UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

JUL 13 2007

GENERAL NOTICE LETTER
URGENT LEGAL MATTER
PROMPT REPLY NECESSARY
CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Bernard Reilly, Esq.
Legal Department
E.I. duPont de Nemours & Company
1007 Market Street
Wilmington, DE 19898

Re: Diamond Alkali Superfund Site, Newark Bay Study Area
Notice of Potential Liability

Dear Mr. Reilly:

The United States Environmental Protection Agency ("EPA") is charged with responding to the release and/or threatened release of hazardous substances, pollutants, and contaminants into the environment and with enforcement responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §9601 et seq. Based on the results of previous CERCLA remedial investigation activities and other environmental studies performed at the Diamond Alkali Superfund Site ("Site"), which includes the Lower Passaic River Study Area, EPA has decided to further expand the area of study to include Newark Bay and portions of the Hackensack River, the Arthur Kill, and the Kill Van Kull. This expanded area of the study is known as the Newark Bay Study Area. EPA has documented the release or threatened release of hazardous substances, pollutants and contaminants into the Newark Bay Study Area.

By this letter, EPA is notifying E.I. duPont de Nemours and Company ("duPont") of its potential liability relating to the Newark Bay Study Area of the Site pursuant to Section 107(a) of CERCLA, 42 U.S.C. §9607(a). Under CERCLA, potentially responsible parties ("PRPs") include current and past owners and operators, as well as persons who arranged for the disposal or treatment of hazardous substances, or the transport of hazardous substances. Based on information that EPA evaluated during the course of its investigation, EPA believes that hazardous substances were released from the former duPont Grasselli Works located at 216 Paterson Plank Road in Linden, New Jersey into the Newark Bay Study Area. Hazardous

substances, pollutants and contaminants released from the facility into the Newark Bay Study Area present a risk to the environment and the humans who may ingest contaminated fish and shellfish. Therefore, duPont may be potentially liable for response costs which the government may incur relating to the Newark Bay Study Area. In addition, responsible parties may be required to pay damages for injury to, destruction of, or loss of natural resources, including the cost of assessing such damages.

For the first phase of the Newark Bay Study, the EPA is proceeding with a multi-year study to determine an appropriate remediation plan for the Newark Bay Study Area. The study involves investigation of environmental impacts and pollution sources, as well as an evaluation of alternative actions, leading to recommendations of environmental remediation activities.

You are requested to preserve and retain any documents now in your Company's or its agents' possession or control, that relate in any manner to your facility or the Site or to the liability of any person under CERCLA for response actions or response costs at or in connection with the facility or the Site, regardless of any corporate document retention policy to the contrary.

Enclosed is a list of the other PRPs who have received Notice letters. This list represents EPA's findings on the identities of PRPs to date. We are continuing efforts to locate additional PRPs who have released hazardous substances, directly or indirectly, into the Newark Bay Study Area. Exclusion from the list does not constitute a final determination by EPA concerning the liability of any party for the release or threat of release of hazardous substances into the Newark Bay Study Area. Be advised that notice of your potential liability at the Site may be forwarded to all parties on this list as well as to the Natural Resource Trustees.

We request that you participate in the EPA-approved activities underway as part of the Newark Bay Study. You, along with other such parties, will be expected to both participate in and fund this CERCLA study. For those who choose not to cooperate, EPA may apply the CERCLA enforcement process, pursuant to Sections 106(a) and 107(a) of CERCLA, 42 U.S.C. §9606(a) and §9607(a) and other laws.

In February 2004, EPA signed an Administrative Order on Consent ("AOC") with Occidental Chemical Corporation ("OCC") to conduct a multi-year remedial investigation/feasibility study in Newark Bay pursuant to CERCLA. This study is being conducted by Tierra Solutions, Inc. with EPA oversight. Tierra Solutions, Inc. is an affiliate of the company from which OCC purchased Diamond Shamrock Chemicals (a former owner of a chemical plant at 80 Lister Avenue in Newark, New Jersey), and is performing the work pursuant to that company's indemnity obligation to OCC. Be advised that notice of your potential liability is being forwarded to OCC by EPA.

We strongly encourage you to contact OCC to discuss your participation. You may do so by

contacting:

Carol E. Dinkins, Esq.
Vinson & Elkins LLP
First City Tower
1001 Fannin Street, Suite 2300
Houston, TX 77002-6760
Tel. (713) 758-2528
Fax (713) 615-5311
cdinkins@velaw.com

Written notification should be provided to EPA documenting your intention to participate with OCC and settle with EPA no later than 30 calendar days from your receipt of this letter. The result of any agreement between EPA and your company will need to be memorialized in an AOC. Your written notification should be mailed to:

Amelia M. Wagner, Esq.
Assistant Regional Counsel
U.S. Environmental Protection Agency
290 Broadway, 17th Floor
New York, NY 10007-1866

Pursuant to CERCLA Section 113(k), EPA has established an administrative record that contains documents that will form the basis of EPA's decision on the selection of a response action for the Site. The administrative record files along with the Site file are located at EPA's Region 2 office located at 290 Broadway, New York, NY on the 18th floor. You may call the Records Center at (212) 637-4308 to make an appointment to view the administrative record and/or the Site file for the Diamond Alkali Site, Newark Bay.

Inquiries by counsel or inquiries of a legal nature should be directed to Ms. Wagner at (212) 637-3141. Questions of a technical nature should be directed to Elizabeth Butler, Remedial Project Manager, at (212) 637-4396.

Sincerely yours,

R Basso

Ray Basso, Strategic Integration Manager
Emergency and Remedial Response Division

Enclosure

COMPANIES ISSUED GENERAL NOTICE LETTERS BY EPA FOR THE NEWARK BAY STUDY AREA OF THE DIAMOND ALKALI SUPERFUND SITE

Mr. Steven Fiverson, President
Amcol Realty Co.
Colt Corporation
Columbia Terminals, Inc.
49 Central Avenue
South Kearny, NJ 07032

Mr. Steven Fiverson, President
Amcol Realty Co.
Colt Corporation
Columbia Terminals, Inc.
P.O. Box 2726
Palm Beach, FL 33480

Mr. Barry W. Perry, Chairman & CEO
BASF Catalysts LLC
101 Wood Avenue
Iselin, New Jersey 08830

Dr. Attila Molnar, President & CEO
Bayer Corporation
100 Bayer Road
Pittsburgh, PA 15205-9741

Chevron Texaco Corporation
Law Department
1111 Bagby Street, Suite 4012
Houston, TX 77002

Bernard Reilly, Esq.
Legal Department
E.I. duPont de Nemours & Company
1007 Market Street
Wilmington, DE 19898

Mr. Gregory B. Kenny, President & CEO
General Cable Industries, Inc.
4 Tesseneer Drive
Highland Heights, KY 41076

David M. Cote, Chief Executive Officer
Honeywell International, Inc.
101 Columbia Road
Morristown, New Jersey 07962

COMPANIES ISSUED GENERAL NOTICE LETTERS BY EPA FOR THE NEWARK BAY STUDY AREA OF THE DIAMOND ALKALI SUPERFUND SITE

Chief Executive Officer
ISP Environmental Services, Inc.
1361 Alps Road, Bldg. 8
Wayne, NJ 07470-3700

OENJ Cherokee Corporation
c/o Cherokee Investment Partners, LLC
702 Oberlin Road
Suite 150
Raleigh, NC 27605

President
Prentiss, Inc.
C.B. 2000
Floral Park, New York 11001

Mr. Ralph Izzo, President
Public Service Electric & Gas
80 Park Plaza
Newark, New Jersey 07102

Daryl D. Smith, President
Troy Chemical Corporation
8 Vreeland Road
P.O. Box 955
Florham Park, New Jersey 07932

NUS CORPORATION
A Halliburton Company

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
EXECUTIVE SUMMARY

E.I. DuPont-Grasselli Plant **Site Name**	NJD002185965 **EPA Site ID Number**
South Wood Avenue Linden, New Jersey **Address**	02-8412-18 **TDD Number**

Date of Site Visit: January 9, 1985

SITE DESCRIPTION

This 206 acre site in Linden, Union County, New Jersey has been the location for numerous chemical manufacturers for over 100 years. The site was originally developed by Standard Chemical Company in the 1800's. In 1885, the plant was sold to the Grasselli Chemical Company, which produced three (3) unknown products. In 1928, the plant became part of the DuPont Chemical Corporation. Principal products produced by DuPont at this site include sulfuric acid, sodium silicate, strontium nitrate and chloro sulfonic acid.

Presently, the site holds several permits (both State and Federal) for discharging materials into the air, Arthur Kill, and the Atlantic Ocean. DuPont has also installed approximately $1 million in environmental control facilities including fume scrubbers, monitoring systems, and effluent alarms.

A site inspection of the E.I. DuPont-Grasselli Plant was conducted on January 9, 1985 by personnel from NUS Corporation, Region II office. The site inspection was considered necessary because of lack of sufficient files and due to a congressional study entitled the Eckhardt Report stating that approximately 7951 tons of chemical waste have been disposed of at this site between 1928 and 1979.

Two (2) surface water samples, one (1) sediment sample, and fourteen (14) soil samples were collected from predetermined locations on the site. The samples were sent to three EPA - contracted laboratories for analysis of organic and inorganic hazardous substance list pollutants.

HAZARD RANKING SCORE: $S_m = 6.13$ ($S_{gw} = 2.94$, $S_{sw} = 10.18$ $S_a = 0$)

$S_{fe} = 43.75$, $S_{dc} = 0$

Prepared by: Nelson J. Abrams of NUS Corporation

Date: 9/13/85

ANALYTICAL DATA
E.I. DUPONT - GRASSELLI PLANT
SAMPLING DATE: 01/09/85
CASE: 3781

PESTICIDES/PCBs

SAMPLE NUMBER	NJI3-SW-D	NJI3-SW-1	NJI3-SW-2	NJI3-SED2	NJI3-S1	NJI3-S2	NJI3-S3	NJI3-S4	NJI3-S5
TRAFFIC REPORT NUMBER	DA410	DA411	DA412	DA415	DA416	DA417	DA418	DA419	DA420
MATRIX	BLANK	WATER	WATER	SEDIMENT	SOIL	SOIL	SOIL	SOIL	SOIL
UNITS	ug/l	ug/l	ug/l	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Alpha-BHC				E	E	E	E	J	E
Beta-BHC				E	E	E	E	J	E
Delta-BHC				E	E	E	E	E	E
Gamma-BHC (Lindane)				E	E	E	E	J	E
Heptachlor				E	E	E	E	E	E
Aldrin				E	E	E	E	E	E
Heptachlor Epoxide				E	E	E	E	E	E
Endosulfan I				E	E	E	E	E	E
Dieldrin				E	E	E	E	E	E
4,4'-DDE				J	E	E	J	J	J
Endrin				E	E	E	E	E	E
Endosulfan II				E	E	E	E	E	E
4,4'-DDD				J	E	E	E	E	E
Endosulfan sulfate				E	E	E	E	E	E
Endrin Aldehyde				E	E	E	E	E	E
4,4'-DDT				J	E	E	J	J	J
Methoxychlor				E	J	E	J	J	E
Endrin Ketone				E	E	E	E	E	E
Chlordane				E	E	E	E	E	E
Toxaphene				E	E	E	E	E	E
Aroclor-1016				E	E	E	E	E	E
Aroclor-1221				E	E	E	E	E	E
Aroclor-1232				E	E	E	E	E	E
Aroclor-1242				E	E	E	E	E	E
Aroclor-1248				E	E	E	E	E	E
Aroclor-1254				E	E	E	E	E	E
Aroclor-1260				E	E	E	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit
B - compound found in blank as well as the sample, indicates possible/probable blank contamination

ANALYTICAL DATA
E.I. DUPONT - GRASSELLI PLANT
SAMPLING DATE: 01/09/85
CASE: 3781

PESTICIDES/PCBs									
SAMPLE NUMBER	NJI3-S6	NJI3-S7	NJI3-S8	NJI3-S9	NJI3-S10	NJI3-S11	NJI3-S12	NJI3-S13	NJI3-S14
TRAFFIC REPORT NUMBER	DA421	DA422	DA423	DA424	DA425	DA426	DA427	DA428	DA429
MATRIX	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Alpha-BHC	E	E	E	E	E	E	E	E	E
Beta-BHC	E	E	E	E	E	E	E	E	E
Delta-BHC	E	E	E	E	E	E	E	E	E
Gamma-BHC (Lindane)	E	E	E	E	E	E	E	E	E
Heptachlor	E	E	E	E	E	E	E	E	E
Aldrin	E	E	E	E	E	E	E	E	E
Heptachlor Epoxide	E	E	E	E	E	E	E	E	E
Endosulfan I	E	E	E	E	E	E	E	E	E
Dieldrin	E	E	E	E	E	E	E	E	E
4,4'-DDE	E	E	E	E	E	E	E	E	E
Endrin	E	E	E	E	E	E	E	E	E
Endosulfan II	E	E	E	E	E	E	E	E	E
4,4'-DDD	E	E	E	E	E	E	E	E	E
Endosulfan sulfate	E	E	E	E	E	E	E	E	E
Endrin Aldehyde	E	E	E	E	E	E	E	E	E
4,4'-DDT	E	E	E	E	E	E	E	E	E
Methoxychlor	E	E	E	E	E	E	E	E	E
Endrin Ketone	E	E	E	E	E	E	E	E	E
Chlordane	E	E	E	E	E	E	E	E	E
Toxaphene	E	E	E	E	E	E	E	E	E
Aroclor-1016	E	E	E	E	E	E	E	E	E
Aroclor-1221	E	E	E	E	E	E	E	E	E
Aroclor-1232	E	E	E	E	E	E	E	E	E
Aroclor-1242	E	E	E	E	E	E	E	E	E
Aroclor-1248	E	E	E	E	E	E	E	E	E
Aroclor-1254	E	E	E	E	E	E	E	E	E
Aroclor-1260	E	E	E	E	E	E	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit
B - compound found in blank as well as the sample, indicates possible/probable blank contamination

INTERSTATE SANITATION COMMISSION

10 COLUMBUS CIRCLE ● NEW YORK 19, N.Y.

LOCATION OF CITY SEWERS Adjacent to INDUSTRIAL PLANTS Bordering ARTHUR KILL IN NEW JERSEY

LOCATION OF CITY SEWERS

Adjacent To

INDUSTRIAL PLANTS

Bordering

ARTHUR KILL IN NEW JERSEY

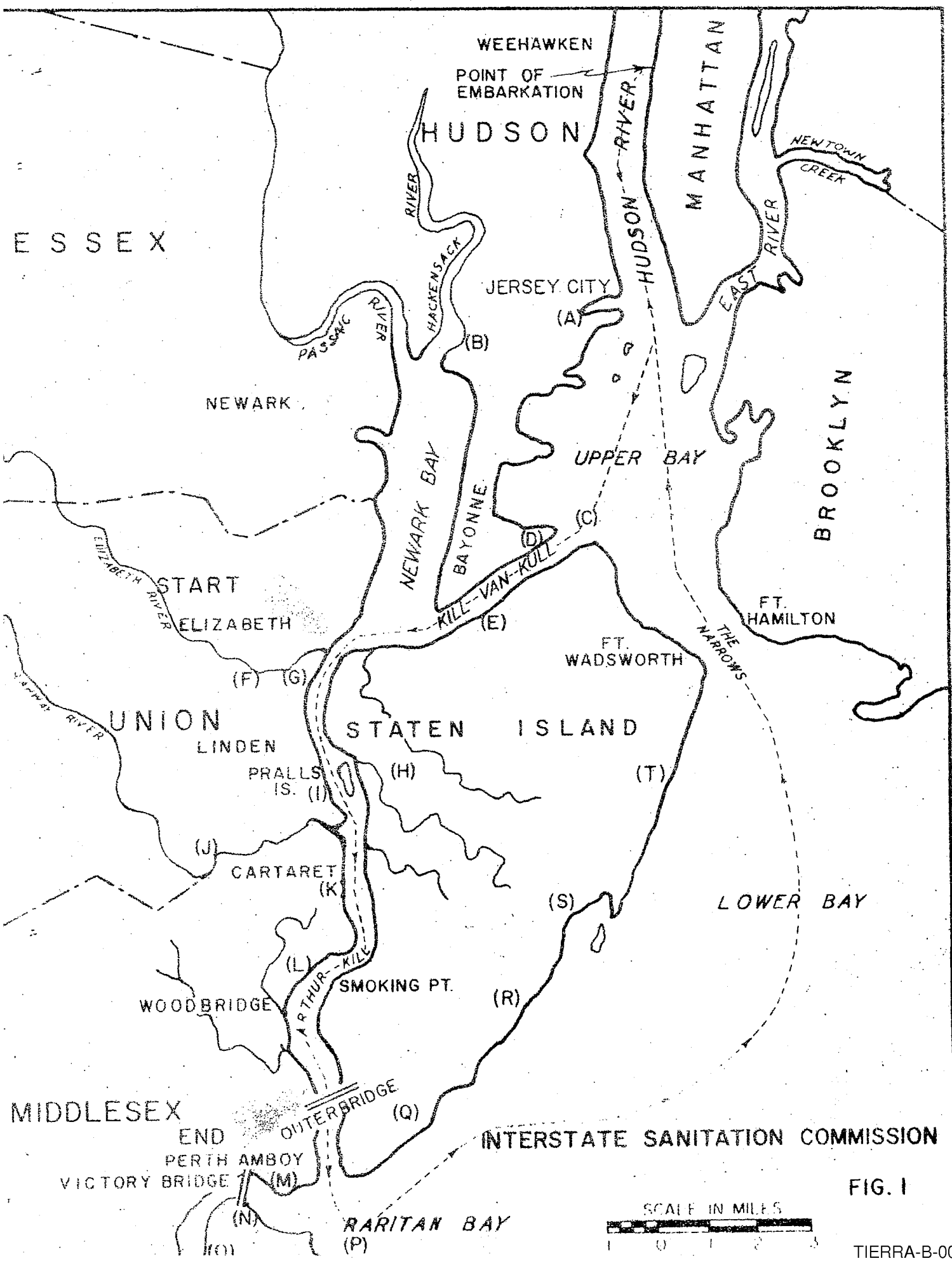


FIG. 1

TIERRA-B-003591

January 5, 1965

MEMORANDUM

TO: G. T. Cowherd, Jr.

FROM: F. W. Gross

Re: Location of City sewer lines with relation to industrial plant sites in the area adjacent to the Arthur Kill on New Jersey shore.

A comprehensive study was conducted by the Interstate Sanitation Commission during the fall of 1964 to obtain certain information as to the exact locations of city sewers, their approximate size and the approximate volume of flow now being handled by these respective sewer lines. Emphasis was given to those sewer lines which are located in the immediate area adjacent to industrial plants which border on the New Jersey side of the Arthur Kill. The area inspected started at the north end of the Arthur Kill at the junction of Newark Bay and Elizabethport Reach and continuing south to Perth Amboy as indicated on map (Fig. 1). In order to facilitate this study sewer maps were obtained from the various municipalities. A few of these maps were accurate and up-to-date but unfortunately the greater part were old prints not showing new sewer lines or laterals. In instances like this, the inspector had to make various trips in the field to locate sewer lines by observing manholes in the adjacent city streets and making observations of size and estimated flows from the street level.

The following municipalities with industrial plants located within their jurisdiction and known to be discharging their waste material directly to the Arthur Kill were inspected. An individual report on each plant is included in this report.

UNION COUNTY

	Plant	City or Borough
1.	Archer-Daniels-Midland	Elizabeth, N.J.
2.	Borme Chemical	" "
3.	Copper Pigment Chemical Works	" "
4.	Phelps Dodge Company	" "
5.	Reichhold Chemical Company	" "
6.	Singer Company	" "
7.	Cities Service Company	Linden, N.J.
8.	E. I. DuPont De Nemours & Company	" "
9.	Nopco Chemical Company	" "

MIDDLESEX COUNTY

	Plant	City or Borough
1.	Agrico Chemical Company	Carteret, N.J.
2.	American Smelting & Refining Company	Barber, Perth Amboy, N.J.
3.	Armour Fertilizer Company	Carteret, N.J.
4.	California Oil Company	Perth Amboy, N.J.
5.	Foster Wheeler Company	Carteret, N.J.
6.	Hess Oil Company	Port Reading, N.J.

MIDDLESEX COUNTY continued

7.	Koppers Chemical Company	Port Reading, N.J.
8.	Koppers Company (Creosoting Plant)	Port Reading, N.J.
9.	U. S. Metals & Refining Company	Carteret, N.J.
10.	Westvaco Company (Food Machinery)	Carteret, N.J.
11.	General American Tank & Stor. Co.	Carteret, N.J.

