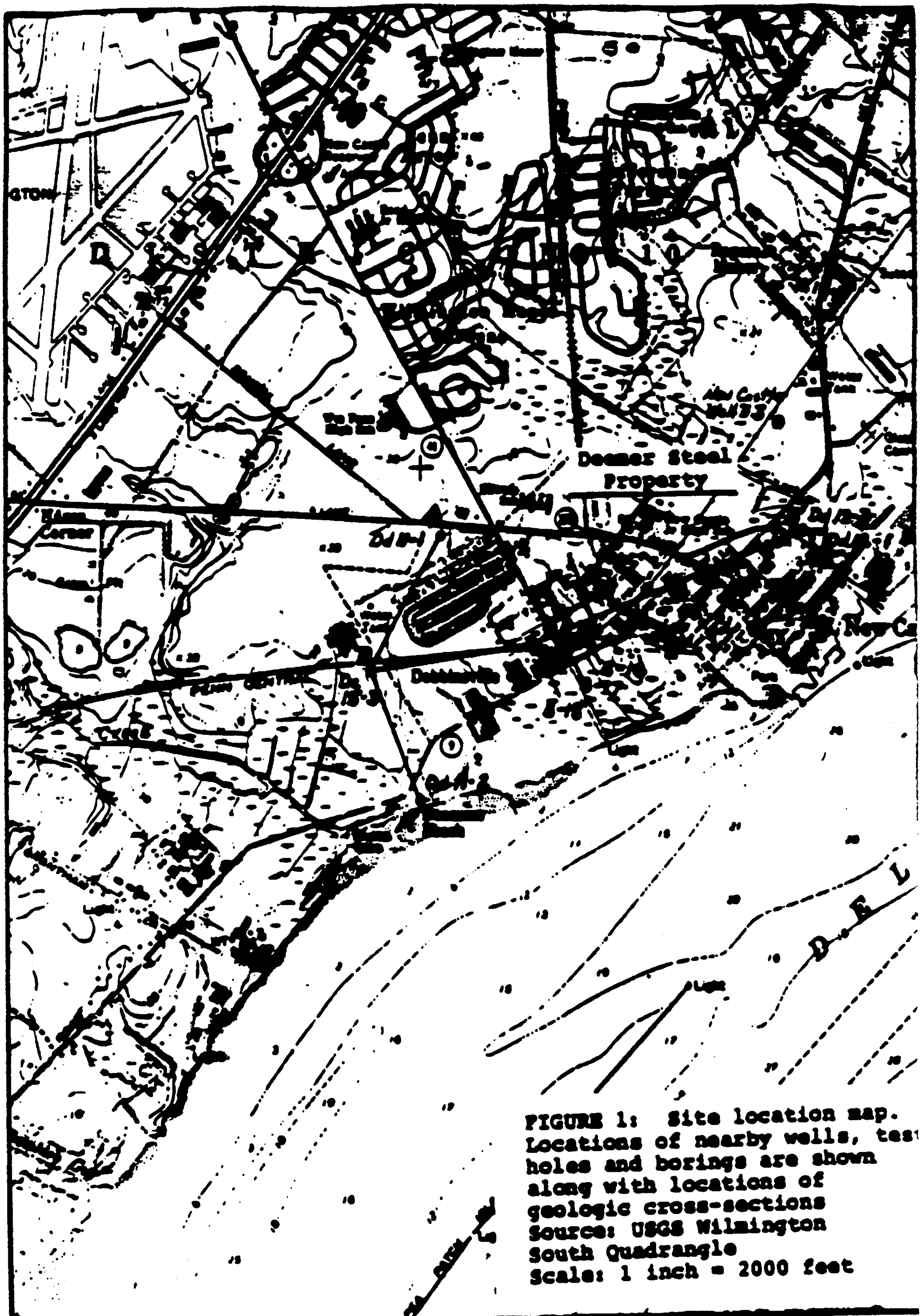
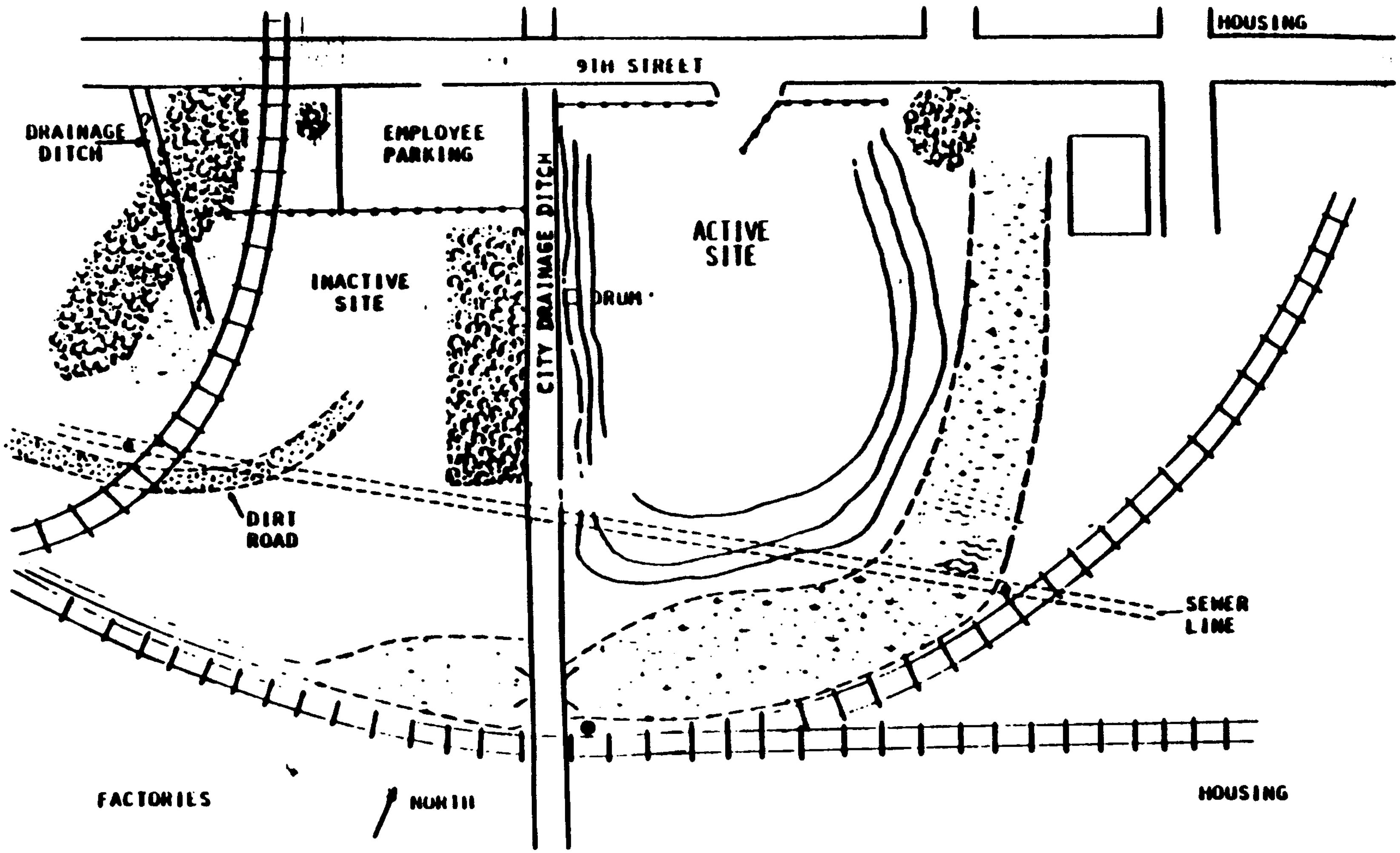