FWG:k

UNION COUNTY

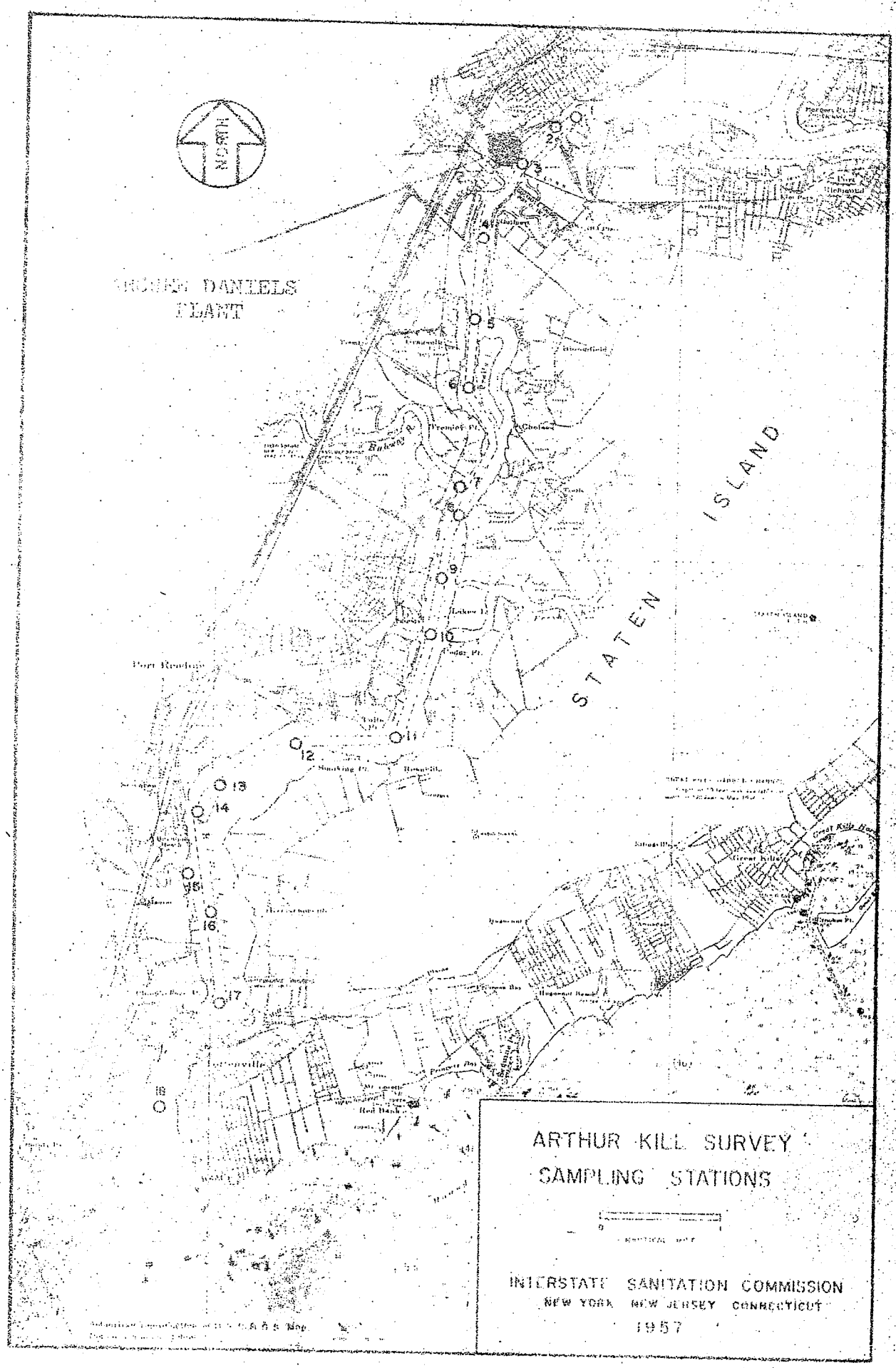
1.	Archer-Daniels-Midland	Elizabeth
2.	Borme Chemical Co.	Elizabeth
3.	Cities Service Co.	Linden
4.	Copper Pigment Chemical Works	Elizabeth
5.	E.I. Du Pont De Nemours & Co.	Linden
6.	Nopco Chemical Co.	Linden
7.	Phelps Dodge Co.	Elizabeth
8.	Reichhold Chemical Co.	Elizabeth
9.	Singer Co.	Elizabeth

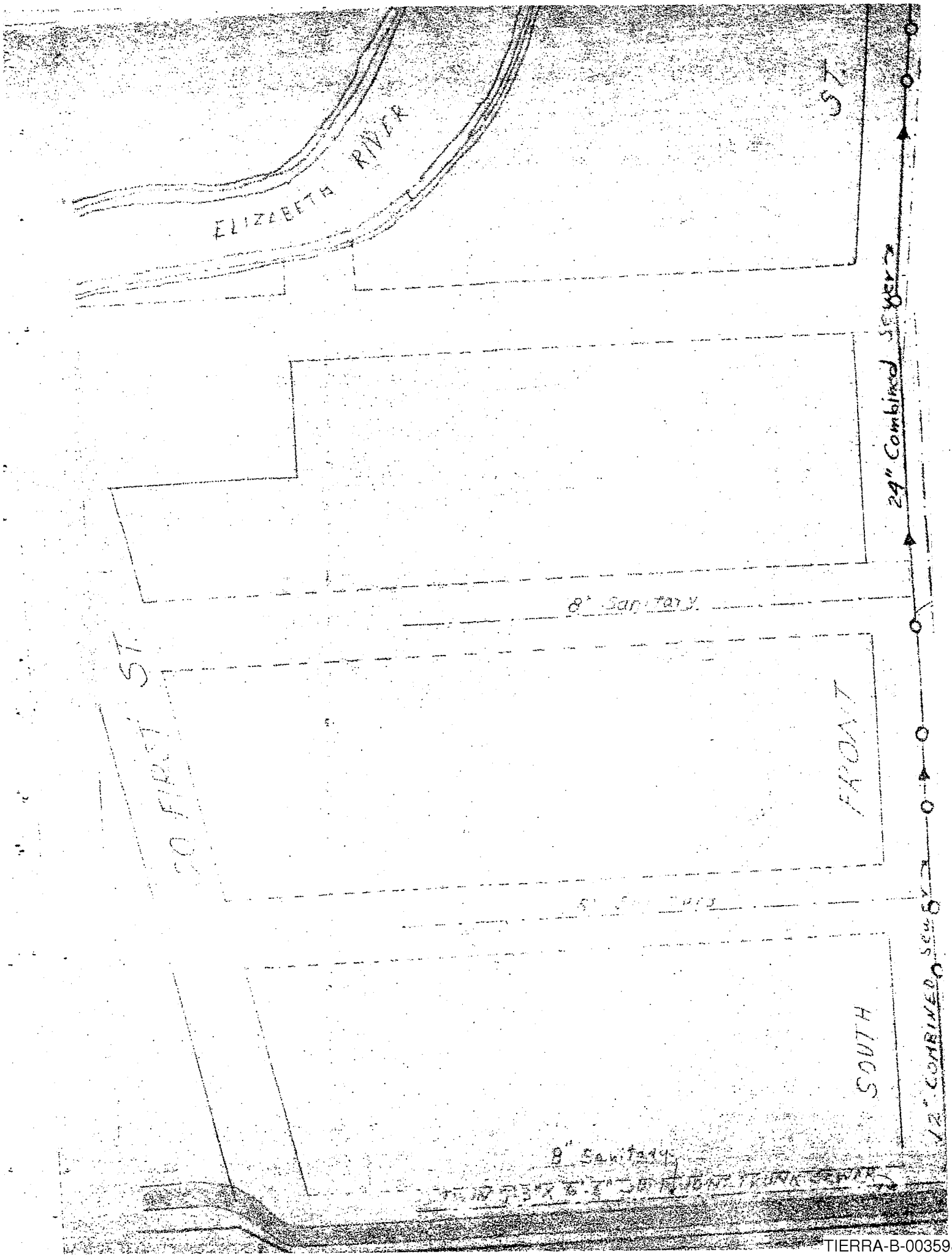
PLANT: Archer-Daniels-Midland Company

LOCATION: East side of Front Street, approximately .05 miles north of Clifton Street, Elizabeth, N.J.

Directly in front of this plant on Front Street, the City of Elizabeth has a 12" non-intercepted combined sewer which flows north where it is connected to a 24" combined sewer. At present, this sewer discharges directly to the Arthur Kill at a point approximately 250 feet north of the southerly property line of Loizeaux Builders Supply Company. While this city sewer discharges raw sewage to the Arthur Kill, plans are being prepared by the City of Elizabeth to have this area's sewage diverted to the Elizabeth Joint Meeting Treatment Plant. At low water, a small flow can be observed discharging to the Kill, which indicates that the 12" and 24" combined sewers have ample capacity to serve this plant. This plant is reported to utilize approximately 100,000 gpd. of city water and 240,000 gpd of Arthur Kill water.

1/7/65
FG:k


NORTH
DANIELS
PLANT
STATEN
ISLAND
ARTHUR KILL SURVEY
SAMPLING STATIONS
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


ELIZABETH RIVER
24" Combined Sewer
8" Sanitary
20 FEET ST
FRONT
SOUTH
12" COMBINED SEWER
8" Sanitary

24" Sludge Force main To
ABANDONED approx

Discharges To Ar. Kill
approx 250' N. of South
property line of Loizeaux
Builders Supply Co.

Proposed Sewer

Sewers Not Intercep

Proposed Street

ELIZABETH SEWERAGE PLANS
SECTION O-9 SHEET 41
7-64

FRONT

APPROX. WATE

WATER

ARCHER DAM, S. KILL ARC

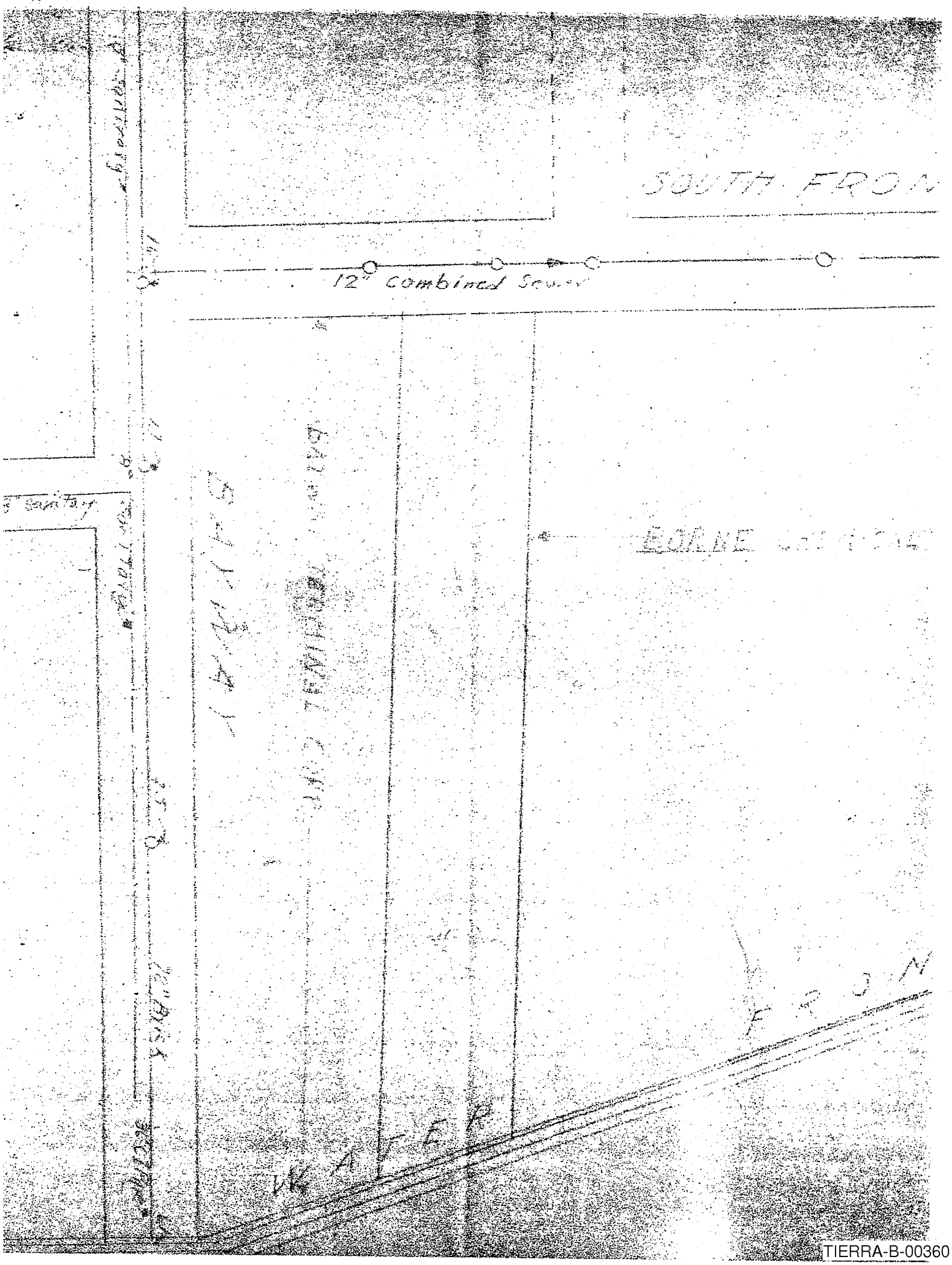
CITY OF NEW BRUNSWICK

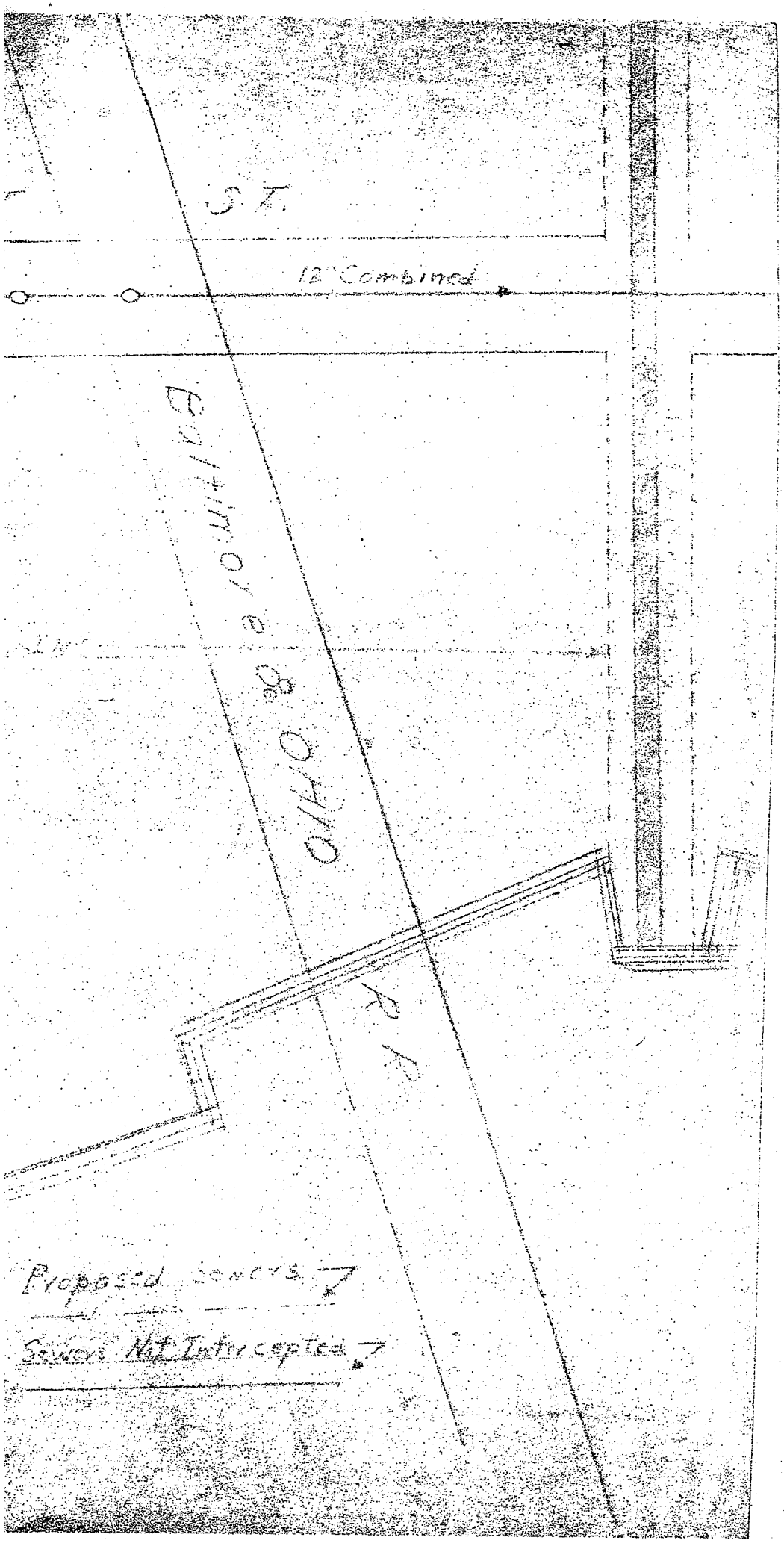
PLANT: Borme Chemical Company, Inc.

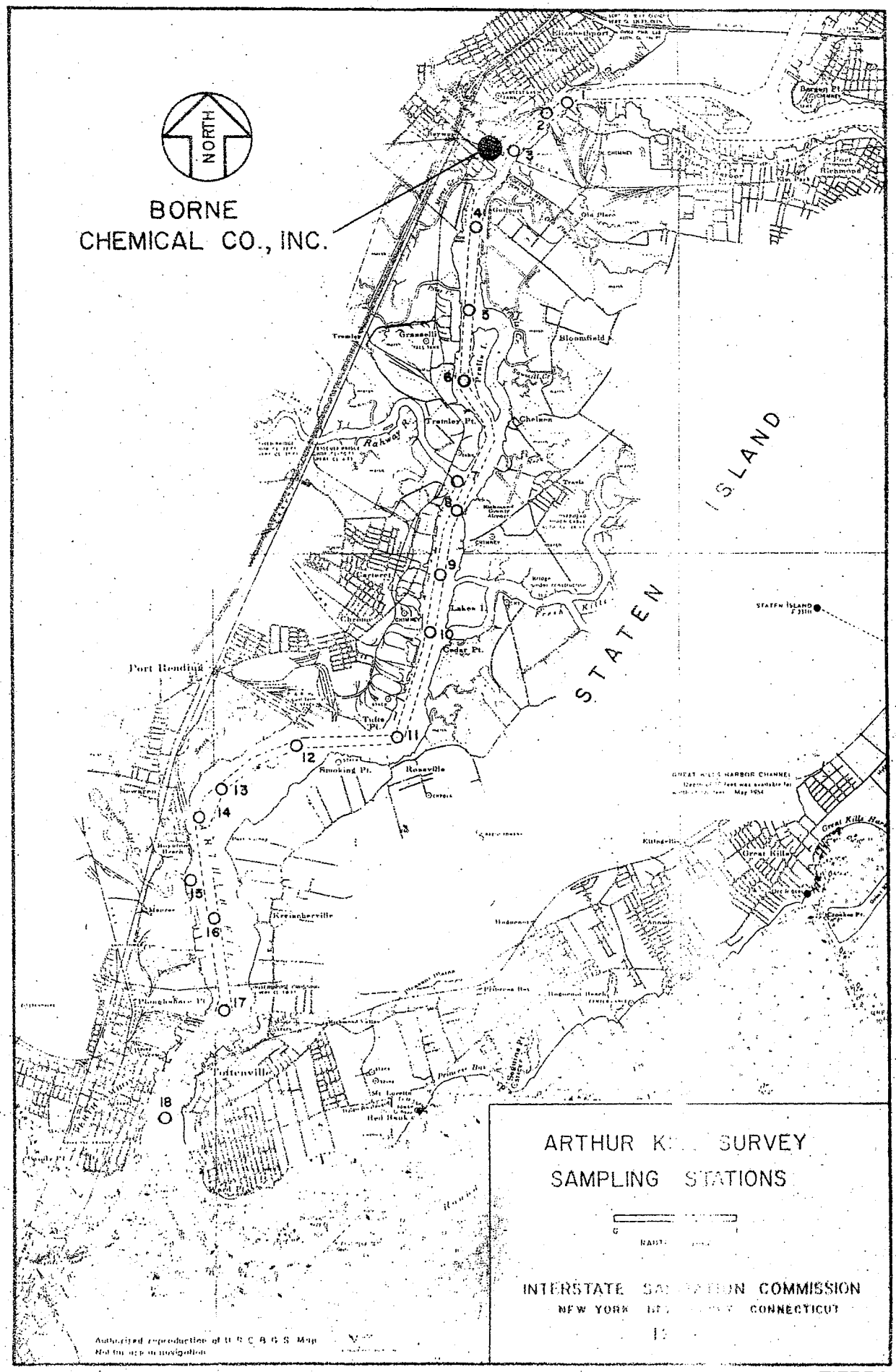
LOCATION: 632-650 Front Street, Elizabeth, N.J.
East side of Front Street and approximately
.2 miles south of Clifton Street.

Starting at a point approximately 125 ft. to the south of the southerly property line of this plant, a 12" non-intercepted combined sewer starts to flow north along Front Street. Plans are being prepared by the City of Elizabeth to construct a new 8" sanitary sewer on Bayway Avenue which will be diverted to this 12" sewer main. The tentative plans call for the sewage in this sewer to be intercepted and diverted to the Elizabeth Joint Meeting Treatment Plant.

1/7/65
FG:k


SOUTH FRON
12" combined Sewer
BORNE
FRON
WATER


5 ft.
12" Combined
Baltimore & Ohio R.R.
Proposed Sewers
Sewers Not Intercepted

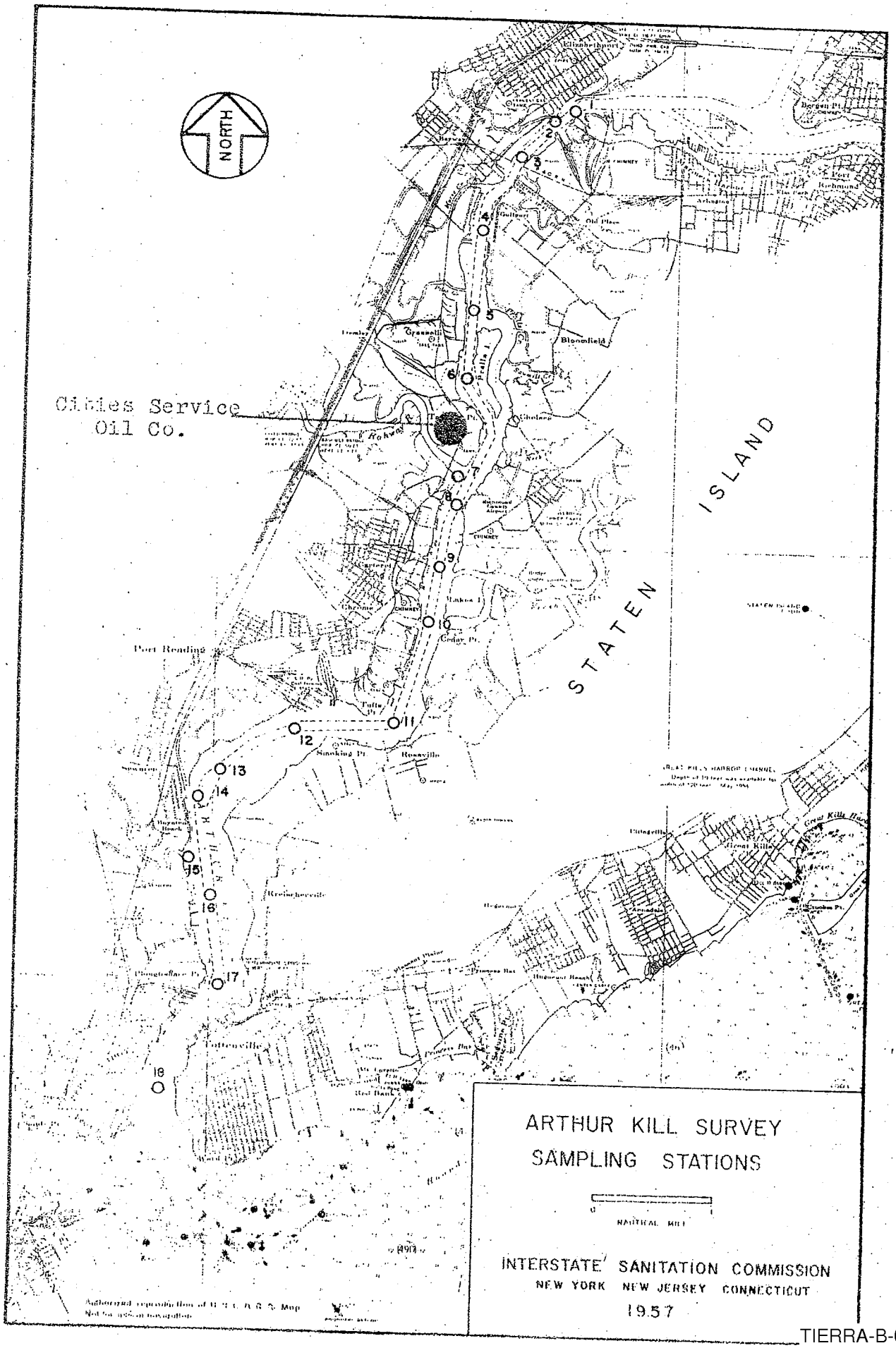

NORTH
BORNE
CHEMICAL CO., INC.
STATEN ISLAND
Port Reading
Tremley Pt.
Cedar Pt.
Tufts Pt.
Smoking Pt.
Rosselle
Great Kills
Tottenville
Bloomfield
Chelsea
Lake I.
Rahway R.
Kill
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR K SURVEY
SAMPLING STATIONS
INTERSTATE SA ATION COMMISSION
NEW YORK CONNECTICUT

PLANT: Cities Service Oil Company

LOCATION: East Side of South Wood Ave., Linden, N.J.

The main processing plant for Cities Service is located near the end of and on the east side of South Wood Ave. On the west side of South Wood Ave. a large tank storage field is located. This section of Linden does not have any City sewer mains which means that the waste from this plant would have to be pumped approximately 5600 ft. to the nearest City sewer. Our recent Industrial Waste Survey indicates that the discharge from the A.P.I. separator is approximately 7.2 mgd.

1/7/65
FG:fd



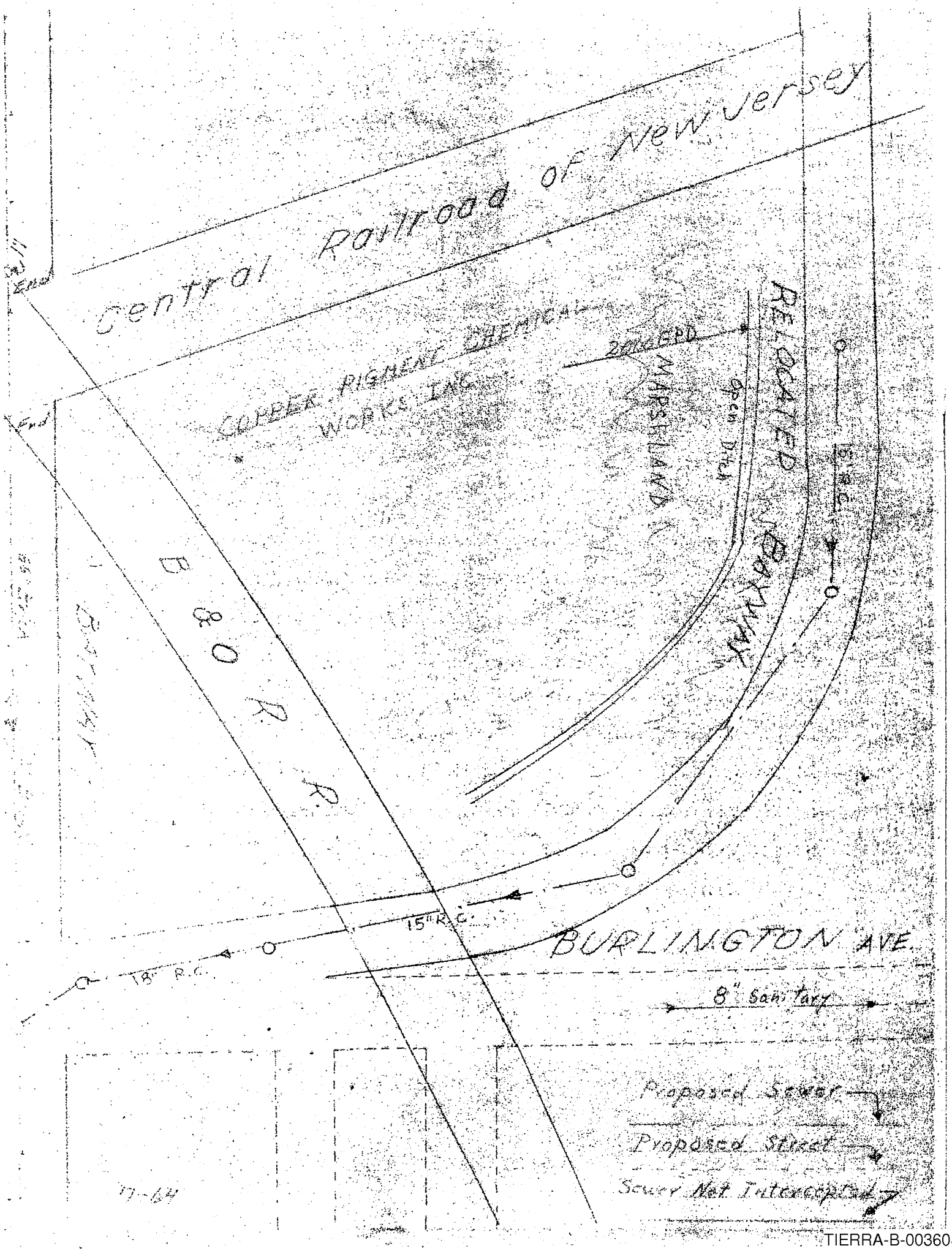
AREA ADJACENT TO
CITIES SERVICE
CITY OF LINDEN, N.J.
8-31-77
ARTHUR KILL
CITIES SERVICE
AM. CYANAMID
N.J. OF R.R.
SLUDGE BARGE DOCK
AVE
WOOD
SOUTH
CREEK
RAHWAY RIVER
LINDEN

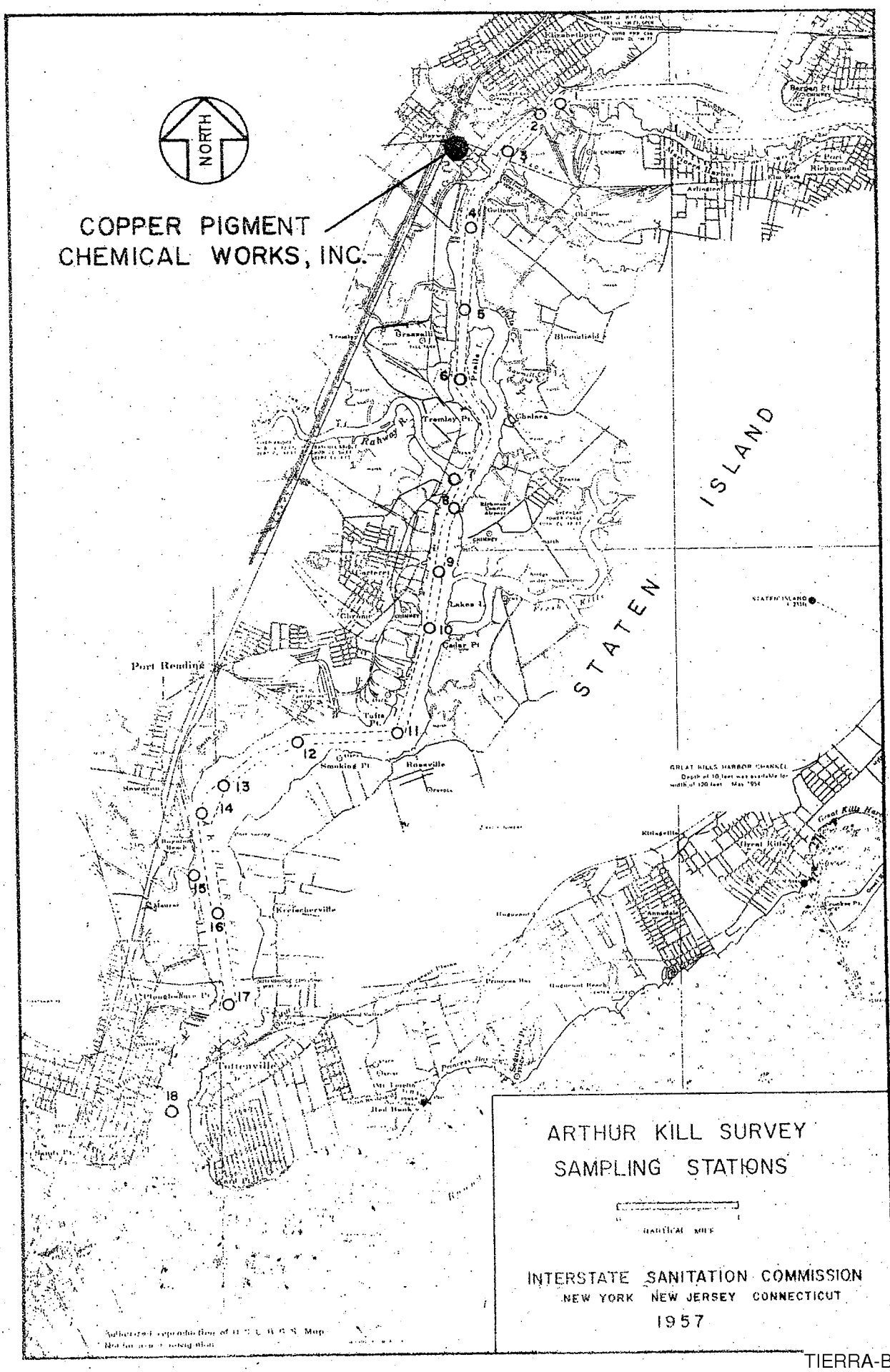
PLANT: Copper Pigment Chemical Works, Inc.

LOCATION: Bayway Ave., Elizabeth, N.J.
North side of Bayway Ave. bordered by
Replaced Bayway Ave., Bayway Ave. and
the N.J. Turnpike.

Located to the south of this plant on Bayway Ave. an old 66" brick non-intercepted sewer flows easterly to a 72" brick sewer which terminates at the foot of Bayway Ave. at the Arthur Kill. At present this plant discharges approximately 2000 gpd of filter wash water from their processing units. The discharge is to an open ditch which runs to the north side of their property. This discharge is trapped in this ditch due to the high embankment which forms the roadbed for Replaced Bayway Ave. All sanitary waste from this plant is connected to the 66" sewer on Bayway Ave. With very little effort the industrial waste discharge could be diverted to the Bayway Ave. sewer line. The final disposal of this waste depends on evaporation and ground absorption. Plans which are being prepared by the City of Elizabeth call for the construction of a new 8" intercepted sewer line which will divert all the flow to the Elizabeth Joint Meeting Treatment Plant.

1/7/65
FG:fd


Central Railroad of New Jersey
COPPER PIGMENT CHEMICAL WORKS INC.
200 GPD
Open Ditch
MARSHLAND
RESTORATION
B & O R R
15" R.C.
18" R.C.
BURLINGTON AVE.
8" Sanitary
Proposed Sewer
Proposed Street
Sewer Not Intercepted
17-64

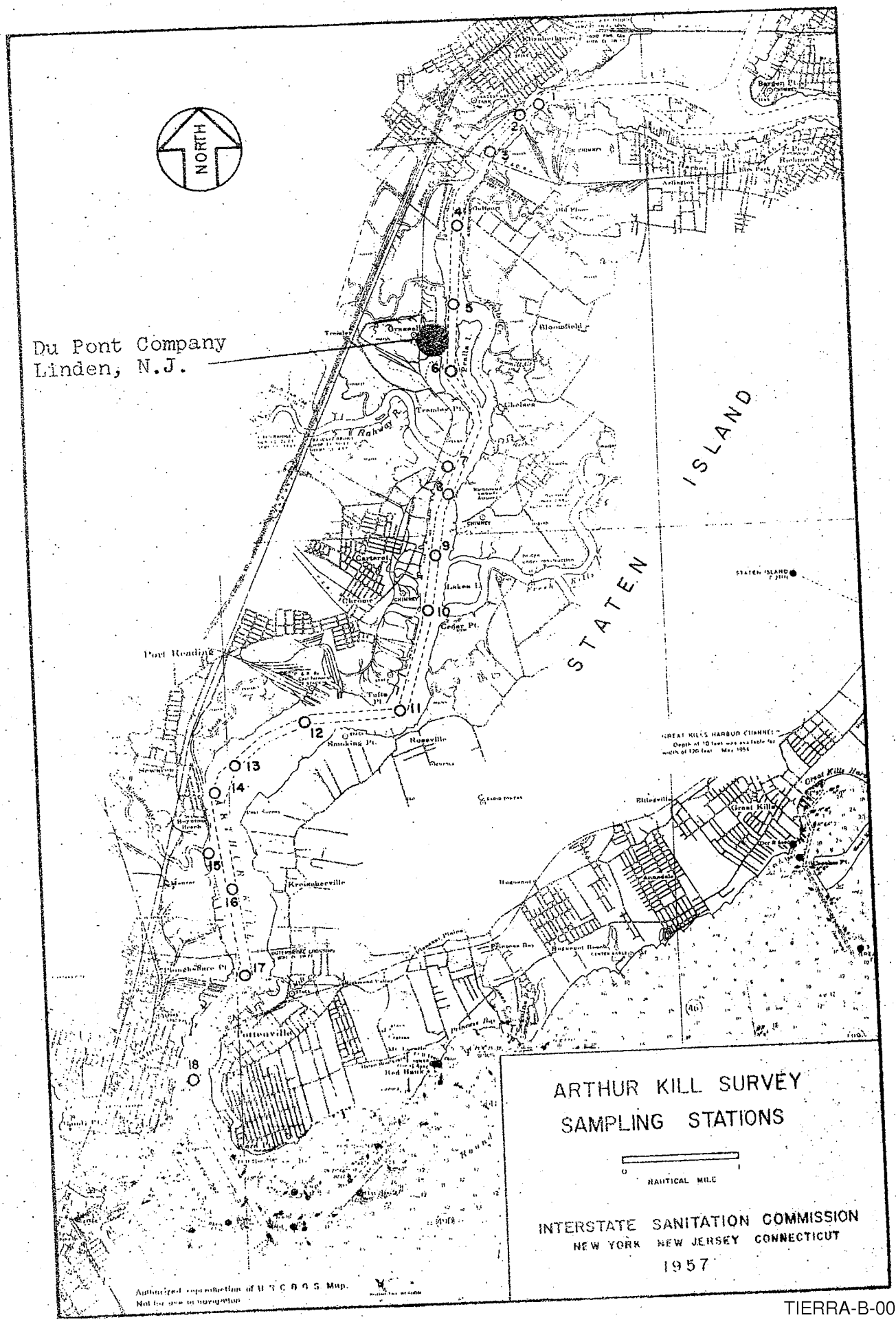

NORTH
COPPER PIGMENT
CHEMICAL WORKS, INC.
STATEN ISLAND
Port Reading
Tremley Pt.
Cedar Pt.
Tufts Pt.
Smoking Pt.
Rahway R.
GREAT KILLS HARBOR CHANNEL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

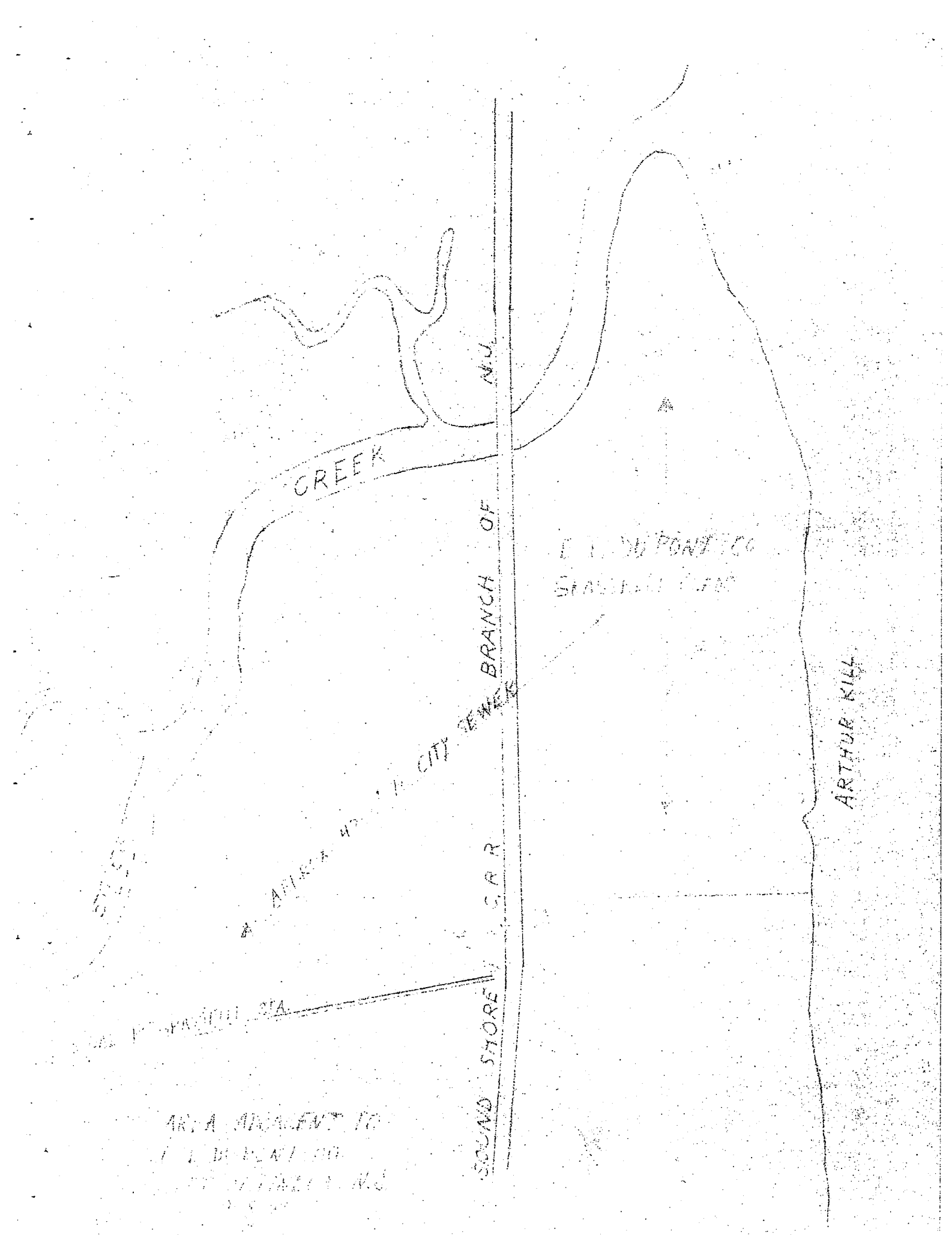
PLANT: E.I. Du Pont De Nemours & Co.

LOCATION: North off the Grasselli Station Road, Linden, N.J.

This plant which is located adjacent to the Arthur Kill in the Grasselli Station section of Linden, N.J. has no available City sewers. Due to the absence of a City sewer in this area it would be necessary to pump the waste approximately 4800 ft. to the nearest sewer main. Our Industrial Waste Survey indicates that through their 7 outfall pipes and several outlets from septic tanks an approximate 6.4 mgd discharges directly to the Arthur Kill.