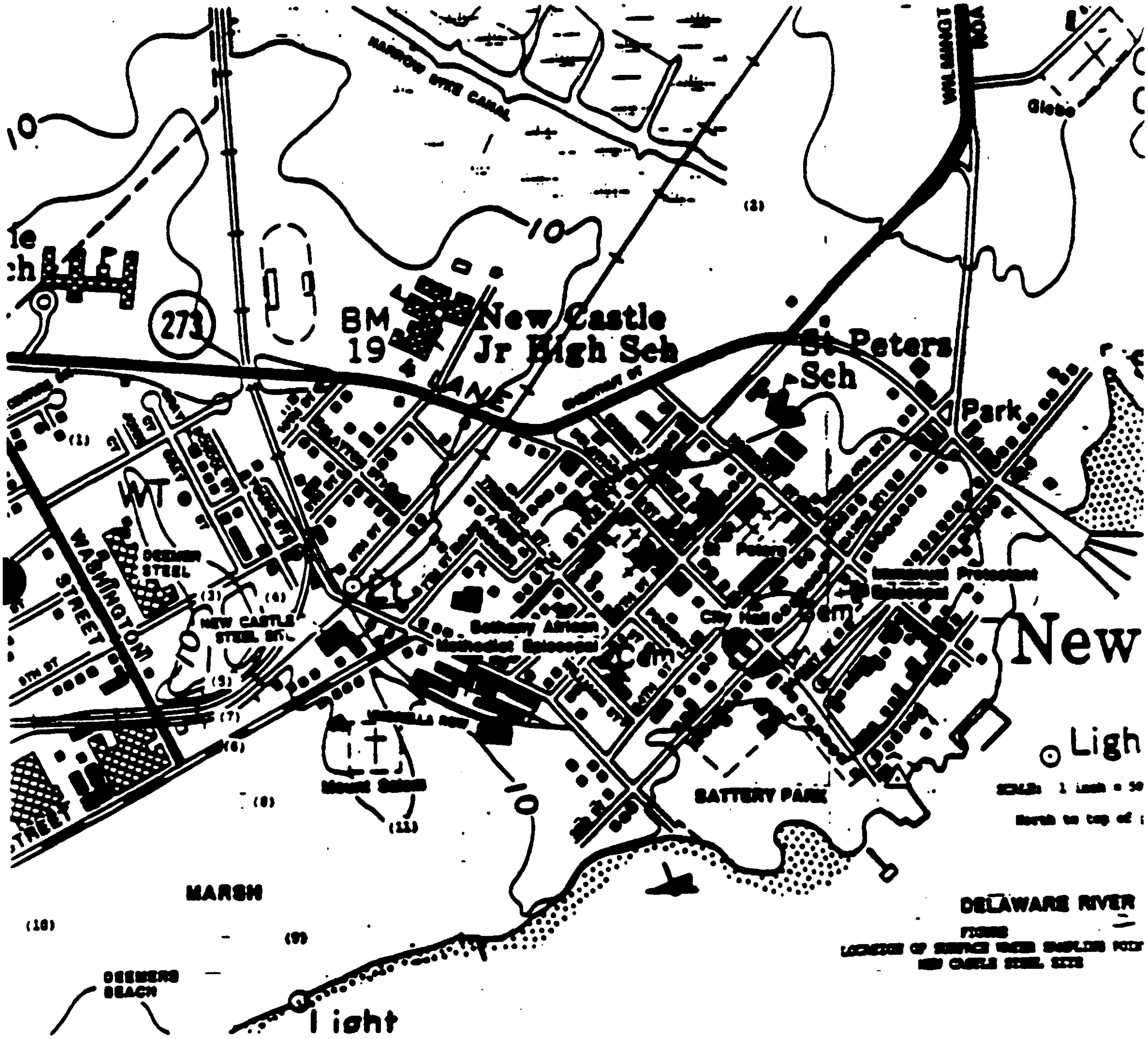
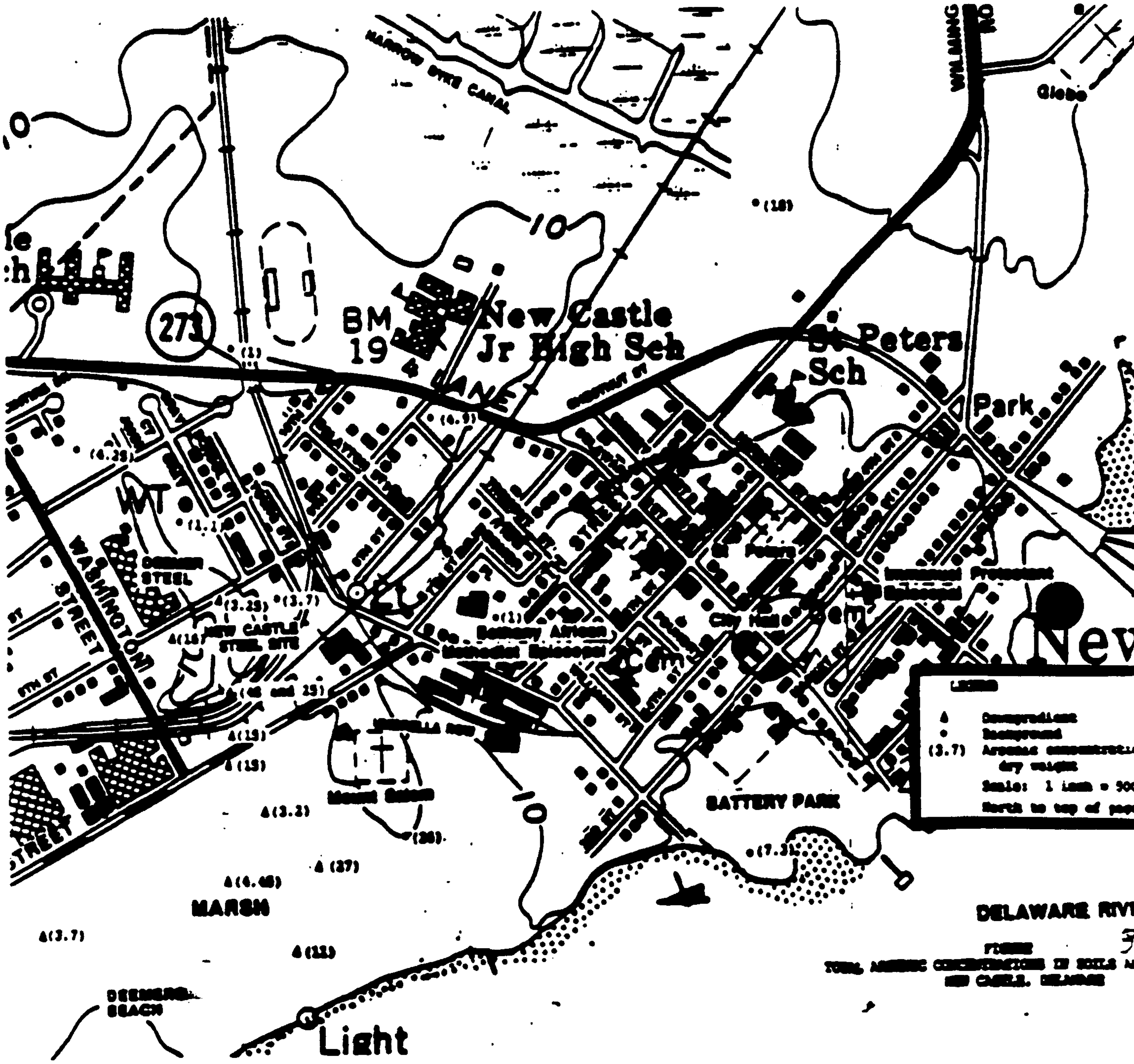