1/7/65
FG:fd


NORTH
Du Pont Company
Linden, N.J.
STATEN ISLAND
Port Reading
Great Kills
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

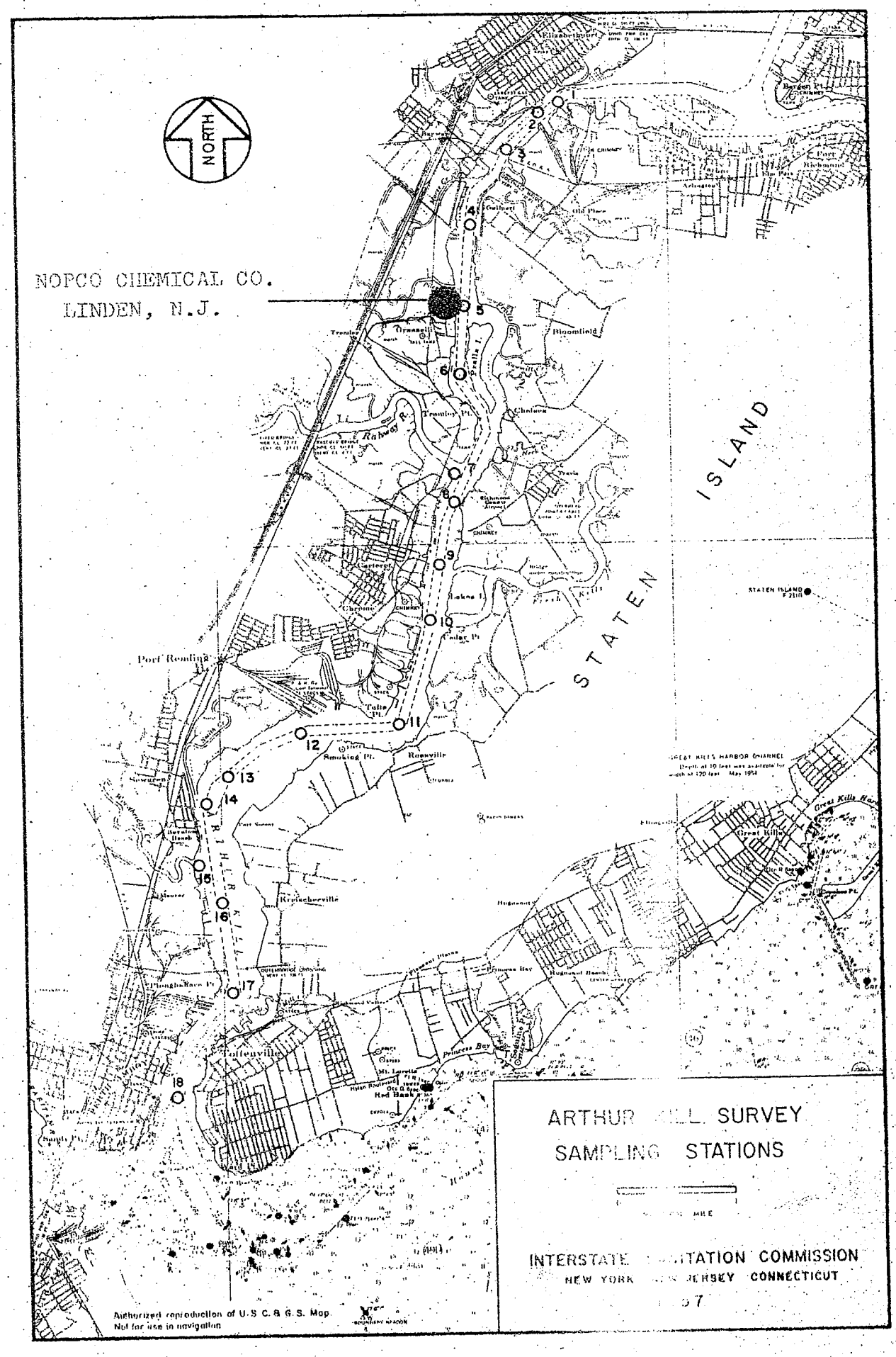

CREEK
N.J.
OF
BRANCH
SECOND SHORE
C.R.R.
ARTHUR KILL

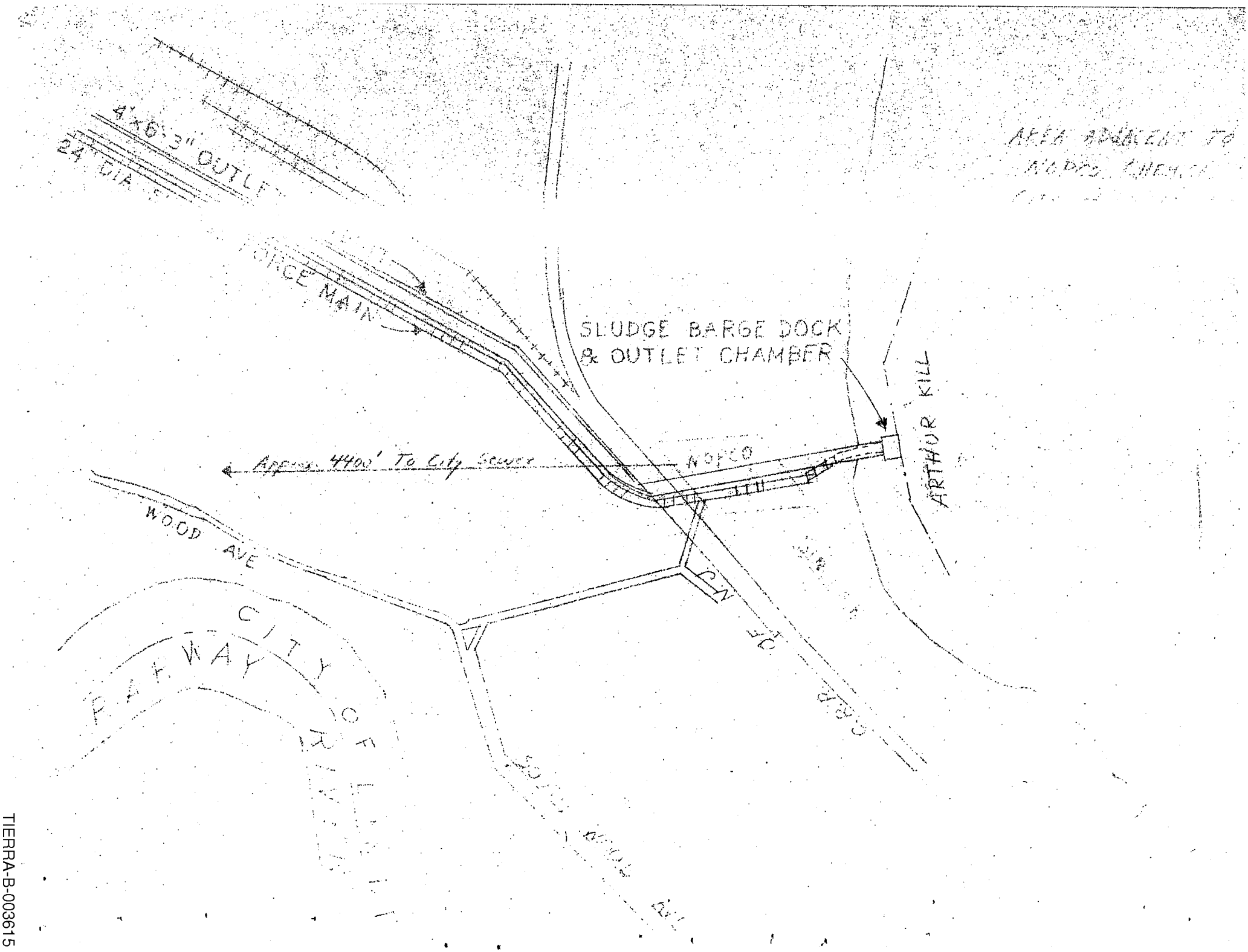
PLANT: Nopco Chemical Company

LOCATION: Near the end of South Wood Ave., Linden, N.J.

This plant which is situated between General Aniline Co. and Sinclair Oil properties on the easterly side of South Wood Ave., Linden, N.J.is in an area which has no available City sewers. In order for the industrial waste discharge from this plant to be diverted to a City sewer the waste would have to be pumped approximately 4400 ft. to the nearest sewer line. Since our Industrial Waste Survey, Nopco has vacated the premises and the buildings are now vacant.

1/7/65
FG:fd


NORTH
NOPCO CHEMICAL CO.
LINDEN, N.J.
STATEN ISLAND
Port Reading
Tottenville
Great Kills
Bloomfield
Chelsea
Rossville
Princess Bay
Red Bank
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
Authorized reproduction of U.S.C.&G.S. Map
Not for use in navigation

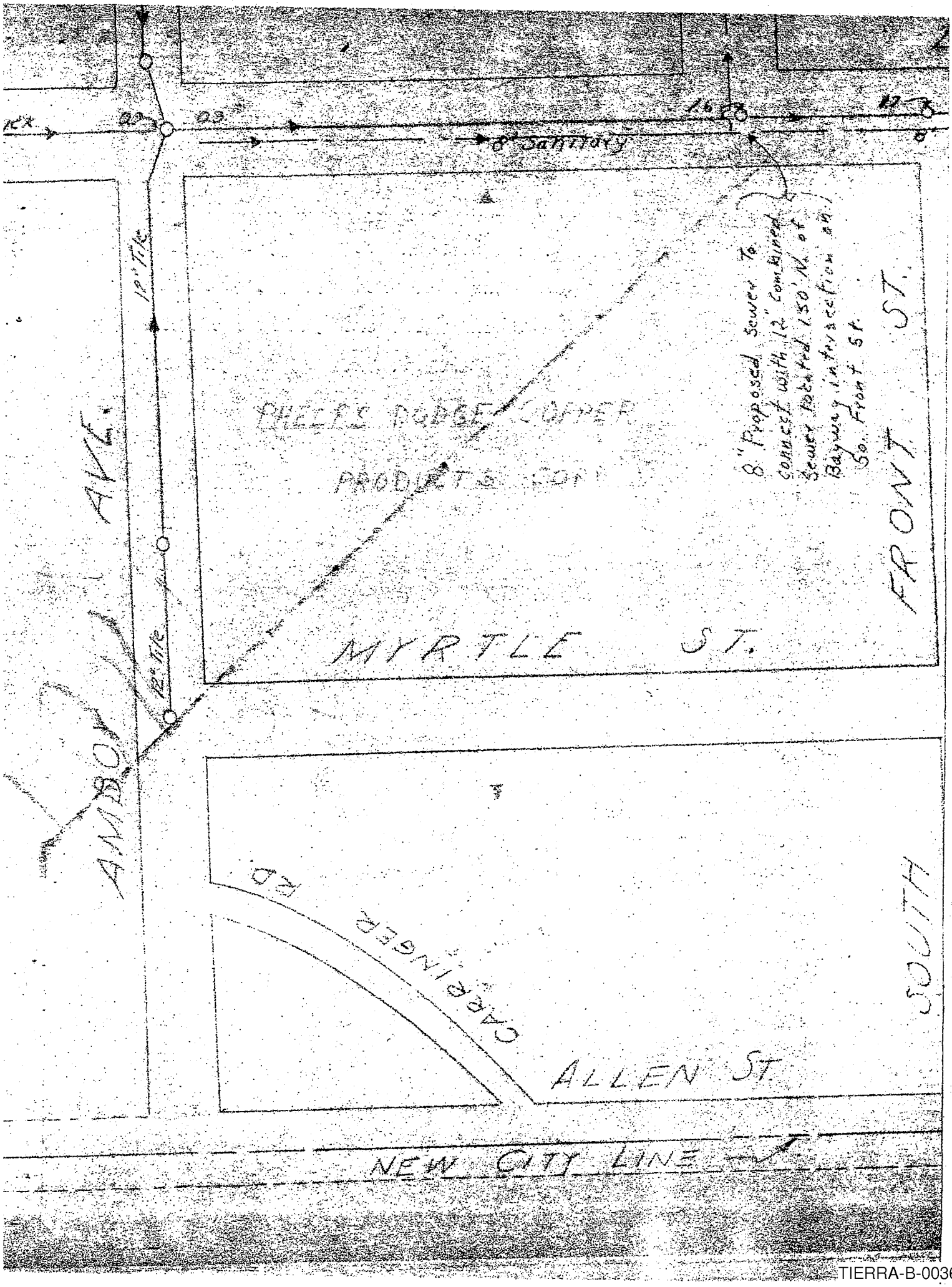

4'x6'-3" OUTLET
24" DIA
FORCE MAIN
SLUDGE BARGE DOCK
& OUTLET CHAMBER
ARTHUR KILL
Approx. 4400' To City Sewer
NOFCO
WOOD AVE
CITY
PARKWAY

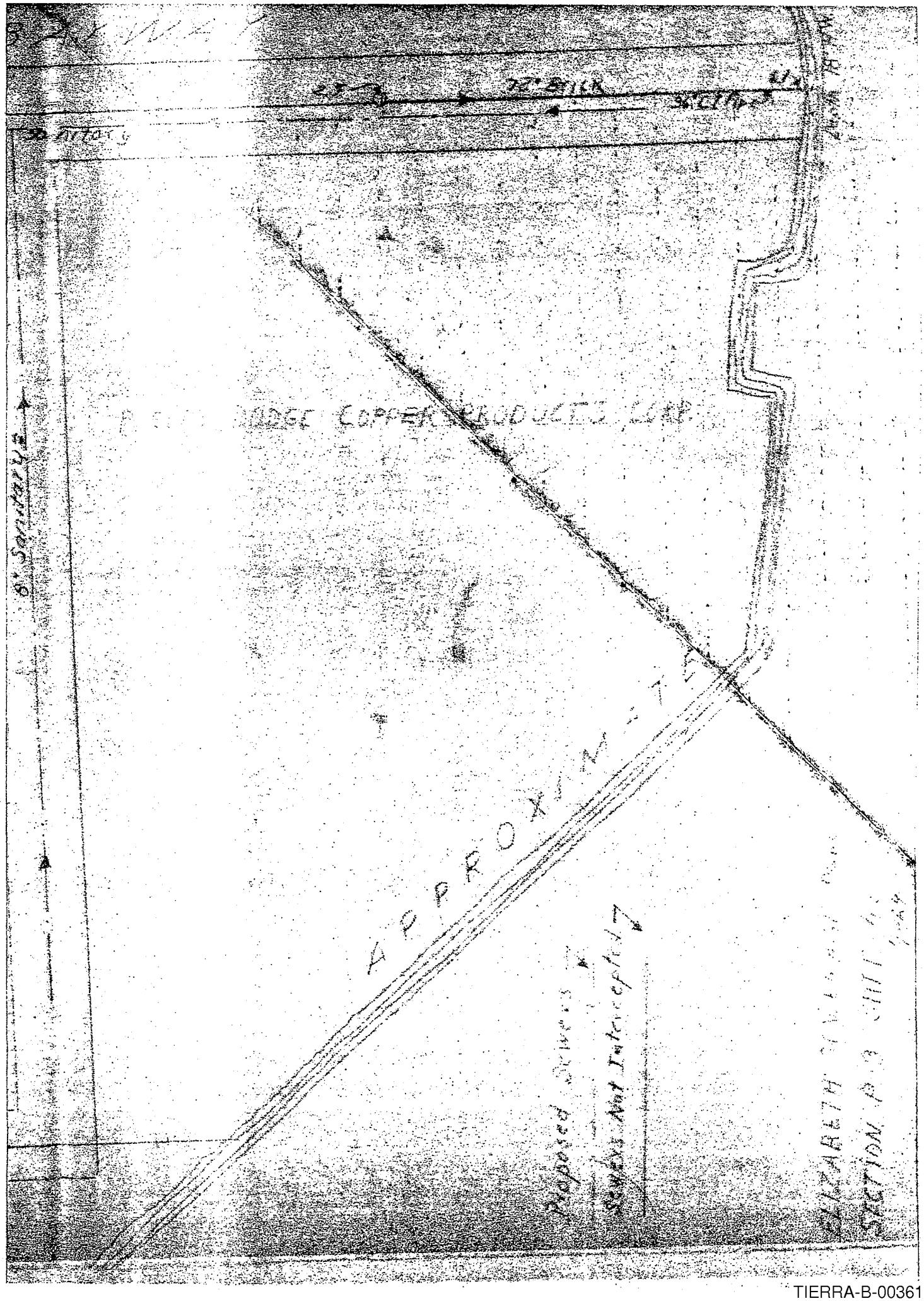
PLANT: Phelps Dodge Copper Products Corp.

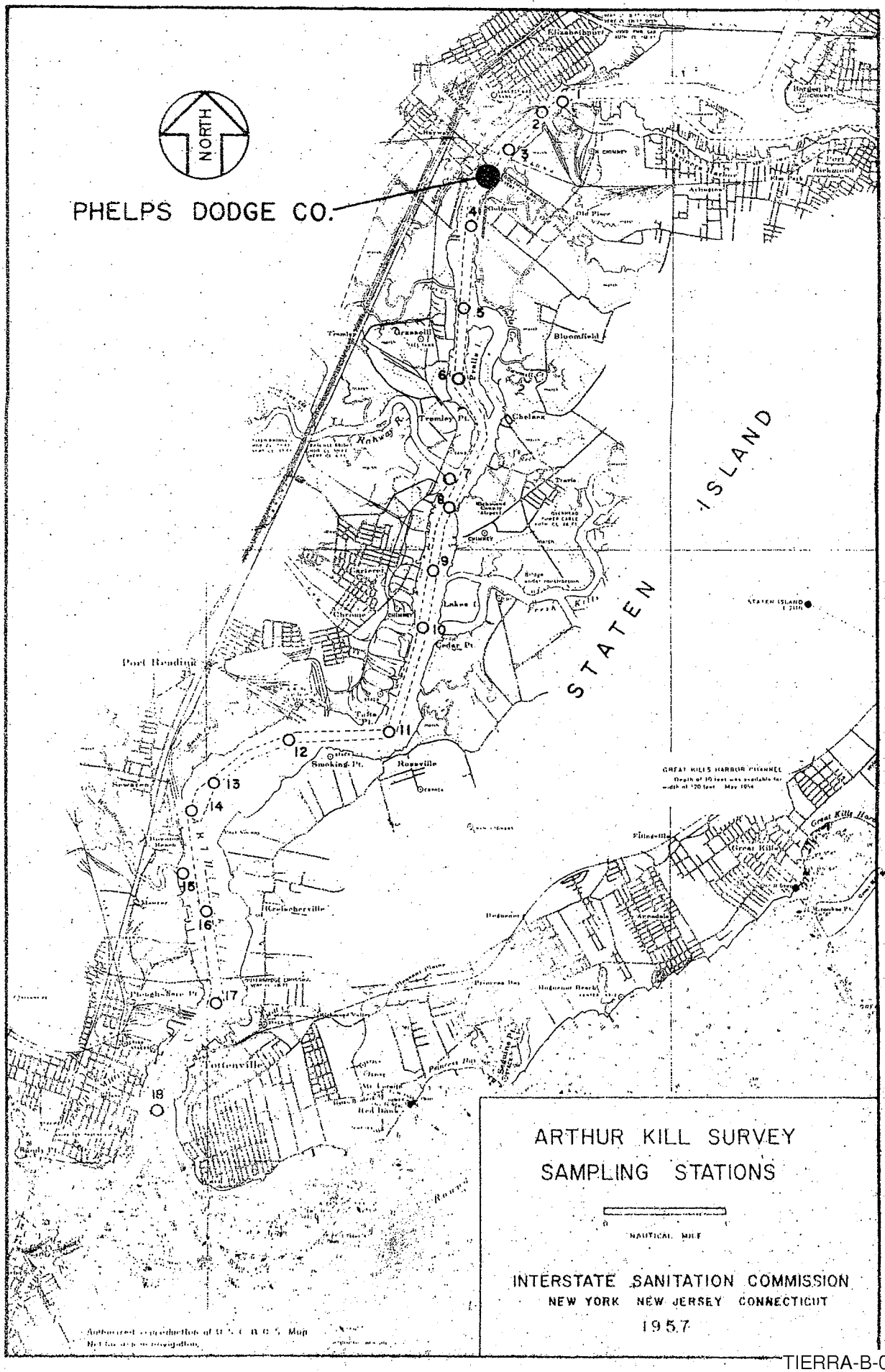
LOCATION: Bayway, Elizabeth, N.J.

The numerous buildings which are operated by Phelps Dodge Copper Products Corp. are bordered on the north by Bayway Avenue, on the east by the Arthur Kill, on the south by the city line of Elizabeth and on the west by Amboy Avenue. This compound of buildings is divided by South Front Street and Myrtle Street which are improved city streets. Running in a northerly direction on Amboy Avenue from Myrtile to Bayway Avenue is a 12" sewer that discharges to the 72" brick sewer on Bayway Avenue. This sewer at present is not intercepted and discharges directly to the Arthur Kill at the foot of Bayway Avenue. The City of Elizabeth has plans for construction of a proposed 8" sanitary sewer on South Front Street and Bayway Avenue which will be intercepted and the entire flow diverted to the Elizabeth Joint Meeting Treatment Plant. Our Joint Industrial Waste Survey indicates that approximately 350,000 gpd of city water and 1.3 mgd of Arthur Kill water is used daily by this plant and is discharged directly to the Arthur Kill.