FIGURE 1: Site location map. Locations of nearby wells, tes holes and borings are shown along with locations of geologic cross-sections
Source: USGS Wilmington South Quadrangle
Scale: 1 inch = 2000 feet

Figure 2 Disposal Area




Glebe
BM
19
New Castle
Jr High Sch
St Peters
Sch
Park
273
WASHINGTON
STREET
DEEMER
STEEL
NEW CASTLE
STEEL SITE
City Hall
Cem
Bethany African
Methodist Episcopal
Mount Salem
BATTERY PARK
New
Light
MARSH
DEEMERS
BEACH
Light
DELAWARE RIVER
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)



10
New Castle
Jr High Sch
BM
19
273
St Peters
Sch
Park
Globe
WT
STEEL
NEW CASTLE
STEEL SITE
WASHINGTON
STREET
(18)
(4.3)
(3.25)
(3.7)
(42 and 25)
(15)
(3.3)
(26)
(37)
(4.45)
(3.7)
(11)
(7.3)
City Hall
BATTERY PARK
Mount Salem
MARSH
DELAWARE RIVE
Light
Nev

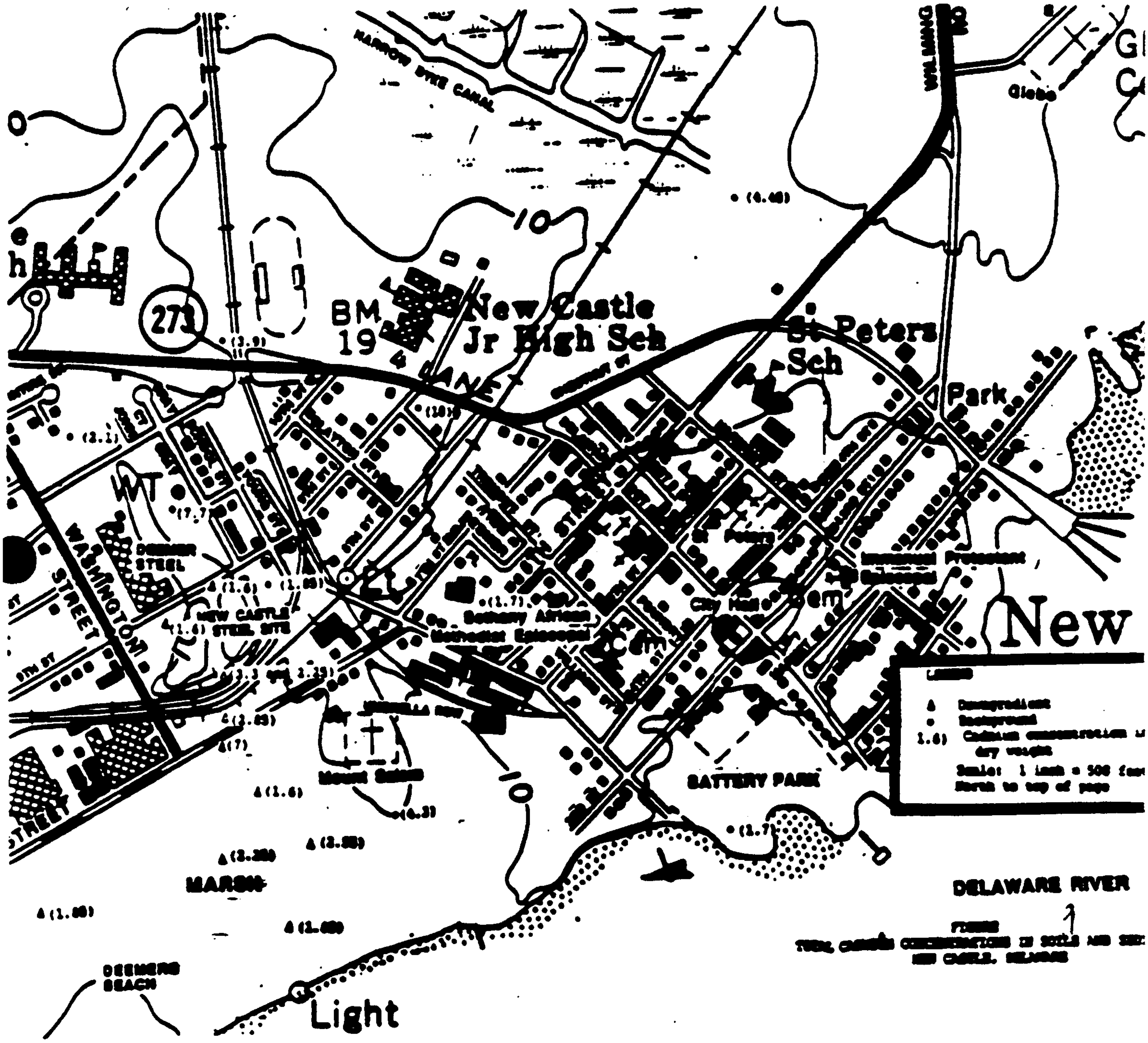
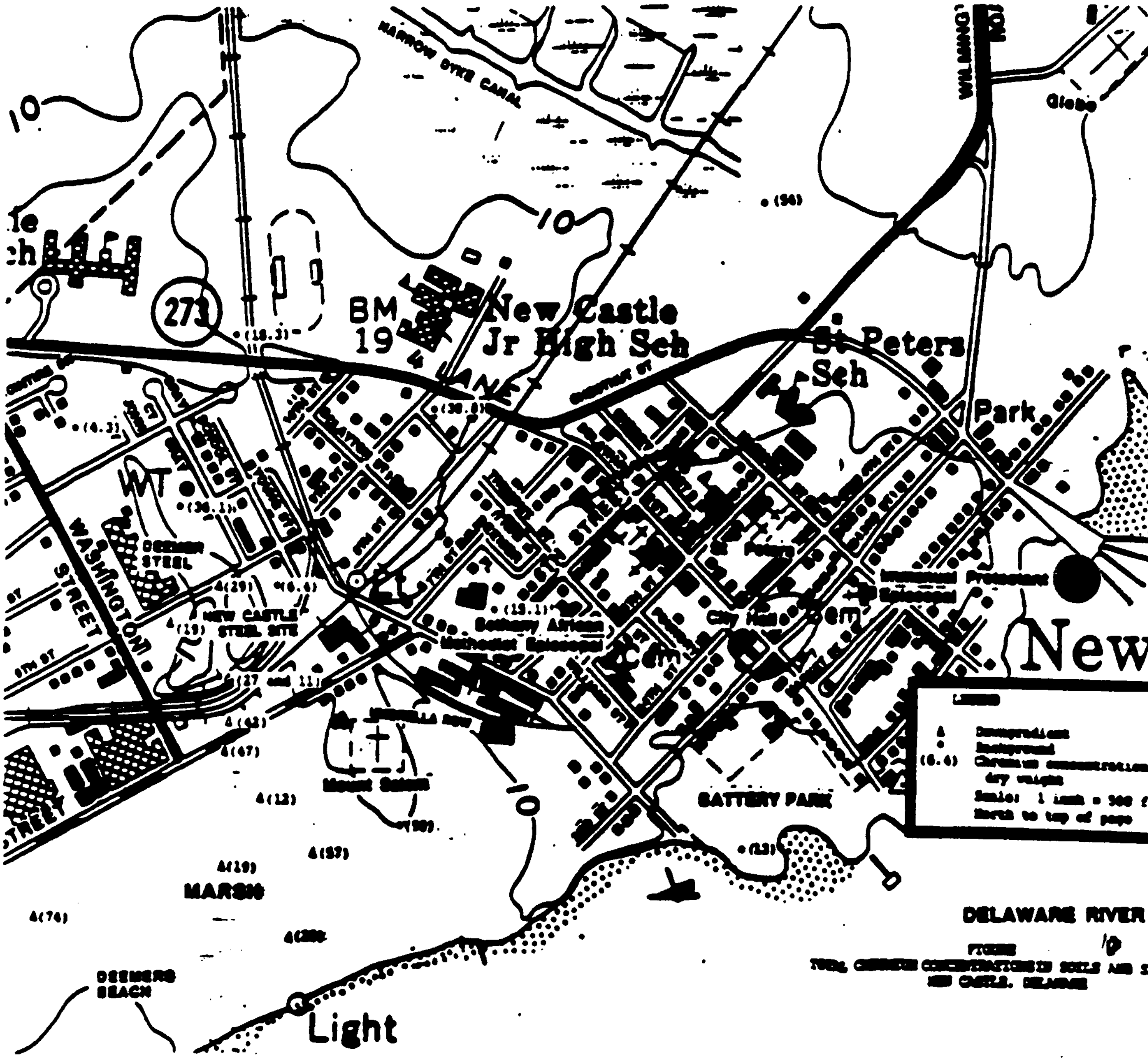
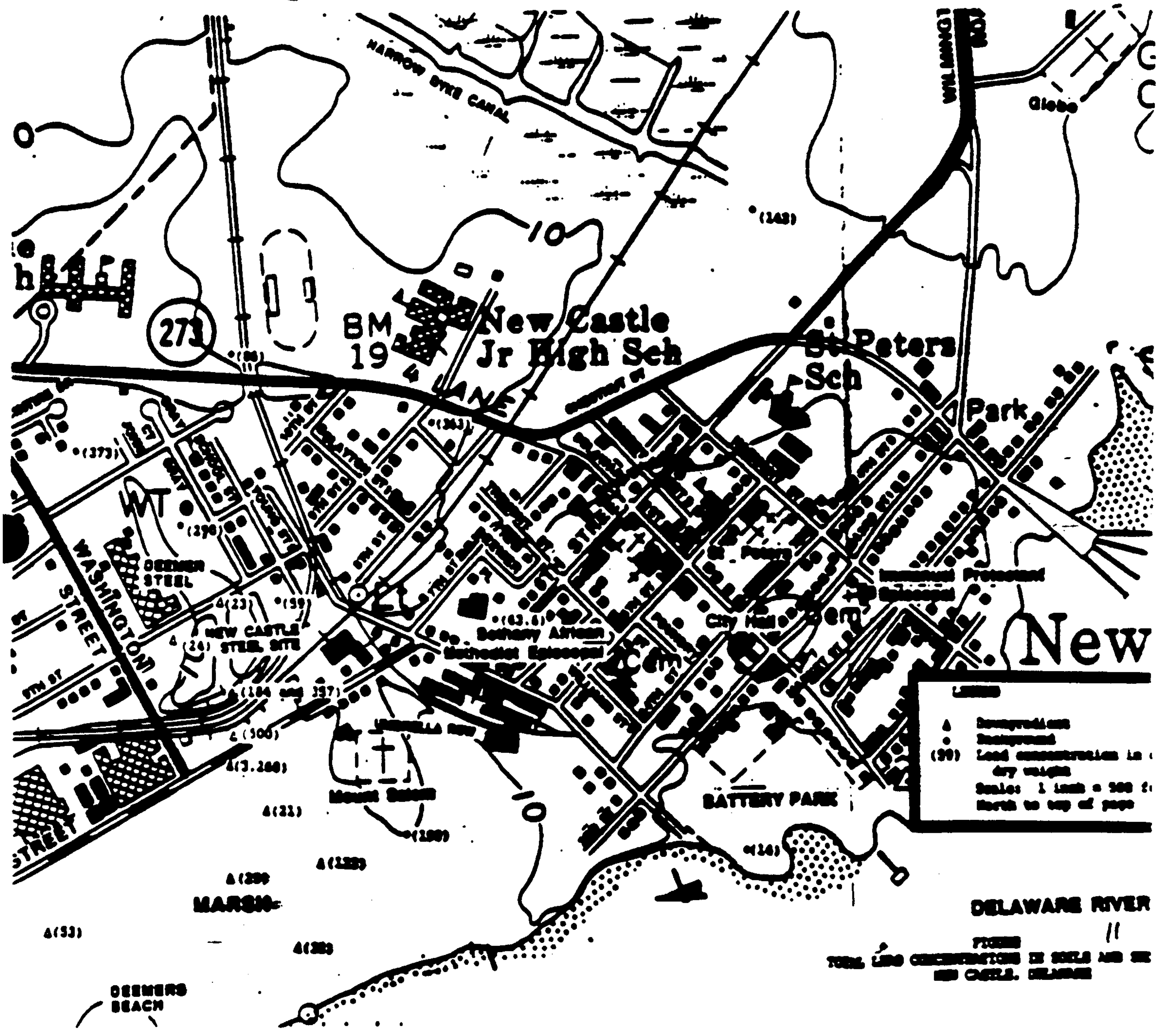


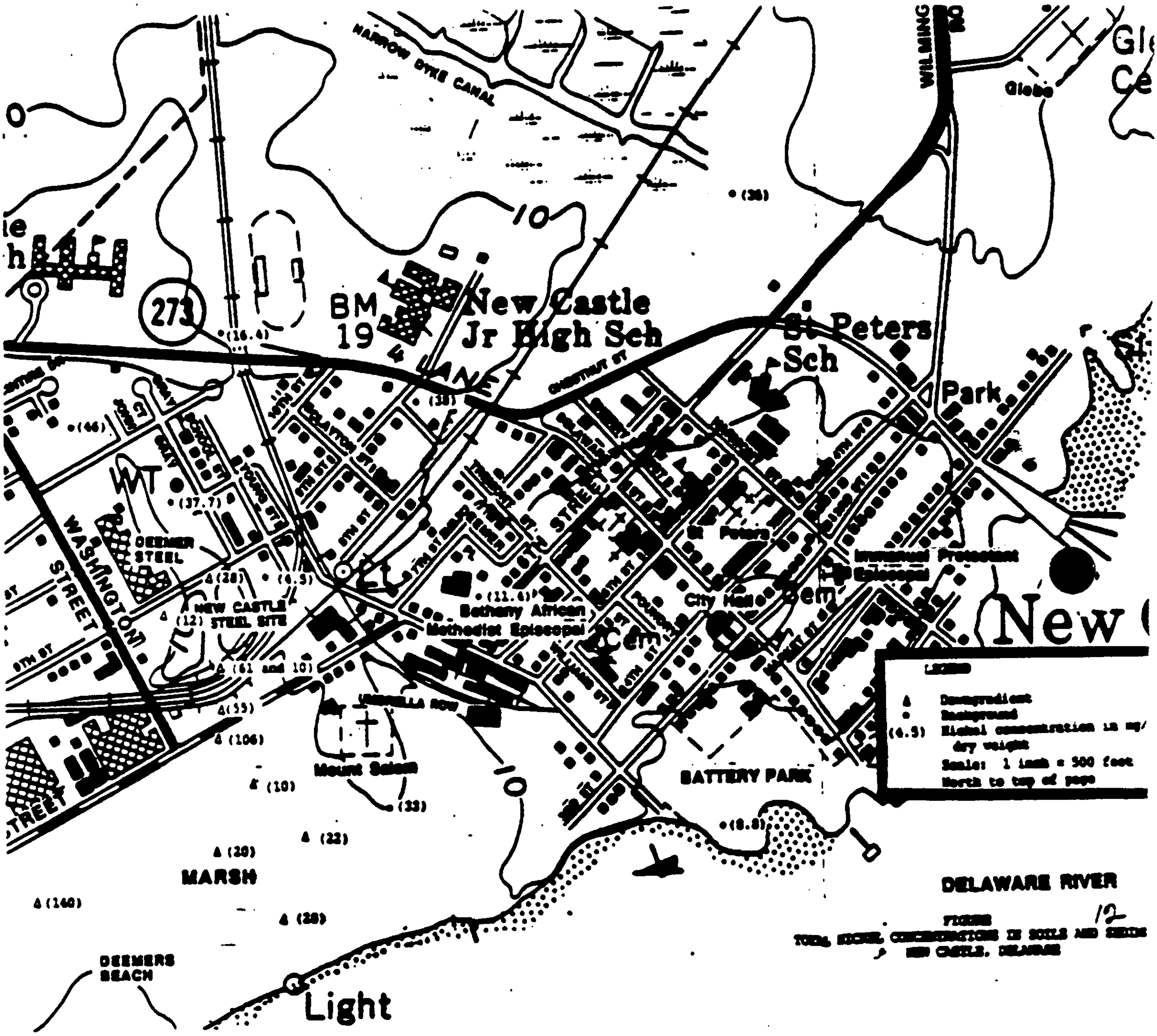
FIGURE 2
TOTAL CADMIUM CONCENTRATIONS IN SOILS AND SED[illegible]
NEW CASTLE, DELAWARE