1/7/65
FG:k


8" Sanitary
12" Tile
12" Tile
8" Proposed Sewer To Connect with 12" Combined Sewer located 1,150' N. of Bayway Interceptor on So. Front St.
PHELPS DODGE COPPER PRODUCTS CORP.
AVE.
AMBOY
MYRTLE ST.
FRONT ST.
SOUTH
CARLINGER RD.
ALLEN ST.
NEW CITY LINE


APPROXIMATE
Proposed Sewers
Sewers And Interceptors
SECTION P 3

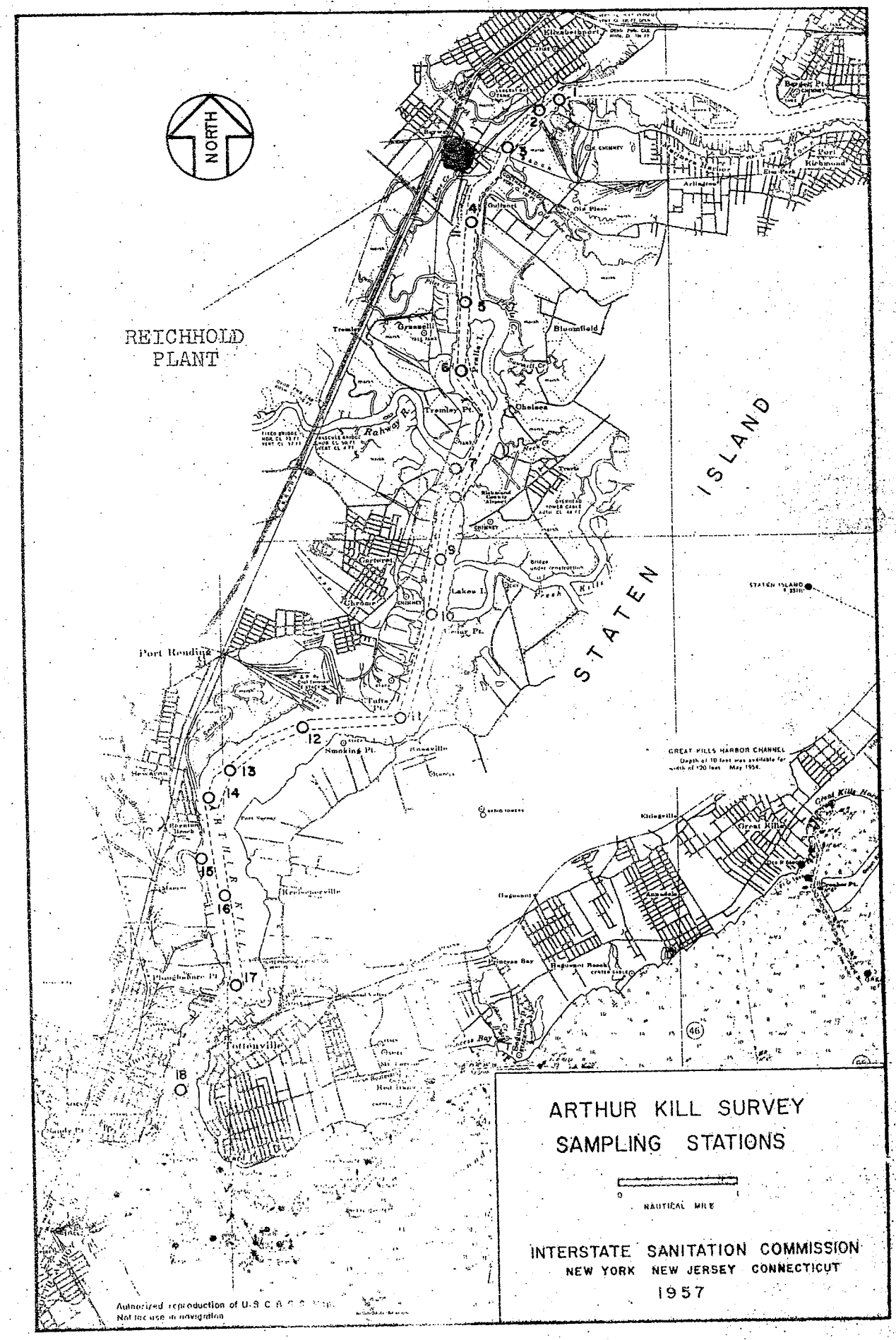

NORTH
PHELPS DODGE CO.
STATEN ISLAND
Elizabethport
Bayway
Port Reading
Tremley Pt.
Bloomfield
Cedar Pt.
Smoking Pt.
Rossville
Great Kills
Flushing
Tottenville
Red Bank
Princess Bay
Hoffman Beach
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

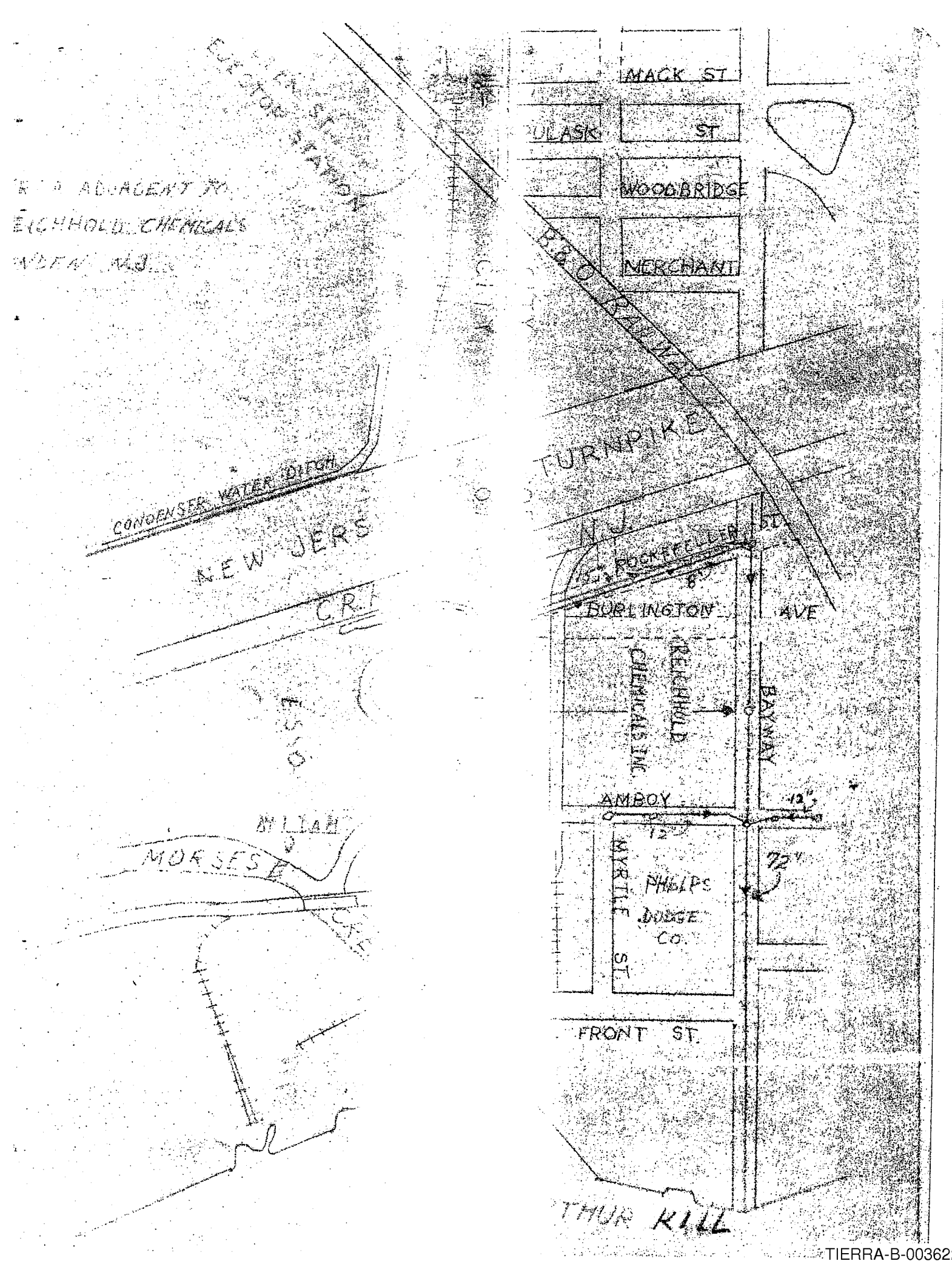
PLANT: Reichhold Chemicals, Inc.

LOCATION: 726 Rockefeller Street, Elizabeth, N.J.

This plant is located in both the City of Elizabeth and the City of Linden, N.J. All buildings in this group are bordered on the North by Bayway Ave., on the East by Amboy Ave. and on the West by the Central Railroad of N.J. tracks in the City of Elizabeth. That section which is in the City of Linden has as its southerly perimeter a leg of Morses Creek. On Rockefeller St. which was a city street but now privately owned by Reichhold has a 15" and 8" City owned sewer which starts at the City Line of Elizabeth and runs northerly to Bayway Ave. where it connects with the 72" brick non-intercepted Bayway Ave. sewer whose outfall terminus is at the Arthur Kill. The 12" City sewer located on Amboy Ave., an improved City St. and the 72" brick sewer on Bayway Ave. can also be used for the collection of all of the waste discharges which now go directly to the small leg of Morses Creek. Plans are being prepared by the City of Elizabeth to construct a new 8" sewer in this area which will divert all the flow to the Elizabeth Joint Meeting Treatment Plant. At present our records indicate that approximately 465,000 gpd and 225,000 gpd discharge to Morses Creek.

1/7/65
FG:fd


NORTH
REICHHOLD PLANT
STATEN ISLAND
Port Reading
Tremley Pt.
Chelsea
Bluemfield
Cartaret
Lakes I.
Tufts Pt.
Smoking Pt.
Hassville
Kilmaville
Great Kills
Hylanville
Tottenville
Arthur Kill
Rahway R.
Kill
GREAT KILLS HARBOR CHANNEL
1
2
3
4
5
6
7
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957
Authorized reproduction of U.S. C.&G.S.
Not for use in navigation

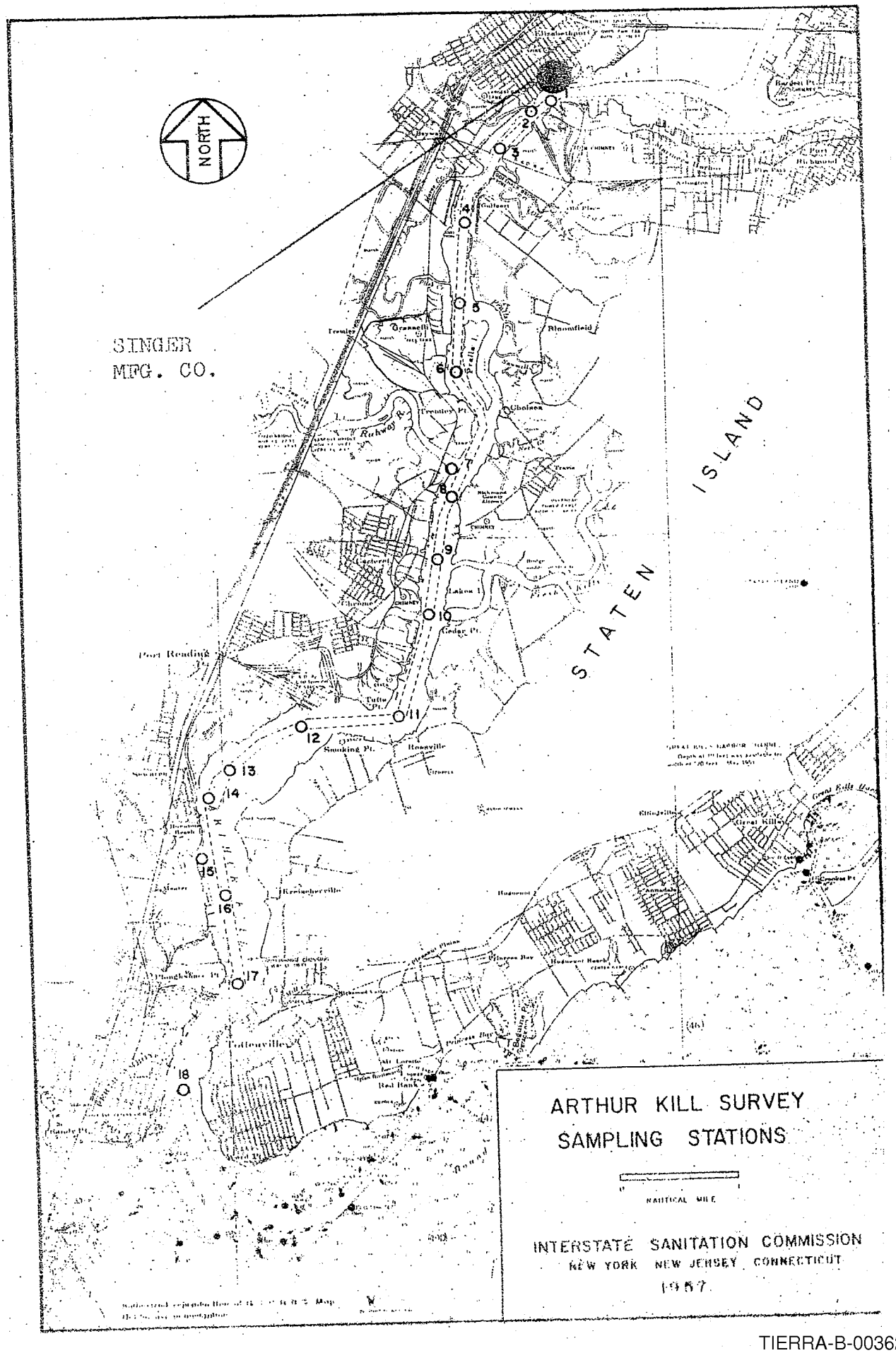

MACK ST
ST
WOODBRIDGE
MERCHANT
TURNPIKE
CONDENSER WATER DITCH
NEW JERS
CR.
MORSES
N.J.
ROCKEFELLER
BURLINGTON
AVE
CHEMICALS INC.
BAYWAY
AMBOY
MYRTLE ST.
PHELPS DODGE CO.
FRONT ST.
THUR KILL

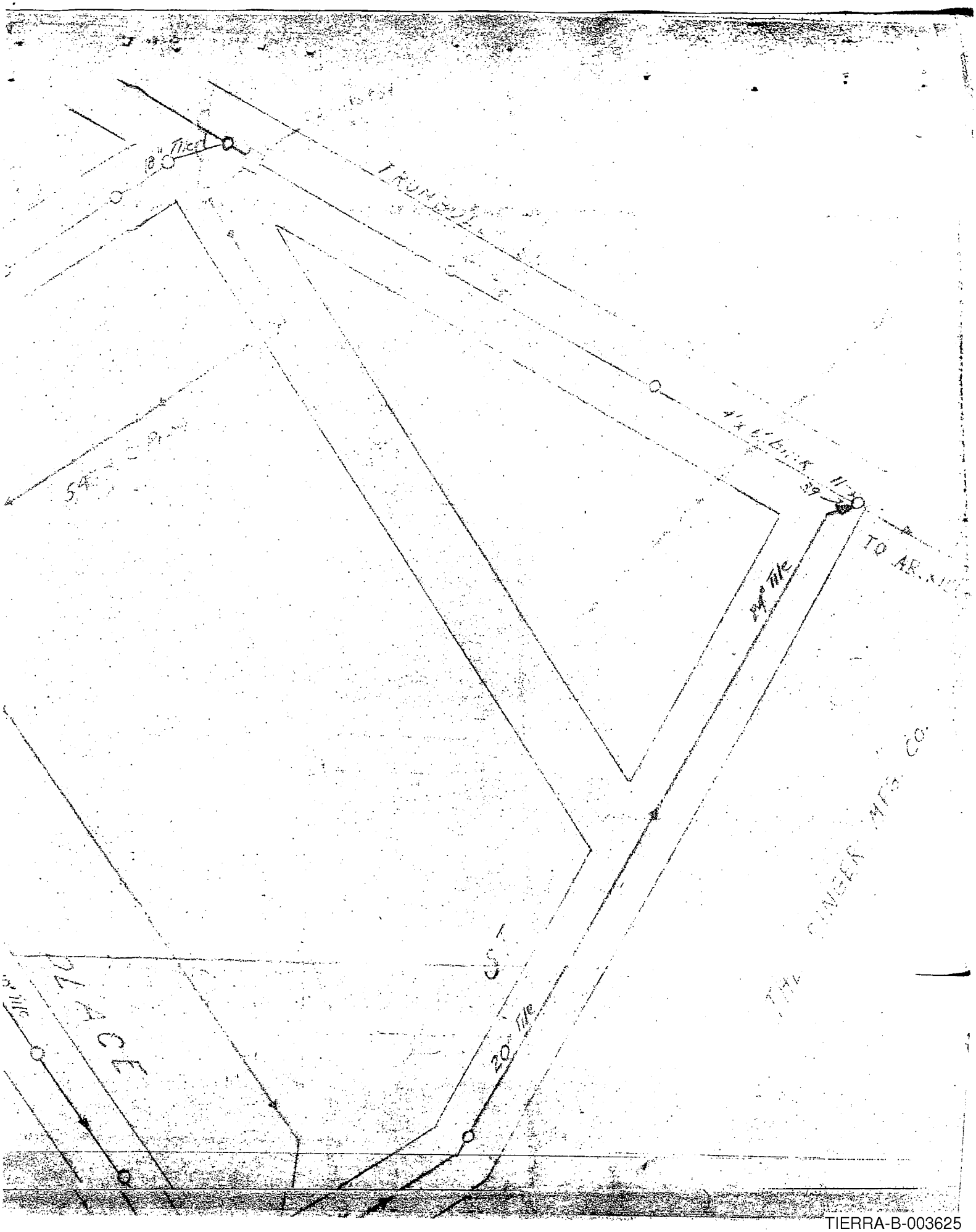
PLANT: Singer Company

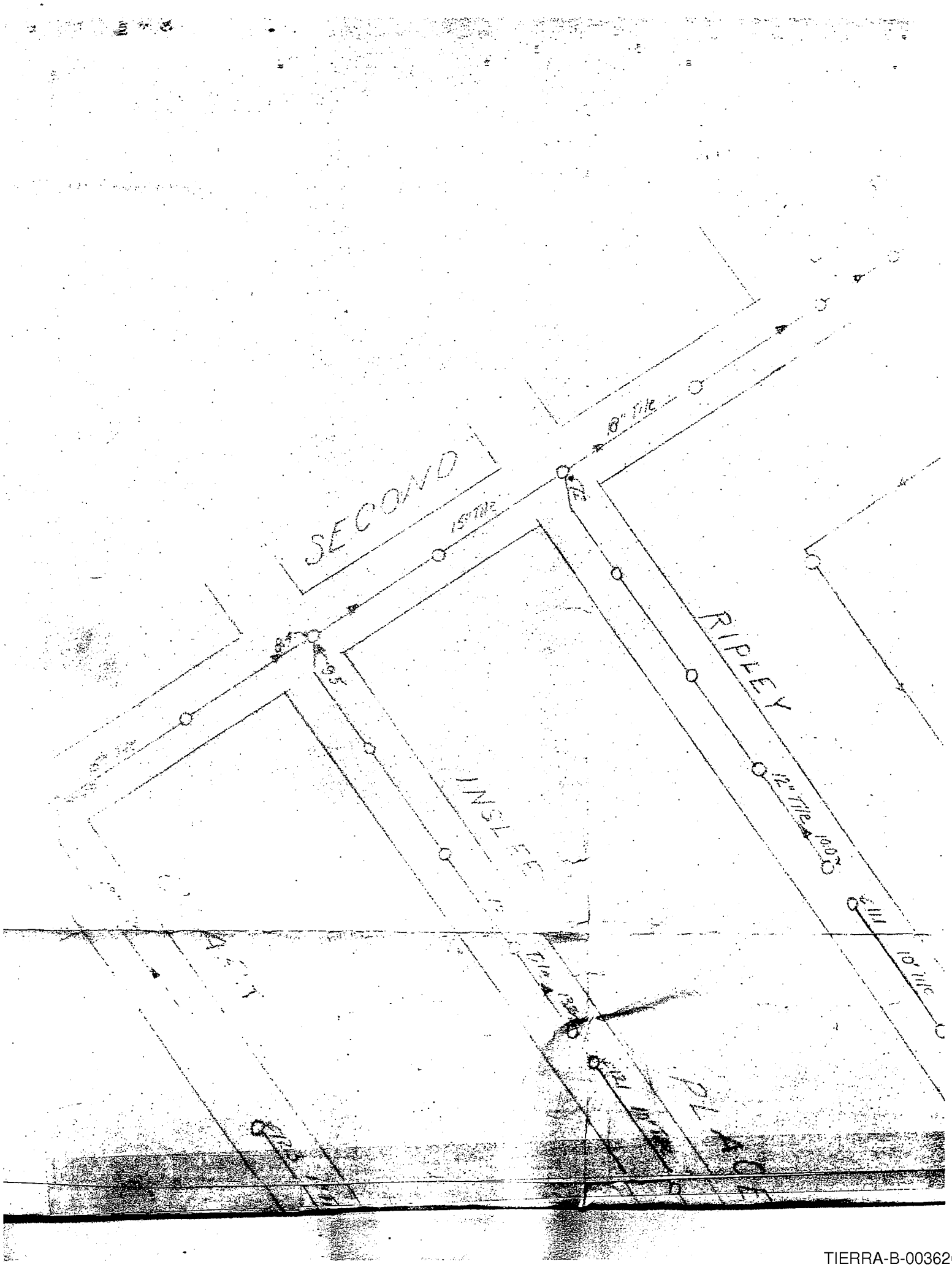
LOCATION: Foot of Trumbull St., Elizabeth, N.J.