10
NARROW DYKE CANAL
Glebe
273
BM
19
New Castle
Jr High Sch
St Peters
Sch
Park
4 LANE
• (18.3)
• (36.8)
• (4.3)
• (36.1)
• (6.6)
• (15.1)
• (34)
4(29)
4(13)
4(42)
4(47)
4(12)
4(57)
4(19)
4(74)
4(28)
• (27 and 11)
• (13)
(50)
WT
DEEMER STEEL
NEW CASTLE STEEL SITE
WASHINGTON STREET
Bethany African Methodist Episcopal
City Hall
Cem
New
BATTERY PARK
Mount Salem
MARSH
DEEMERS BEACH
Light
DELAWARE RIVER
(6.4)
10



HARROW DYKE CANAL
Globe
10
273
BM
19
New Castle
Jr High Sch
St Peters
Sch
Park
WT
DEEMER
STEEL
WASHINGTON
STREET
NEW CASTLE
STEEL SITE
City Hall
Cem
Bethany African
Methodist Episcopal
Mount Salem
BATTERY PARK
MARSH
DEEMERS
BEACH
DELAWARE RIVER
New



HARROW DYKE CANAL
10
273
BM 19
New Castle Jr High Sch
4 LANE
St Peters Sch
Park
CHESTNUT ST
WASHINGTON STREET
DEEMER STEEL
NEW CASTLE STEEL SITE
(37.7)
(16.4)
(46)
(38)
(36)
(28)
(6.5)
(12)
(61 and 10)
(55)
(106)
(11.6)
Bethany African Methodist Episcopal
St Peters
City Hall
Cem
Immanuel Protestant Episcopal
New C
UMBRELLA ROW
Mount Salem
BATTERY PARK
(10)
(33)
(22)
(20)
(140)
(8.8)
MARSH
DEEMERS BEACH
Light
DELAWARE RIVER
(4.5)
Scale: 1 inch = 500 feet
Glebe

FIGURE 12

TABLE 7
Selected Contaminant ARAR Requirements
(Concentrations in ppb)

Contaminant	Groundwater Concentration Maximum	SDWA MCL	Surface Water Concentration Mean	Surface Water Concentration Maximum	CWA Water Quality Criteria for Aquatic Life (Freshwater) Acute	CWA Water Quality Criteria for Aquatic Life (Freshwater) Chronic
Arsenic	1	50	9.6	38	360	190
Cadmium	1	10	2.5	2.5	3.9	1.1
Chromium	5	50	23.1	102	1700	210
Lead	28	50	149.5	660	82	3.2

Footnotes

1. Surface water average represents eleven data points
2. Surface water quality criteria (acute) for lead exceeded for three samples.

TABLE 6

TOTAL METALS ANALYSIS AND STATISTICAL SUMMARY OF SOIL AND SEDIMENT SAMPLES FROM OFFSITE, BACKGROUND LOCATIONS

NEW CASTLE STEEL SITE

Background Location	Laboratory Sample	Contaminant Concentration (mg/kg dry weight) As	Cd	Cr	Pb	Ni
Upstream	NCS 034	4.25	2.1	43	373	46
Narrow Dyke marsh area	NCS 044	18	4.45	54	143	38
East marsh	NCS 038	3.7	1.85	8.4	58	4.5
Upgradient marsh	NCS 041	28	4.3	90	188	33
Battery Park	NCS 042	7.3	1.7	13	14	8.8
Ballfield near Abex facility	NCS 403	0.95	3.7	18	80.5	17.5
Playground bordering site	NCS 404	1.1	7.7	30.1	288	37.7
Vacant lot	NCS 405	1	3.8	18.3	86	18.4
Garden soil	NCS 406	4.8	10	30.8	263	38
Yard soil	NCS 407	1	1.7	15.1	63.6	11.4
Mean concentration		6.82	4.34	33.47	165.11	24.88
Standard deviation		8.48	2.88	25.18	132.87	14.74
Maximum concentration		28	10	90	373	46
Minimum concentration		0.95	1.7	8.4	14	4.5

TABLE 1
EP TOXICITY TEST AND pH RESULTS FOR INACTIVE AND ACTIVE DISPOSAL AREAS[1]
NEW CASTLE STEEL SITE
MAY 21, 1984

Parameter	Maximum Concentration Limit[2]	Inactive Disposal Area	Active Disposal Area
Toxic Metals			
Arsenic	5.0	<0.005	<0.005
Barium	100.0	<0.1	<0.1
Cadmium	1.0	<0.005	<0.005
Chromium	5.0	<0.01	<0.01
Lead	5.0	<0.02	<0.02
Mercury	0.2	0.0011	<0.005
Selenium	1.0	<0.005	<0.005
Silver	5.0	<0.005	<0.005
Other Metals[3]			
Aluminum	NA	<0.5	<0.5
Beryllium	NA	<0.001	<0.001
Cobalt	NA	0.03	0.03
Copper	NA	0.005	<0.005
Iron	NA	2.43	1.55
Manganese	NA	10.0	1.95
Nickel	NA	1.75	0.07
Vanadium	NA	<0.005	<0.005
Zinc	NA	0.189	0.295
pH	NA	9.2	8.6

[1]All concentrations (except pH) reported in mg/l.
[2]Limits established under 40 CFR 261.24.
[3]Maximum concentration limits have not been established for these elements.

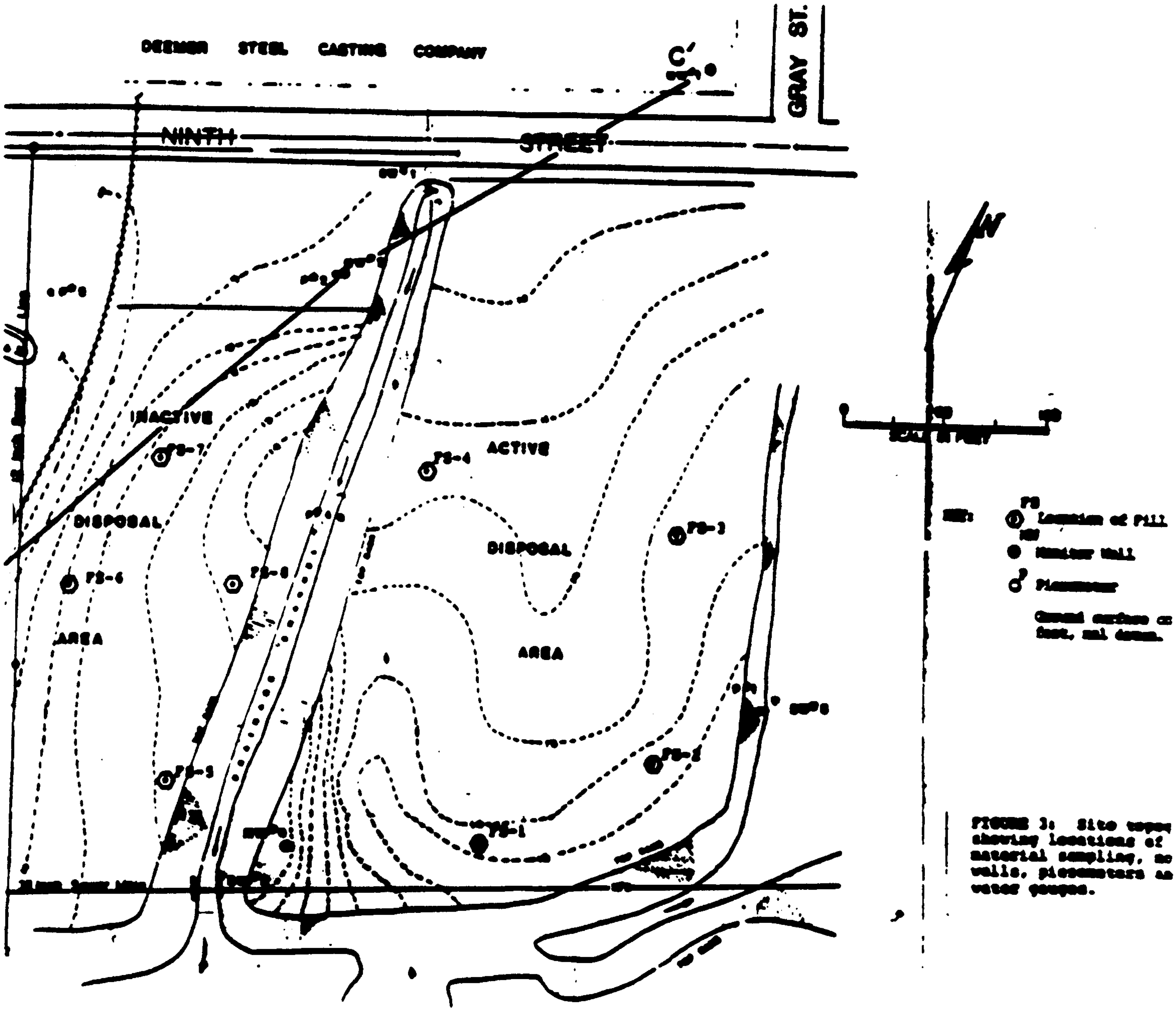
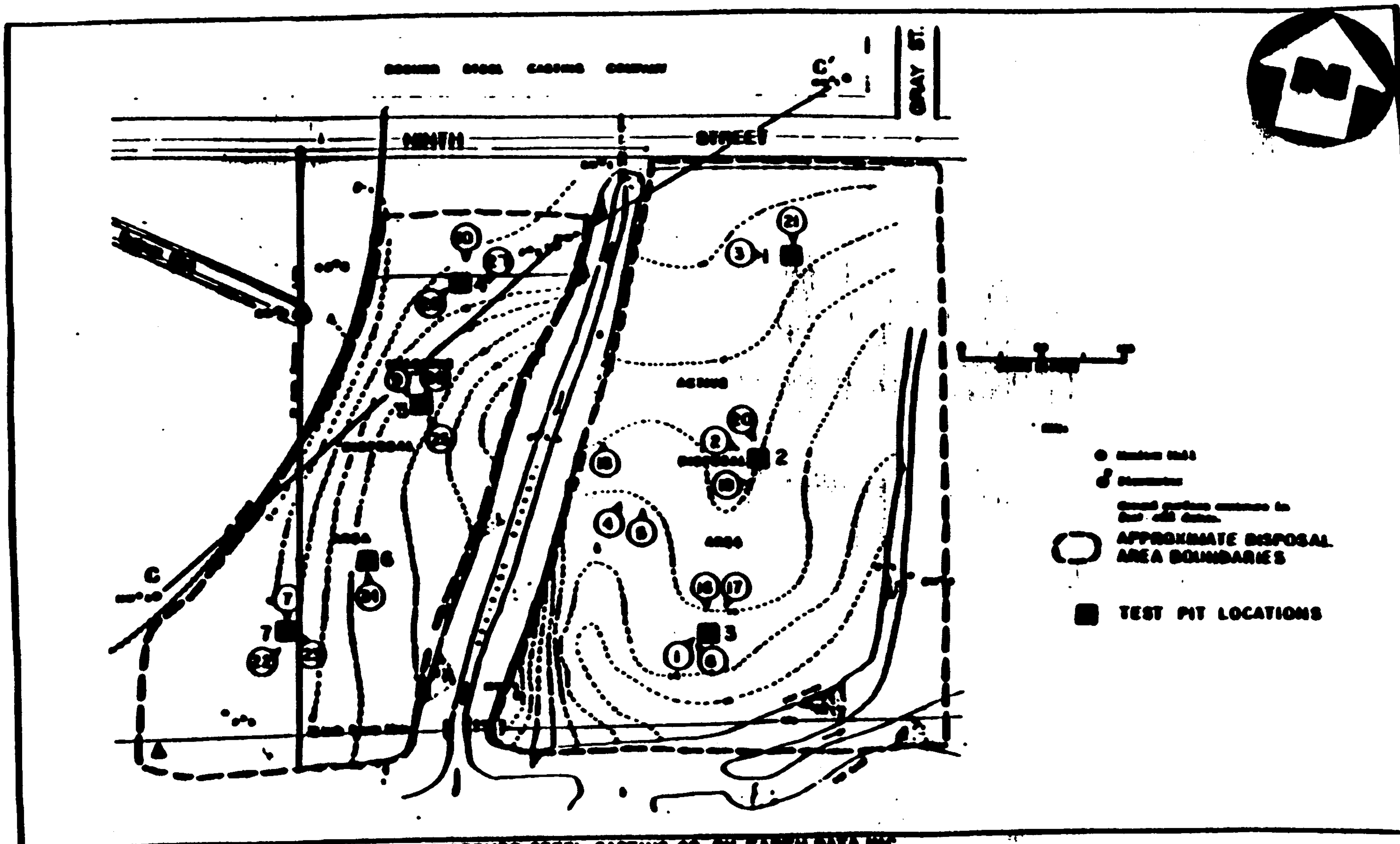


FIGURE 3: Site topog
showing locations of
material sampling, mo
wells, piezometers an
water gauges.