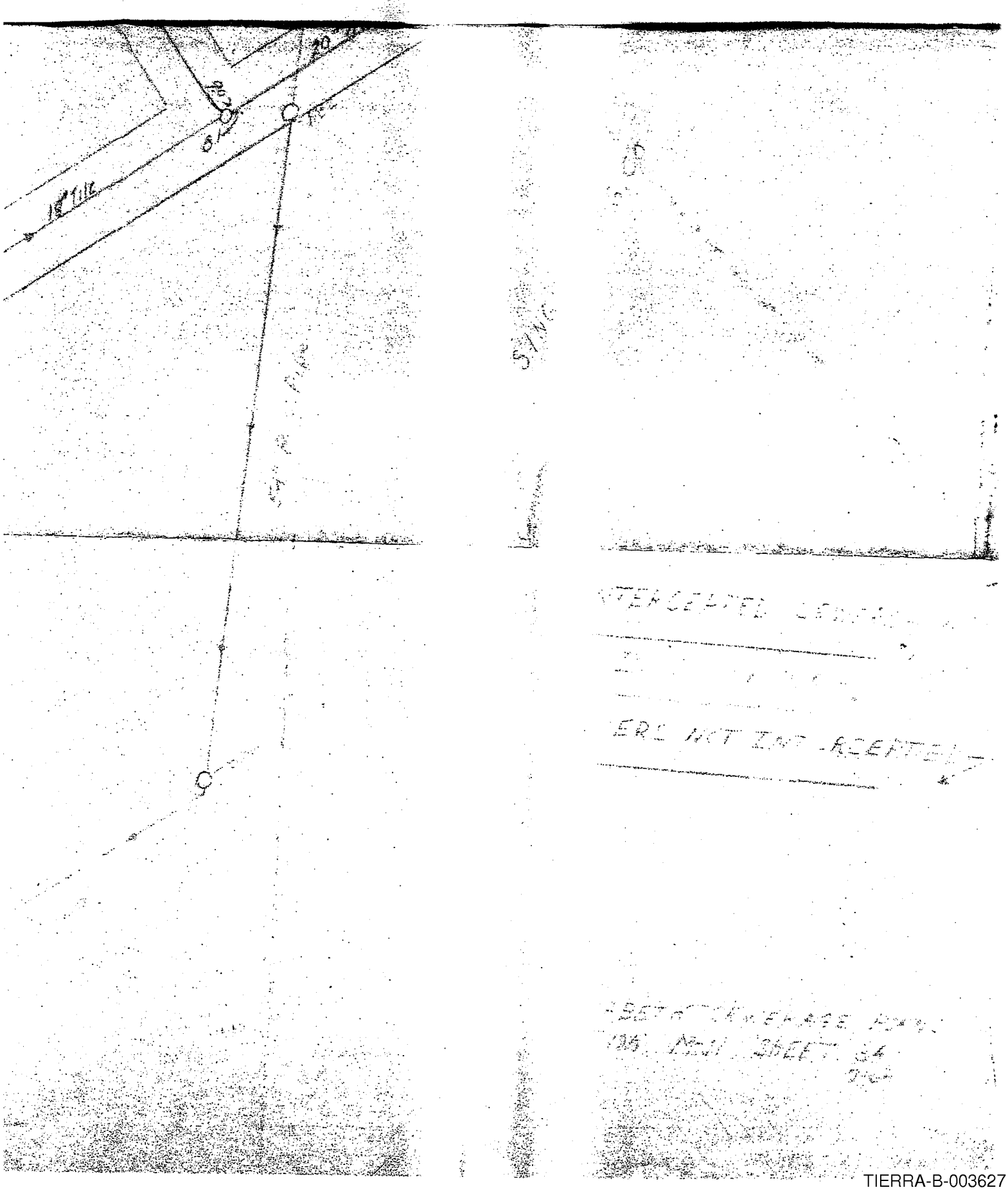
All buildings of this corporation are located in the City of Elizabeth and border on the north side of Trumbull Street and on the east side of First Street between Port Avenue and Trumbull Street. The six outfalls which now discharge directly to the Arthur Kill could be intercepted and by using a lift station the flow could be pumped directly to the 54" interceptor which crosses the parking field east of First Street and flows to the Elizabeth Joint Meeting Plant. This problem could also be resolved by using the existing city sewers on First Street and Trumbull Street, all of which are large enough to handle the flow. If this second alternative were used the 4' x 6' brick sewer on Trumbull Street would still have to be intercepted, as this sewer is not intercepted east of Second Street. Likewise, the laterals on Clark Place, Inslee Place, Ripley Place which flow to the First Street sewer that connects with the Trumbull Street sewer at the intersection of First and Trumbull Streets are not intercepted. At the present time, our Industrial Waste Survey indicates that approximately 1,548,950 gd discharge directly to the Arthur Kill.

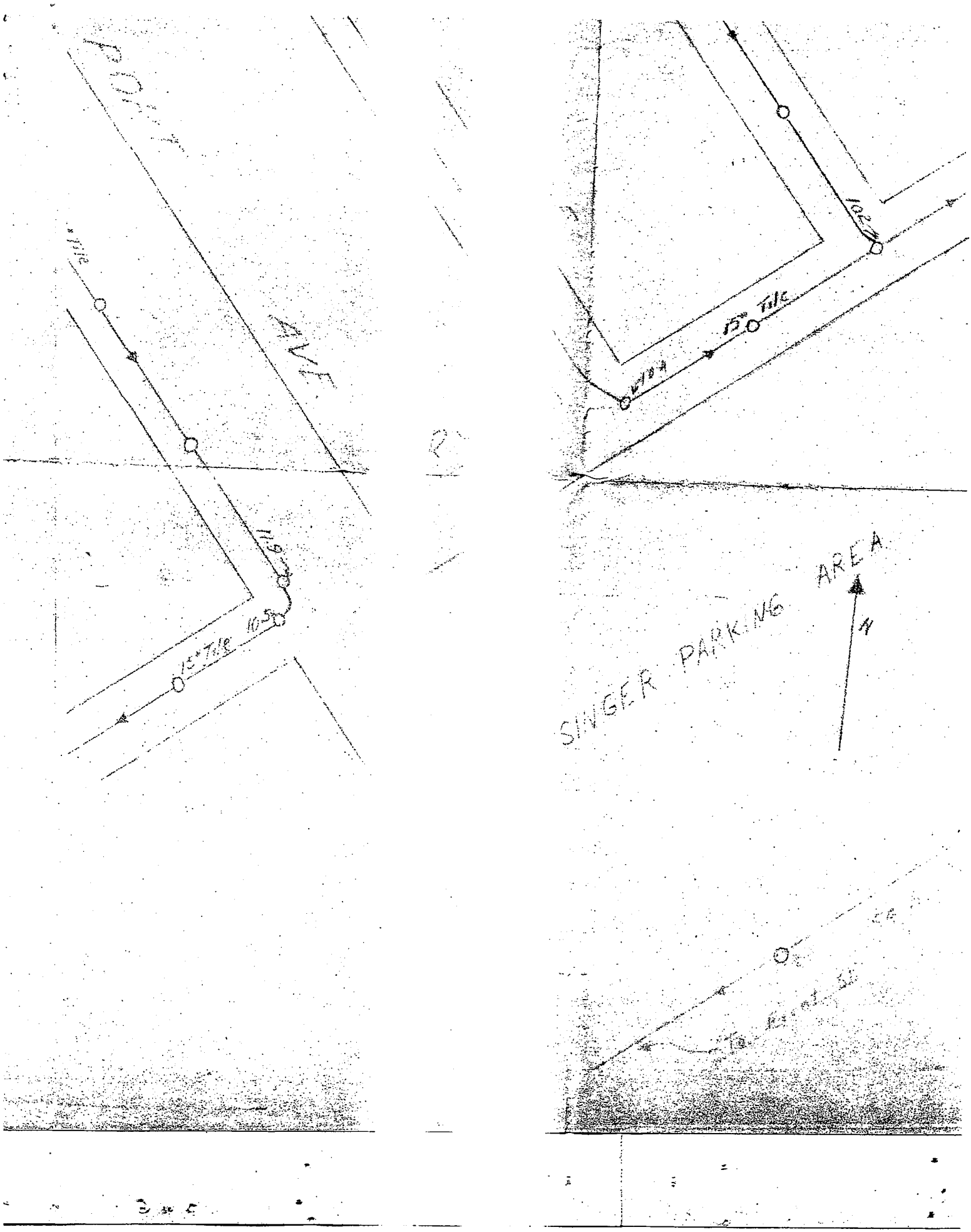
1/7/65
FG:k


NORTH
SINGER
MFG. CO.
STATEN
ISLAND
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Port Reading
Smoking Pt.
Roosevelt
Tottenville
Great Kills
Bloomfield
Cholsea
Tremley Pt.
Cedar Pt.
Tuttle Pt.
Red Bank
Rossville
Richmond
Rahway Pt.
Great Kills Harbor
Rhodesville
Hudson Pt.
Hudson Beach
Princess Bay
Pleasant Plains
Arthur Kill
Raritan Bay
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


TRUMBULL
TO AR
THE PIONEER MTG CO
PLACE
30 Tile


SECOND
RIPLEY
INSLEE
18" Tile
15" Tile
12" Tile
10" Tile


20
8
18
5
INTERCEPTED
ERS NOT INTERCEPTED


AVE
SINGER PARKING AREA

CONCLUSION:

After carefully reviewing the City of Elizabeth's sewer maps and verifying the sizes of the laterals and sewer mains with their present flows, it is reasonable to expect that this added flow would not over tax the present system. With the additional new sewer construction and interceptor which is being planned by the City of Elizabeth to eliminate the pollution from the Bayway Avenue section of Elizabeth, all direct discharges to the Arthur Kill in this area could be abated. All of this additional industrial waste would be diverted to the main pumping station which is operated by the City of Elizabeth. This station which is located on Atlantic Street, Elizabeth, New Jersey has a designed capacity of approximately 85.0 MGD. The past year's daily average flow which was pumped at this station was 14.86 MGD (June 1963 through May 1964). The Elizabeth Joint Meeting Treatment Plant has a designed capacity of 100.0 MGD with a yearly daily average for 1964 of 54.4 MGD. The Linden-Roselle Treatment Plant is designed for 12.5 MGD and this plant had a yearly daily average of 10.2 MGD.

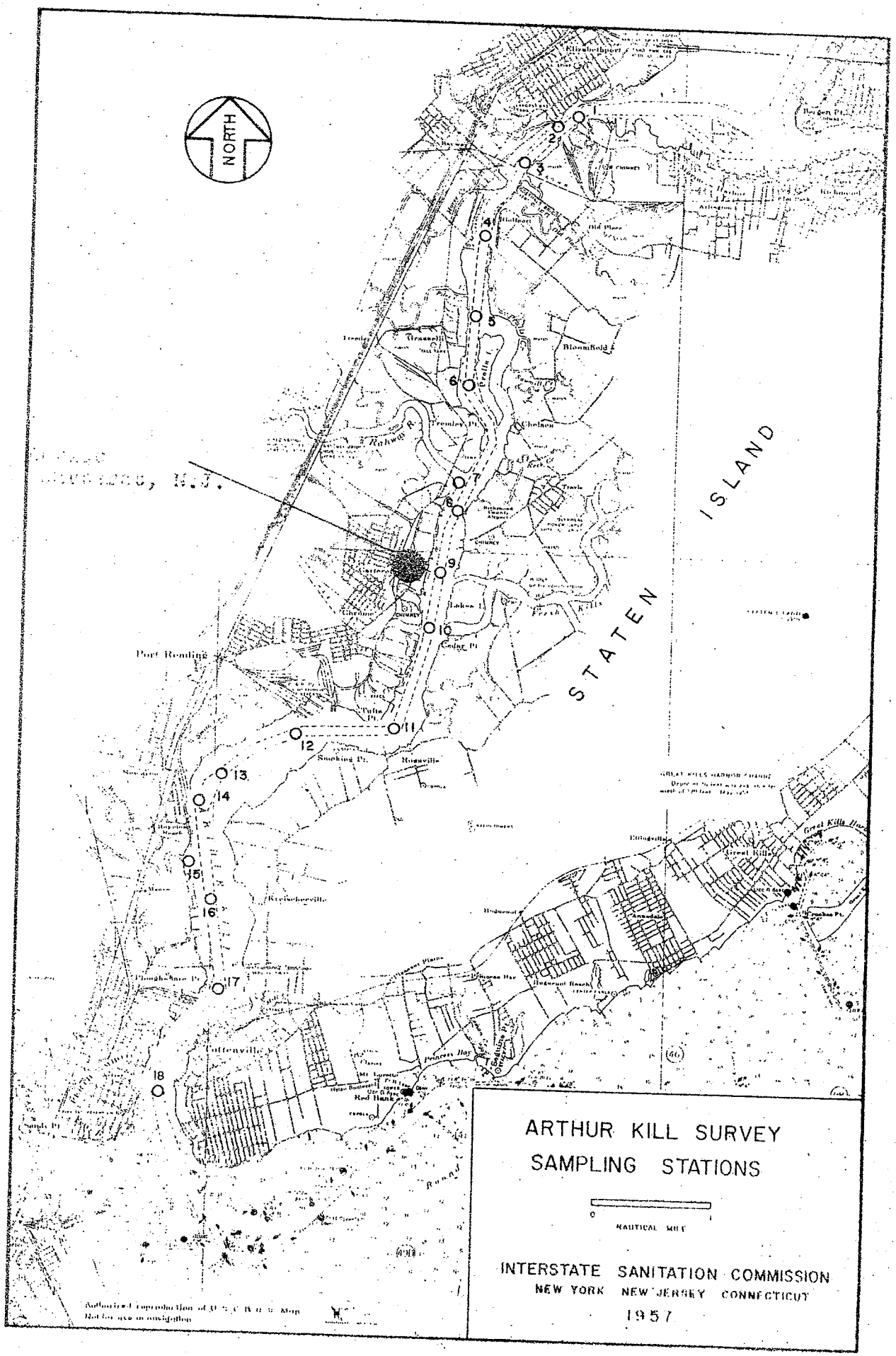
MIDDLESEX COUNTY

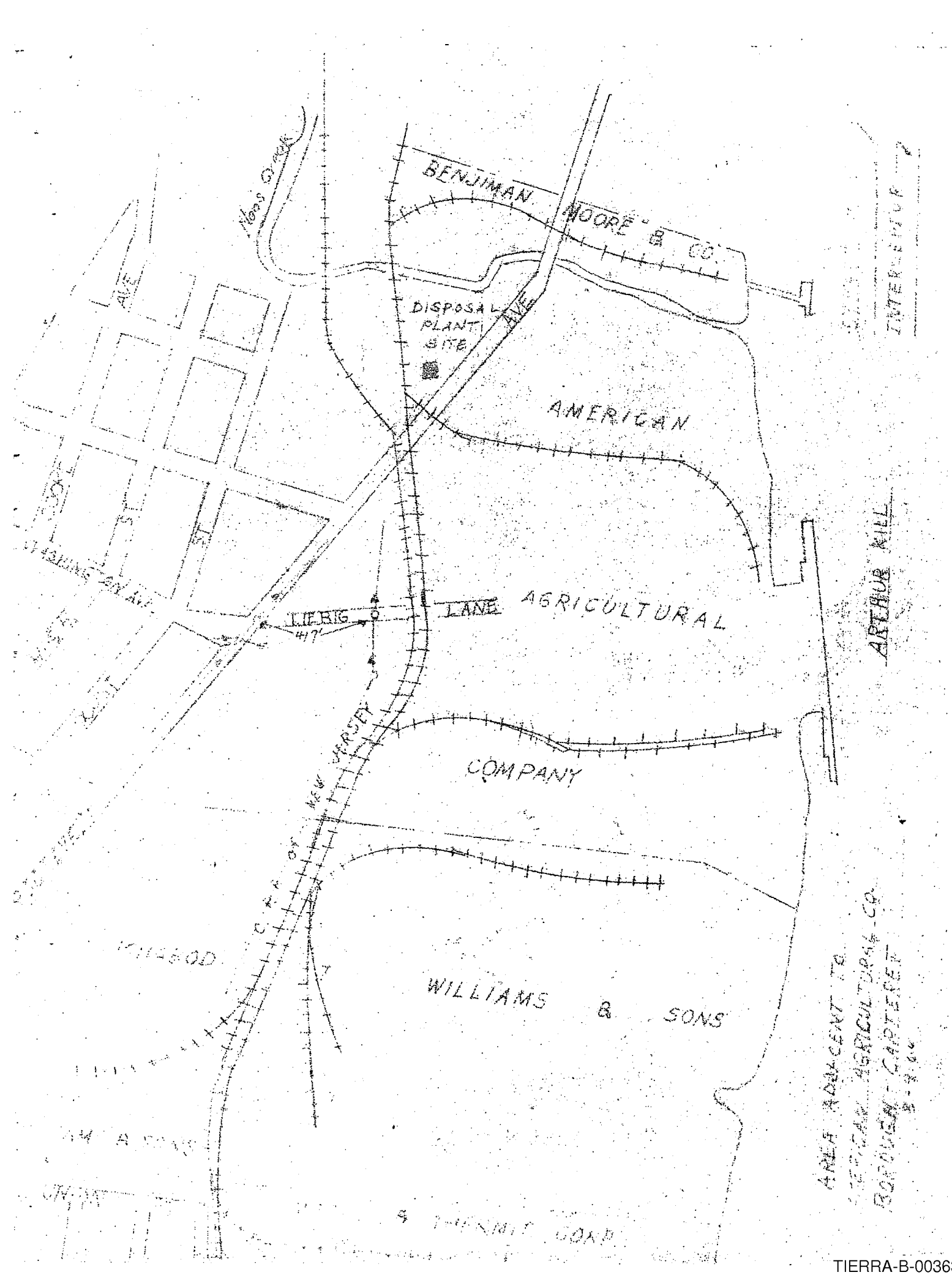
1.	Agrico Chemical Company	Carteret
2.	American Smelting & Refining Company,	Perth Amboy
3.	Armour Fertilizer Company	Carteret
4.	California Oil Company	Perth Amboy
5.	Foster Wheeler Company	Carteret
6.	General American Tank & Storage Co.,	Carteret
7.	Hess Oil Company	Perth Amboy
8.	Hess Oil Company	Port Reading
9.	Koppers Chemical Company	Port Reading
10.	Koppers Co. Creosoting Plant,	Port Reading
11.	Metal & Thermit Corp.	Carteret
12.	United States Metals & Refining Co.,	Carteret
13.	Westvaco Co. Food Machinery	Carteret

PLANT: American Agricultural Chemical Co.

LOCATION: End of Liebig Lane, Carteret, N.J.

This plant which is situated on the Arthur Kill and with its front property line approximately 500 feet east of Roosevelt Avenue and only 60 feet to the east of the Carteret interceptor could discharge its waste to either of the above mentioned sewer lines. The sizes of these lines could not be determined at the Borough Engineer's Office and due to the elevation of both lines, they could not be measured in the field. However from observing the flow through manholes, it can be estimated that the Roosevelt Avenue sewer is at least an 8" sewer flowing approximately one quarter full. The interceptor is estimated at approximately 24" and flowing less than one half full. Our Industrial Waste Survey indicates that this plant utilizes a combined (City and salt water) water consumption of 1,208,040 gpd of which an estimated 50,000 gpd discharges directly to the Arthur Kill.

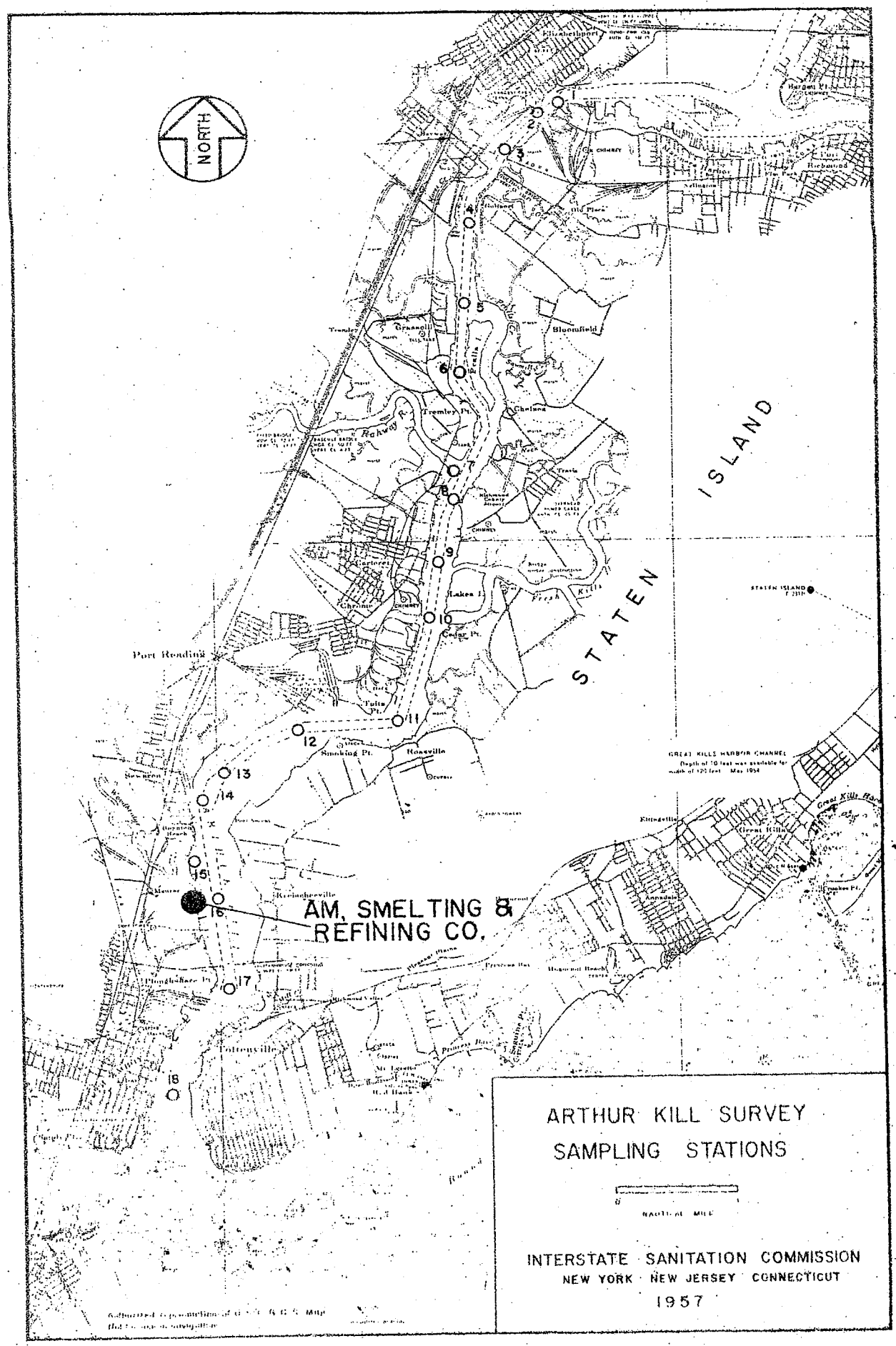

NORTH
STATEN ISLAND
Port Reading
Bloomfield
Cedar Pt
Smoking Pt
Rossville
Great Kills
Red Bank
Princess Bay
Cottenville
Kreischerville
Tremley Pt
Chelsea
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