SOURCE: MAP FROM REPORT PREPARED FOR BEEMER STEEL CASTING CO. BY EARTH DATA INC.

FIGURE 4

TEST PIT PHOTO LOCATIONS

NEW CASTLE STEEL, N[illegible] CASTLE, DEL.

(SCALE ABOVE)

NUS CORPORATION

A Halliburton Company

TABLE
TOTAL ARSENIC, CADMIUM, CHROMIUM, LEAD, AND NICKEL
FROM ACTIVE DISPOSAL AREA
NEW CASTLE STEEL SITE

Sample Depth	Test Pit	Laboratory Sample	Contaminant Concentration (mg/kg dry weight)				
			As	Cd	Cr	Pb	Ni
0-3 feet	1	MCM 434	1	7.0	47	317	42
3-5 feet	1	MCM 435	1	3.0	17	71	32
5-8 feet	1	MCM 436	6.6	8.1	30	144	39
5-8 feet	1	MCM 440[1]	7.2	6.3	20	235	17
0-4 feet	2	MCM 431	4.6	6.1	35	207	21
4-8 feet	2	MCM 432	2.3	5.4	34	214	26
7-14 feet	2	MCM 433	3.3	2.5	7.3	31	10
Composite	3	MCM 400	3.4	4	37.9	57.3	26.6
Composite	3	MCM 402[1]	0.95	2	19	33.3	19
0-5 feet	3	MCM 428	1	7.7	37	231	35
5-10 feet	3	MCM 429	0.95	13	83.3	40	57.7
10-13 feet	3	MCM 430	6.5	12	86	54	67
Mean concentration			3.23	6.43	37.79	136.22	32.69
Standard deviation			2.45	3.48	24.49	100.32	16.79
Maximum concentration			7.2	13	86	317	67
Minimum concentration			0.95	2.5	7.3	31	10

[1]Samples MCM 402 and MCM 440 are duplicate samples of MCM 400 and MCM 436 respectively. Duplicate samples are collected at the same location.

TABLE 3
TOTAL ARSENIC, CADMIUM, CHROMIUM, LEAD, AND NICKEL
FROM INACTIVE DISPOSAL AREA
NEW CASTLE STEEL SITE

Sample Depth	Test Pit	Laboratory Sample	Contaminant Concentration (mg/kg dry weight) As	Cd	Cr	Pb	Ni
Composite	4	MCM 401	1	10.4	40.8	134	76.5
0-4 feet	4	MCM 448	4.4	8.1	30	16	52
4-8 feet	4	MCM 449	1.05	7.6	32	53	56
8-11 feet	4	MCM 450	2.6	8.7	43	72	69
0-4 feet	5	MCM 445	5.2	6.6	45	40	38
4-8 feet	5	MCM 446	1.1	4.4	20	13	26
8-12 feet	5	MCM 447	2.5	3.7	10	20	15
0-4 feet	6	MCM 442	1.05	5.3	31	92	28
4-8 feet	6	MCM 443	3.8	5.7	20	9.7	25
8-10 feet	6	MCM 444	2.4	5.3	17	1.09	26
0-3 feet	7	MCM 437	1.1	7.0	58	29	53
3-5 feet	7	MCM 438	1.1	9.6	93	14	27
4-8 feet	7	MCM 439	1.05	13	75	18	66
Mean concentration			2.18	7.34	39.60	47.67	42.96
Standard deviation			1.46	2.62	23.92	41.47	20.08
Maximum concentration			5.2	13	93	134	76.5
Minimum concentration			1	3.7	10	9.7	15

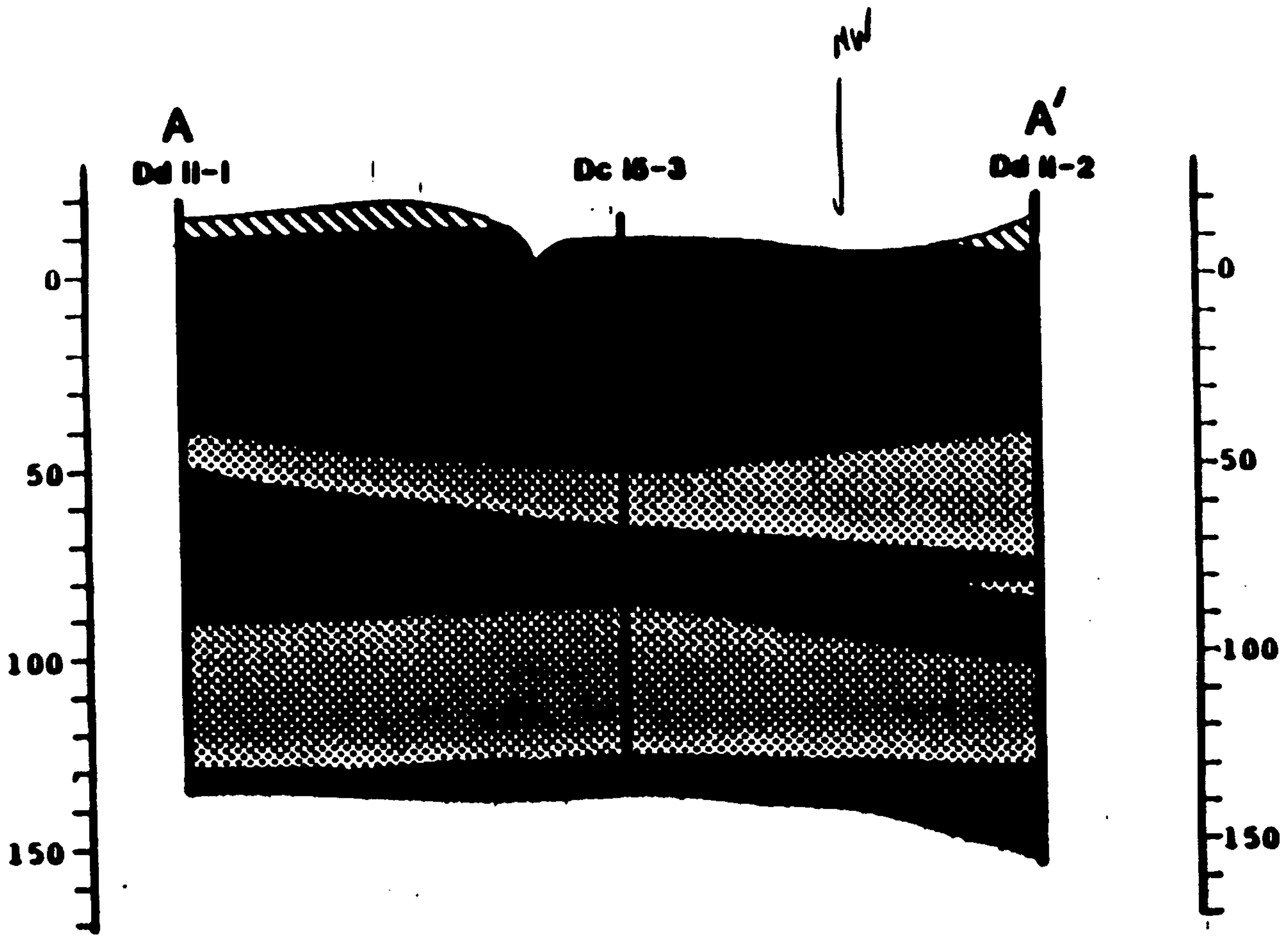


FIGURE 5: Geologic cross-section based on well logs shown in Table 1. Well locations shown in Figure 1.
Horizontal scale 1 inch = 1000 feet.
Elevations in feet, msl datum.

KEY:

Pleistocene and Recent Sediments

Potomac Sands

Potomac Clays

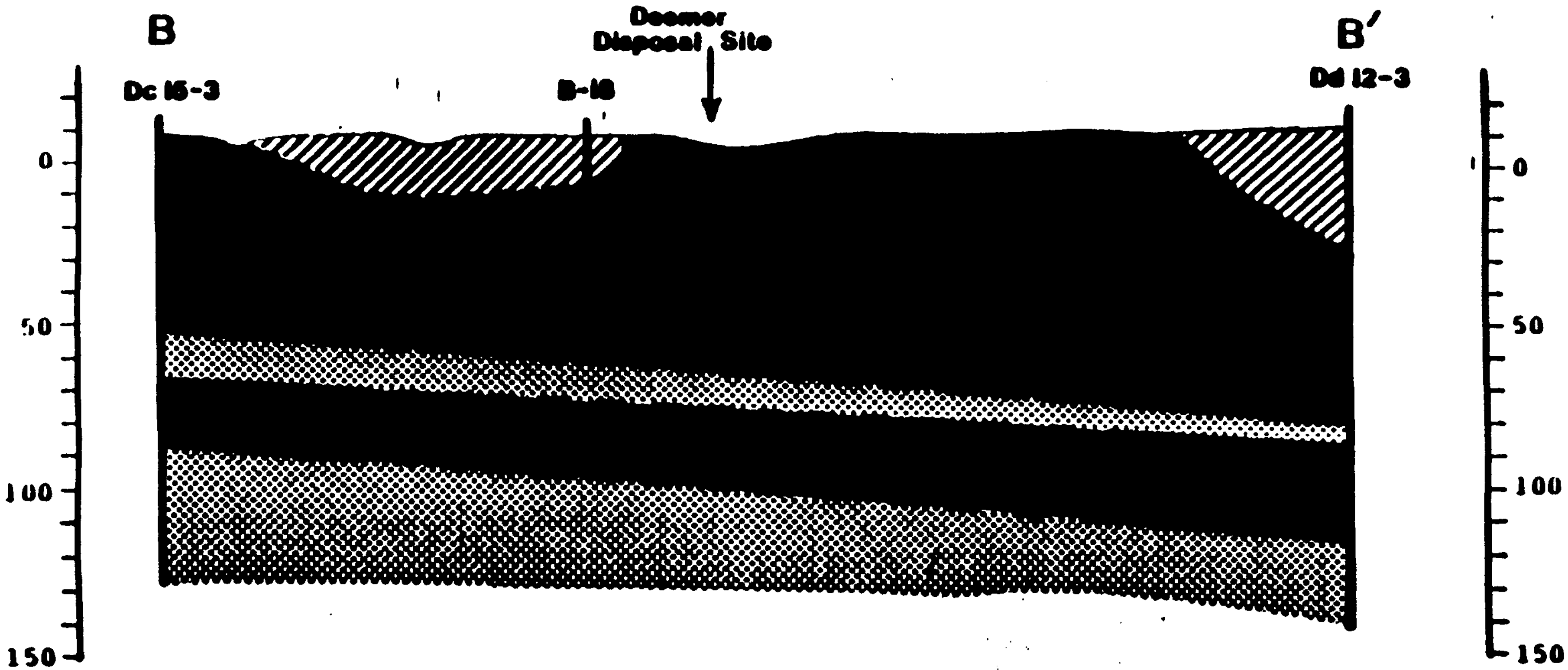


FIGURE 6: Geologic cross-section based on well and boring logs shown in Table 1. Well locations shown in Figure 1. Horizontal scale 1 inch = 1000 feet. Elevations in feet, msl datum.

KEY:
- Pleistocene and Recent Sediments
- Potomac Sands
- Potomac Clays

TABLE 4: Analytical Results From Ground-Water and Surface-Water Sampl
Deemer Steel, May 1984

	MW-1	MW-2	MW-3	MW-4	SW-1	SW-2	Drin Wate Limi
Arsenic	<0.001	0.001	<0.001	<0.001			0.05
Barium	0.038	0.034	0.059	0.011			1.0
Cadmium	<0.001	<0.001	0.001	<0.001	0.002	0.001	0.01
Chromium	0.001	0.005	0.003	0.002	<0.001	0.001	0.05
Fluoride	0.11	0.73	0.12	0.28			1.4-
Lead	0.003	<0.001	0.028	0.004	0.054	0.022	0.05
Mercury	<0.001	<0.001	<0.001	0.001			0.00
Nitrate-N	0.3	1.2	5.0	2.0			10.
Selenium	<0.001	<0.001	<0.001	<0.001			0.01
Silver	<0.001	<0.001	<0.001	0.003			0.05
Chloride	12.5	72.0	28.0	115.0			
Iron	0.63	8.30	2.45	17.40			
Manganese	3.20	2.70	0.76	3.20			
Phenols	<0.01	<0.01	<0.01	<0.01			
Sodium	50.	90.	40.	100.			
Sulfate	75.	122.	45.	273.			
pH	6.15	5.95	5.80	4.70			
Sp. Cond.	368.	790.	275.	795.			
Total Organic Carbon	26.8	90.0	16.4	55.8			
Total Organic Halogen	0.028	0.051	0.012	0.073			

NOTE: All units are mg/l except pH (units) and Sp. Conductance (umhos/cm).

TABLE
TOTAL METALS ANALYSIS OF SURFACE WATER
NEW CASTLE STEEL SITE[1,2]

Sample Number	Sample Location	(μg/l) As	Cd	Cr	Pb	Ni
Downstream:						
MCM 914	3	5	2.5	2.5	25	10
MCM 919	4	13	2.5	53	600	51
MCM 915	5	5	2.5	2.5	10	14
MCM 920	6	5	2.5	2.5	2.5	9.8
MCM 922	7	5	2.5	30	300	82
MCM 921	8	5	2.5	2.5	8.3	9.5
MCM 935	9	5	2.5	2.5	7.1	6.7
MCM 937	10	5	2.5	2.5	5.0	2.5
MCM 940	11	30	2.5	102	230	40
Mean		9.6	2.5	23.1	140.5	23.7
Standard Deviation		11.0	0.0	35.2	234.6	23.8
Minimum		5	2.5	2.5	2.5	2.5
Maximum		30	2.5	102	600	82.0
Background:						
MCM 913	1	5	2.5	6.2	60	10
MCM 943	2	86	16	351	740	202
Mean		45.5	9.3	178.6	400.0	106.0
EPA Ambient Water Quality Criteria:						
Acute		360[3]	3.9	1700[4]	82	1400
Chronic		48[3]	1.1	210[4]	3.2	160

[1]See Figure 3-12 for sample locations.
[2]Samples whose concentrations were reported at the detection limit were assigned one-half the detection limit value.
[3]Trivalent arsenic.
[4]Trivalent chromium.