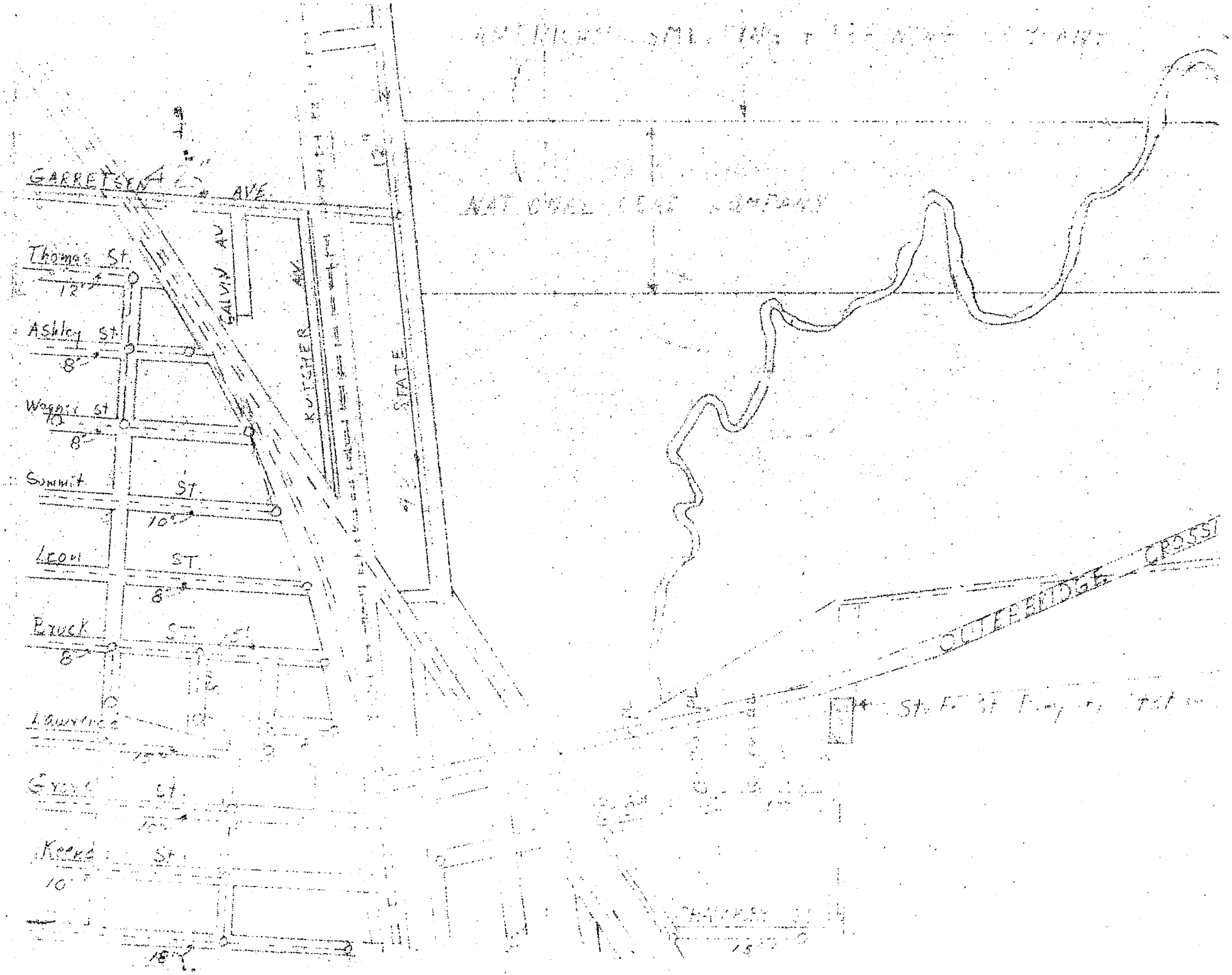

BENJIMAN MOORE & CO.
DISPOSAL PLANT SITE
AMERICAN
AGRICULTURAL
COMPANY
WILLIAMS & SONS
LANE
417'
ARTHUR KILL
INTERSTATE
AREA ADJACENT TO
AMERICAN AGRICULTURAL CO.
BENJIMAN - CARTERET

PLANT: American Smelting & Refining Company

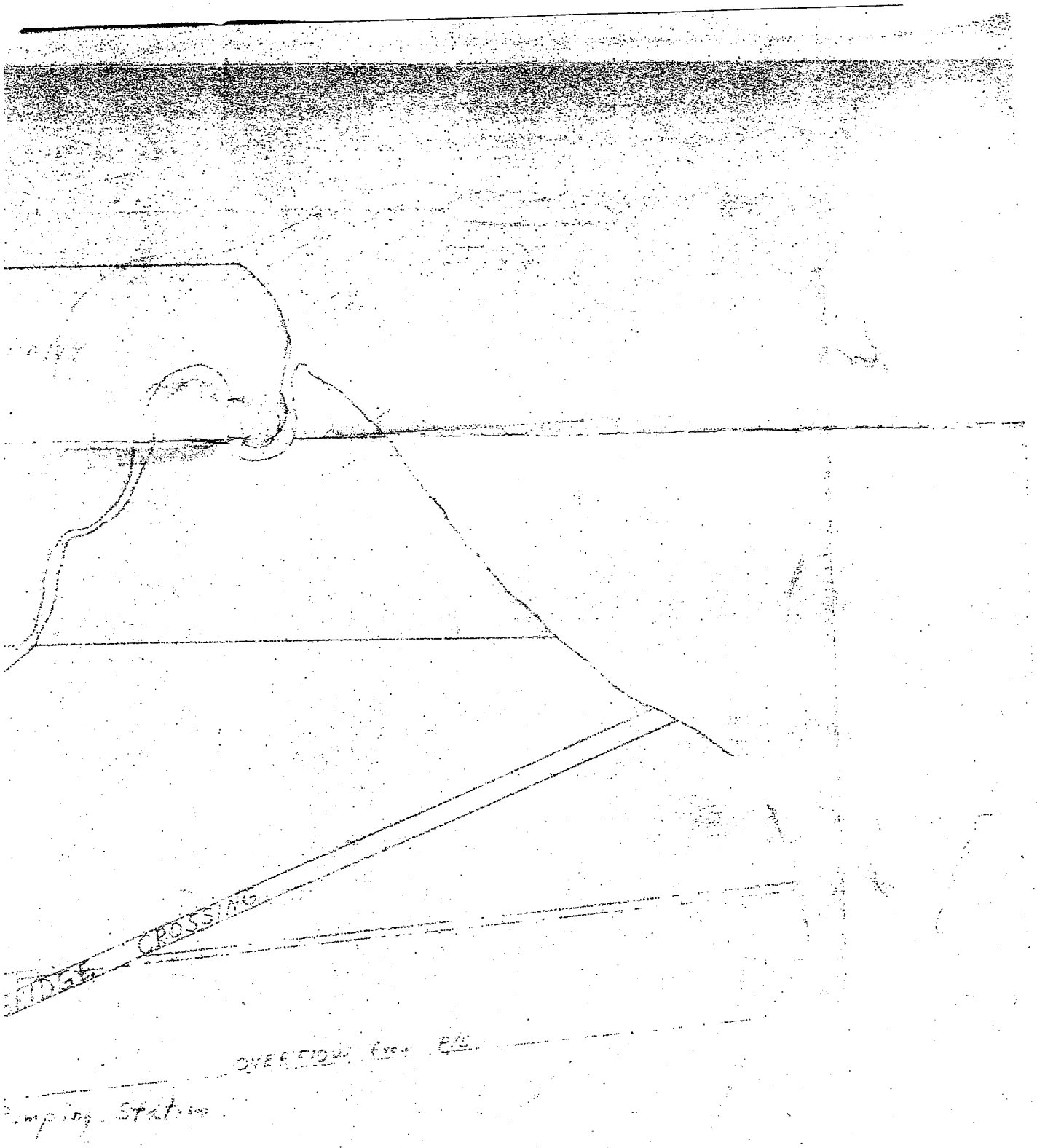
LOCATION: East Side of State Street, Barber Section, Perth Amboy, N.J.

This plant which is situated on the Arthur Kill and bound on the north by California Oil Company and on the south by National Lead Company, has the alternative of discharging its waste material to the 48" interceptor sewer or a 12" sewer which connects with the 48" interceptor at the intersection of State Street and Garretsen Avenue. This plant fronts on State Street. No information is available as to the volume and nature of their discharge to the Arthur Kill.





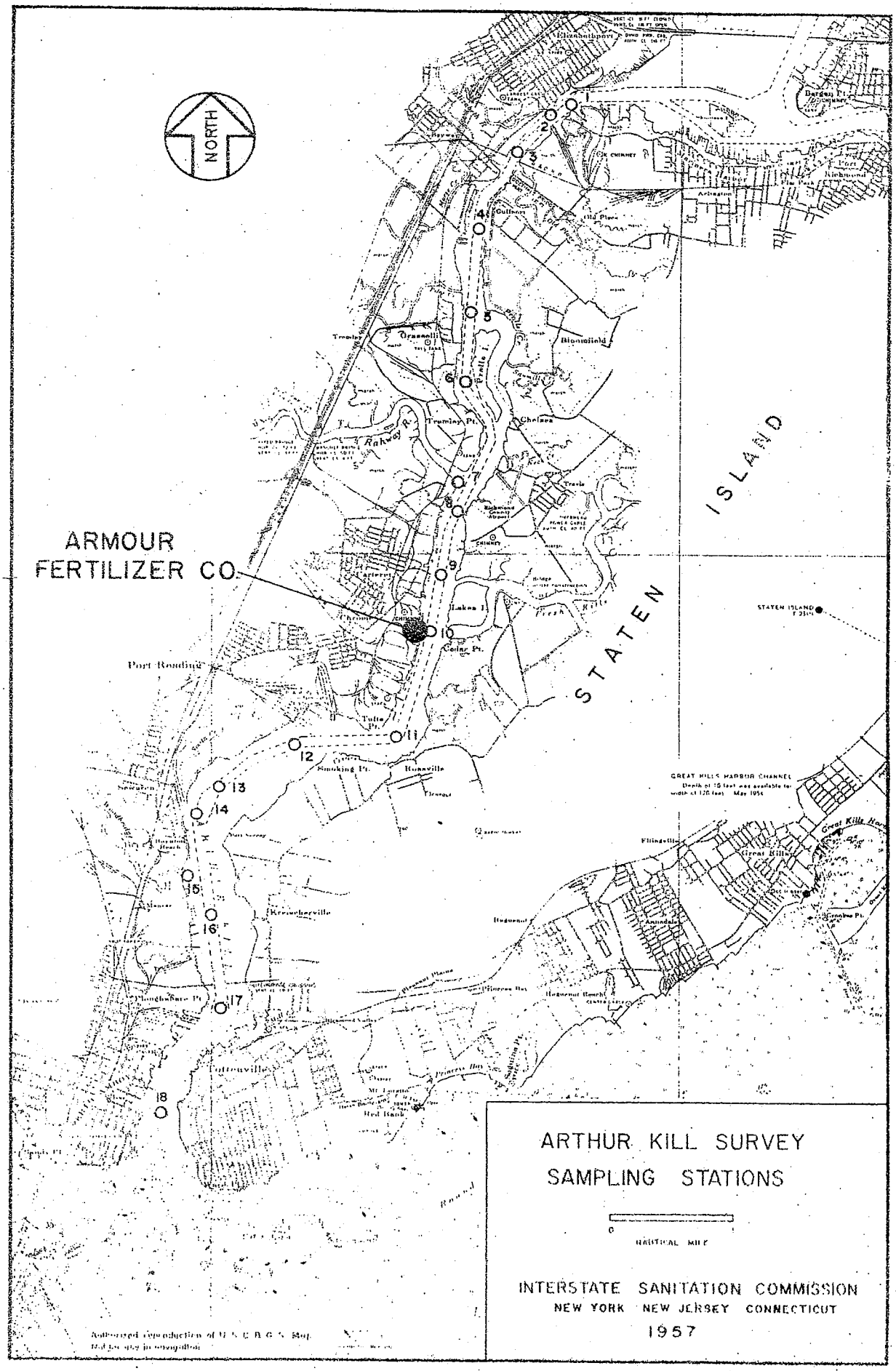
TIERRA-B-003636

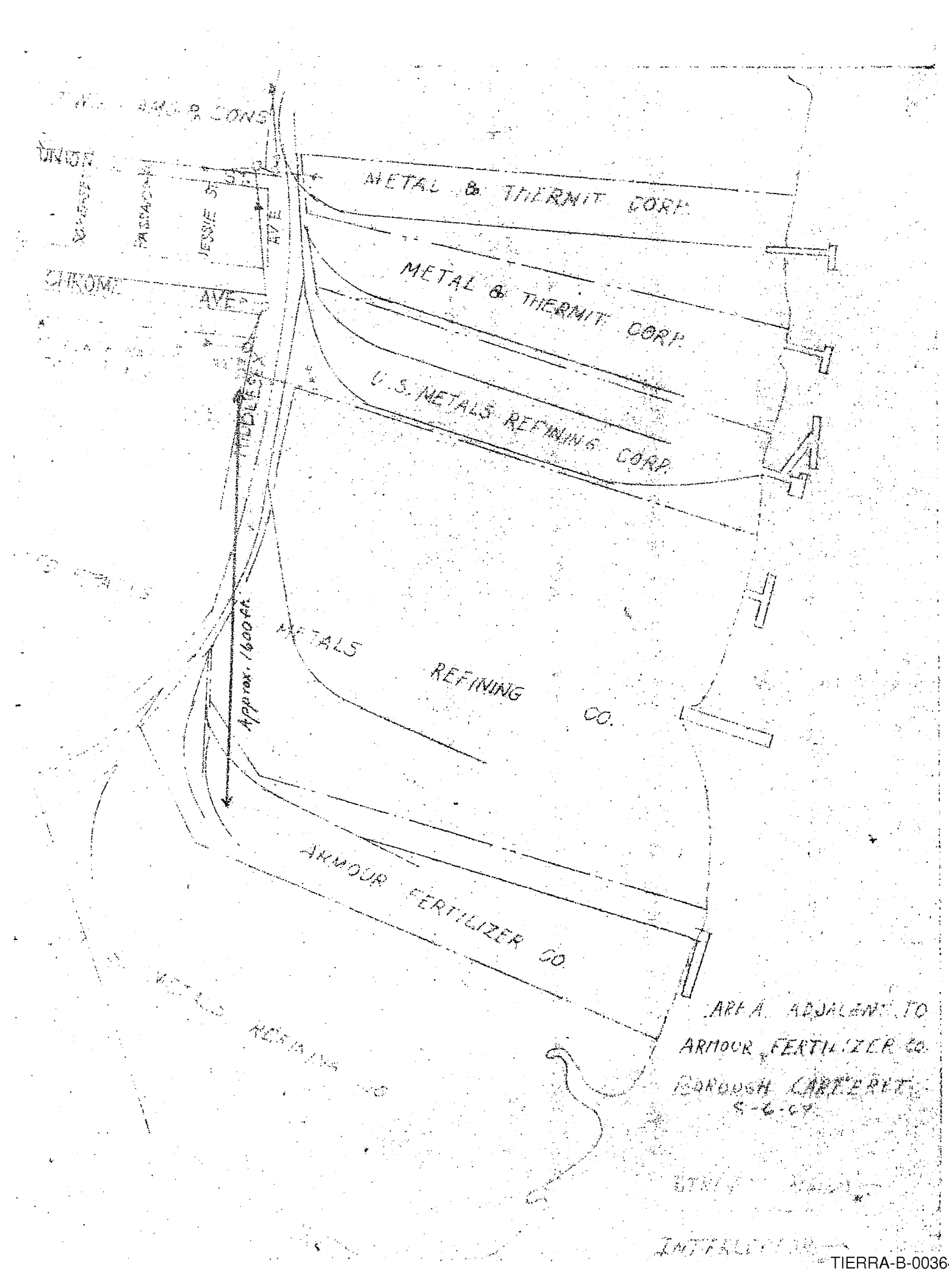

CROSSING
OVERFLOW from EAS
Pumping Station

PLANT: Armour Fertilizer Company

LOCATION: Foot of Middlesex Avenue, Carteret, N.J.

This plant which is located at the end of Middlesex Avenue, Carteret, N.J. is adjacent to the Arthur Kill and is bordered on the north and south by U.S. Metals. This entire area is not sewered. A 12" sewer which is located approximately 100 feet south of Chrome Avenue, is the nearest City sewer. From this point to the front of Armour's property it is approximately 1600 feet. This 12" sewer flows north where it connects with the 12" force main coming from the Edwin Street pumping station. From observations made through manholes on these lines it is estimated that the 12" gravity sewer is flowing approximtely 1" full and the 12" force main when in operation flows approximately one quarter full. No flow records are available at this time regarding the volume of discharge emanating from Armour & Company.


NORTH
ARMOUR
FERTILIZER CO.
STATEN ISLAND
Port Reading
Bloomfield
Chelsea
Travis
Great Kills
Great Kills Harbor
Tottenville
Red Bank
Rossville
Kreischerville
Flinderville
Arrochar
Rahway R.
Fresh Kill
Cedar Pt.
Tremley Pt.
Smoking Pt.
Pleasant Bay
Raritan Bay
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

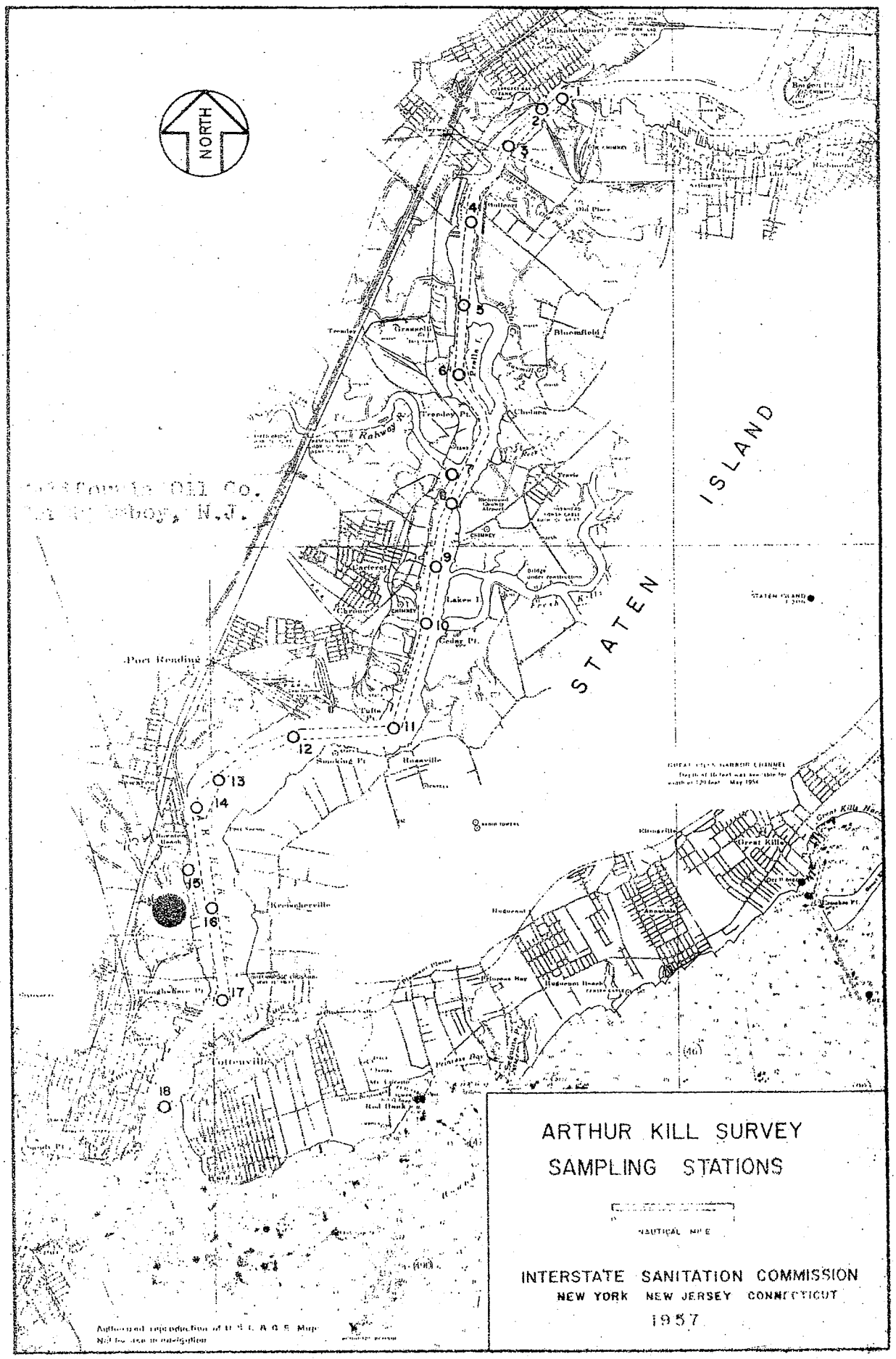

UNION
CHROME
AVE
JESSIE
METAL & THERMIT CORP.
METAL & THERMIT CORP.
U.S. METALS REFINING CORP.
METALS
REFINING
CO.
Approx. 1600 ft.
ARMOUR FERTILIZER CO.
AREA ADJACENT TO
ARMOUR FERTILIZER CO.
BOROUGH CARTERET
5-6-69

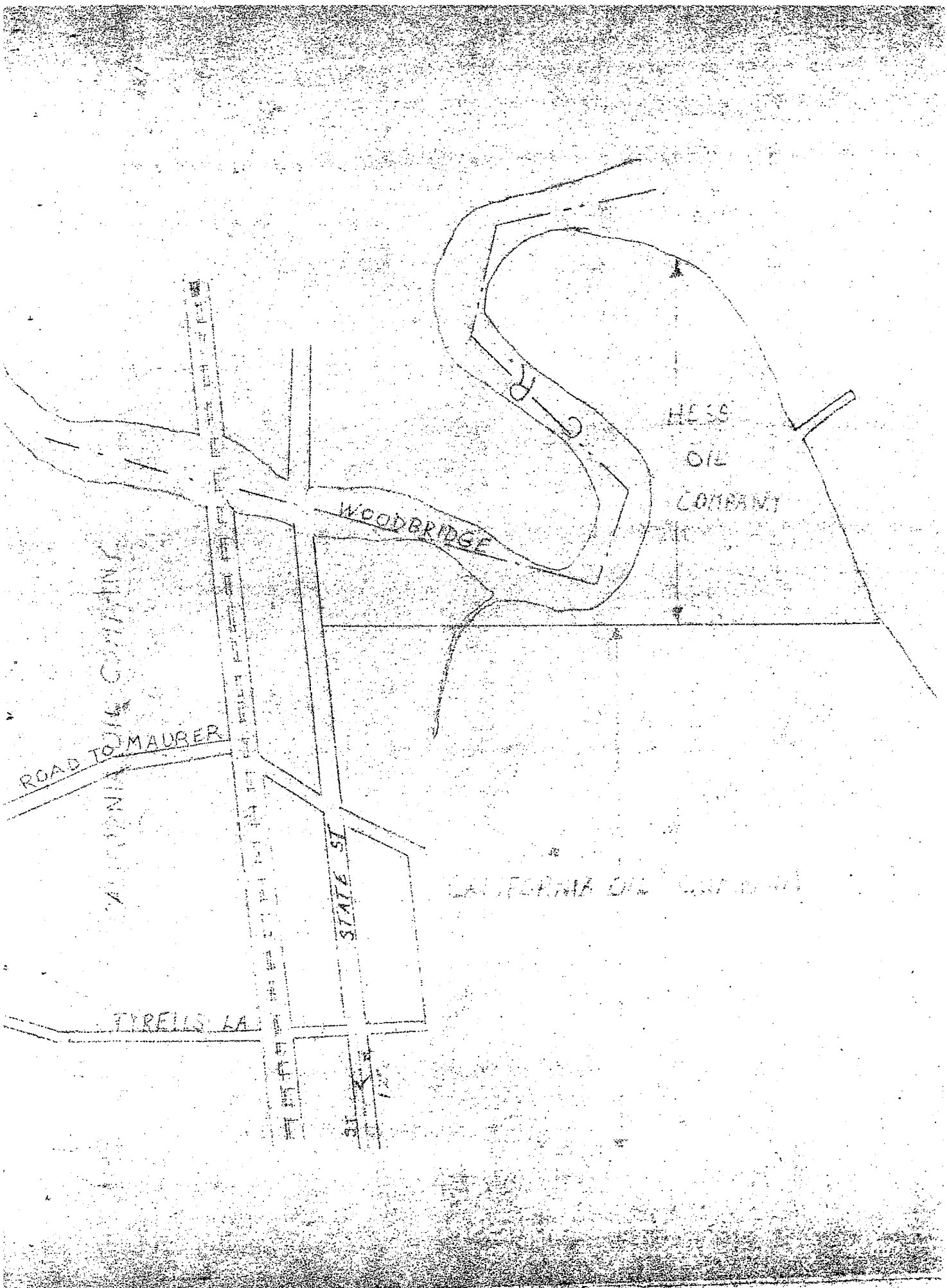
PLANT - California Oil Company

LOCATION: State Street, Perth Amboy, N.J.

The California Oil Company has its installation divided by State Street, Perth Amboy, N.J. On the east side of State Street this portion of the plant is located directly on the Arthur Kill and is bordered on the north by Hess Oil Company, and on the south by the American Smelting & Refining Company. Their property, which is located on the west side of State Street, is bordered on the north by Woodbridge Creek and on the south by Tyrells Lane. Starting at Tyrells Lane and flowing in a southerly direction, a 12" city sewer is located on State Street. This sewer flows to the intersection of State Street and Garretsen Avenue where it discharges to the 48" interceptor which terminates at the State Street pumping station. Our records indicate that the East Yard Tank Farm Separator discharges to the Arthur Kill. This separator has a capacity of 2000 gpm. API Separators #1 and #2 and the settling basin (lagoon) discharge their effluent to Woodbridge Creek. All sanitary waste from this plant is discharged to the 12" sewer on State Street.

1/8/65
FG:k




HESS
OIL
COMPANY
WOODBRIDGE
ROAD TO MADBER
STATE ST
TYRELL LA

GENERAL MAP
SEWERS & INTERCEPTOR
CITY OF PERTH AMBOY

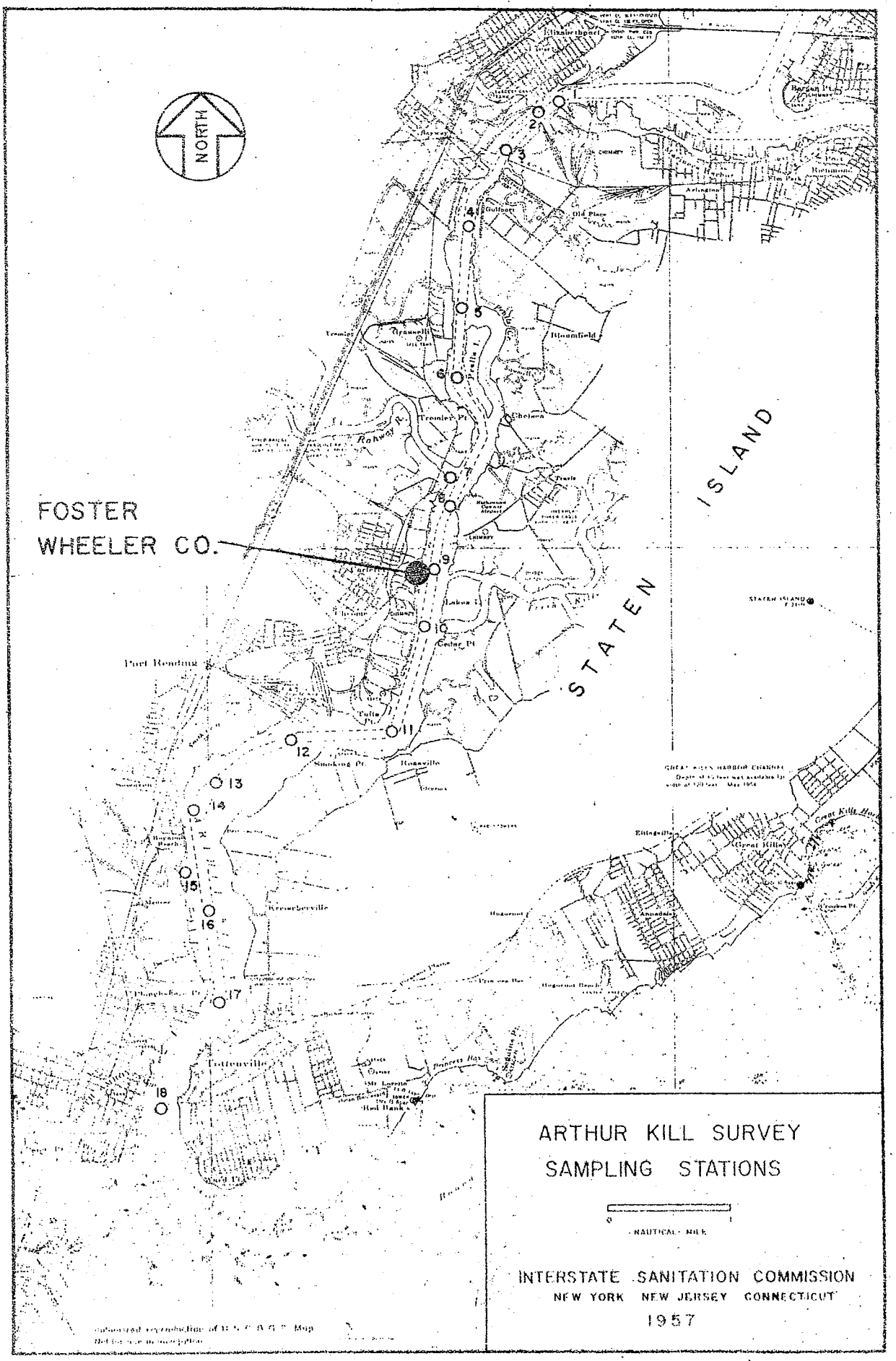
EXISTING SEWERS
INTERCEPTOR

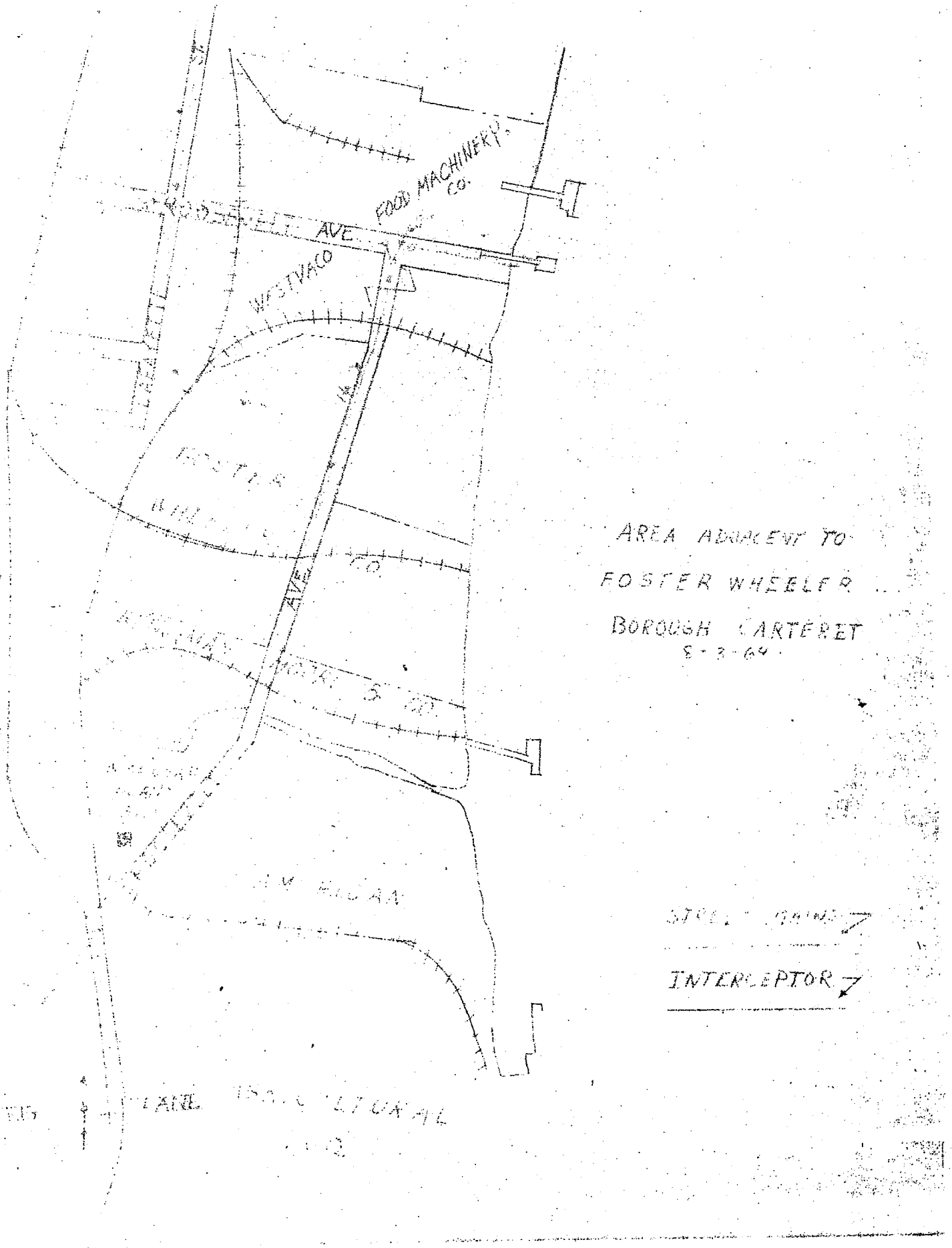
PLANT: Foster Wheeler Company

LOCATION: Roosevelt Avenue, Carteret, N.J.

This plant is divided by Roosevelt Avenue. All buildings situated on the east side of the street are adjacent to the Arthur Kill.

A City sewer flows south on Roosevelt Avenue past all units of this plant. From observations made through a manhole at street level it is estimated that the size of the sewer is 16" and it was flowing less than one quarter full. This sewer terminates at the Carteret Sewage Disposal Plant.

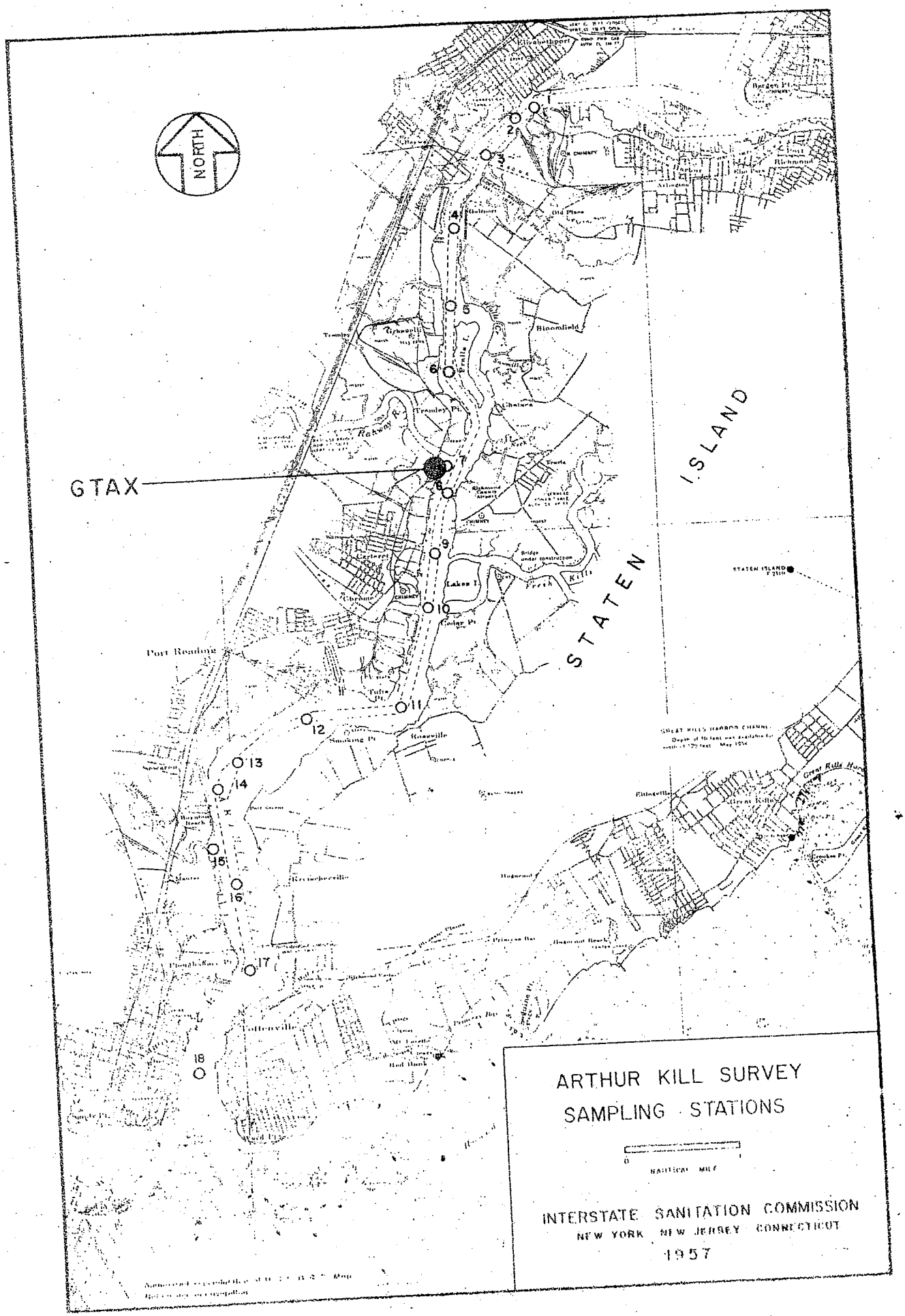

NORTH
FOSTER
WHEELER CO.
STATEN ISLAND
Port Reading
Bloomfield
Chelsea
Rahway R.
Great Kills
Tottenville
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

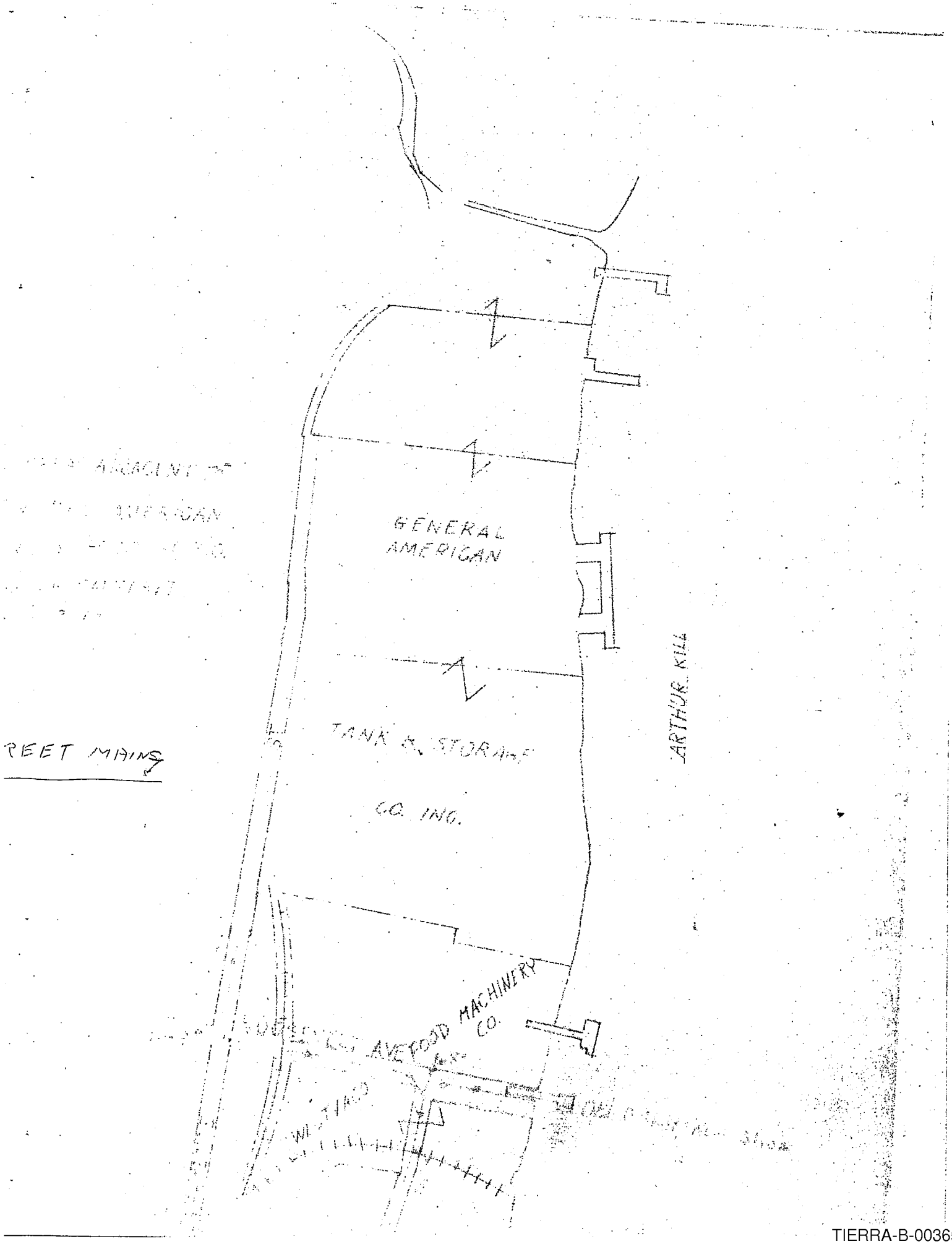

FOOD MACHINERY CO.
AVE
WESTVACO
AVE
AREA ADJACENT TO
FOSTER WHEELER
BOROUGH CARTERET
INTERCEPTOR

PLANT: General American Tank & Storage Company

LOCATION: End of Lafayette Street, Carteret, N.J.

The General American Tank & Storage Company installations are located on the east side of Lafayette Street and adjacent to the Arthur Kill. This area has no available City sewers. The nearest City sewer line is approximately 1500 feet to the south. At this point a 6" line serving approximately three homes flows in a southerly direction to a 12" main sewer line on Roosevelt Avenue. From observations made through manholes at street level all sizes and flows are estimated. The flow in the 12" main was approximately one quarter full.


NORTH
GTAX
STATEN ISLAND
Port Reading
Bloomfield
Rahway R.
Fresh Kills
Great Kills Harbor Channel
Staten Island
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


GENERAL
AMERICAN
TANK & STORAGE
CO. INC.
ARTHUR KILL
REET MAINS
AVE FOOD MACHINERY
CO.

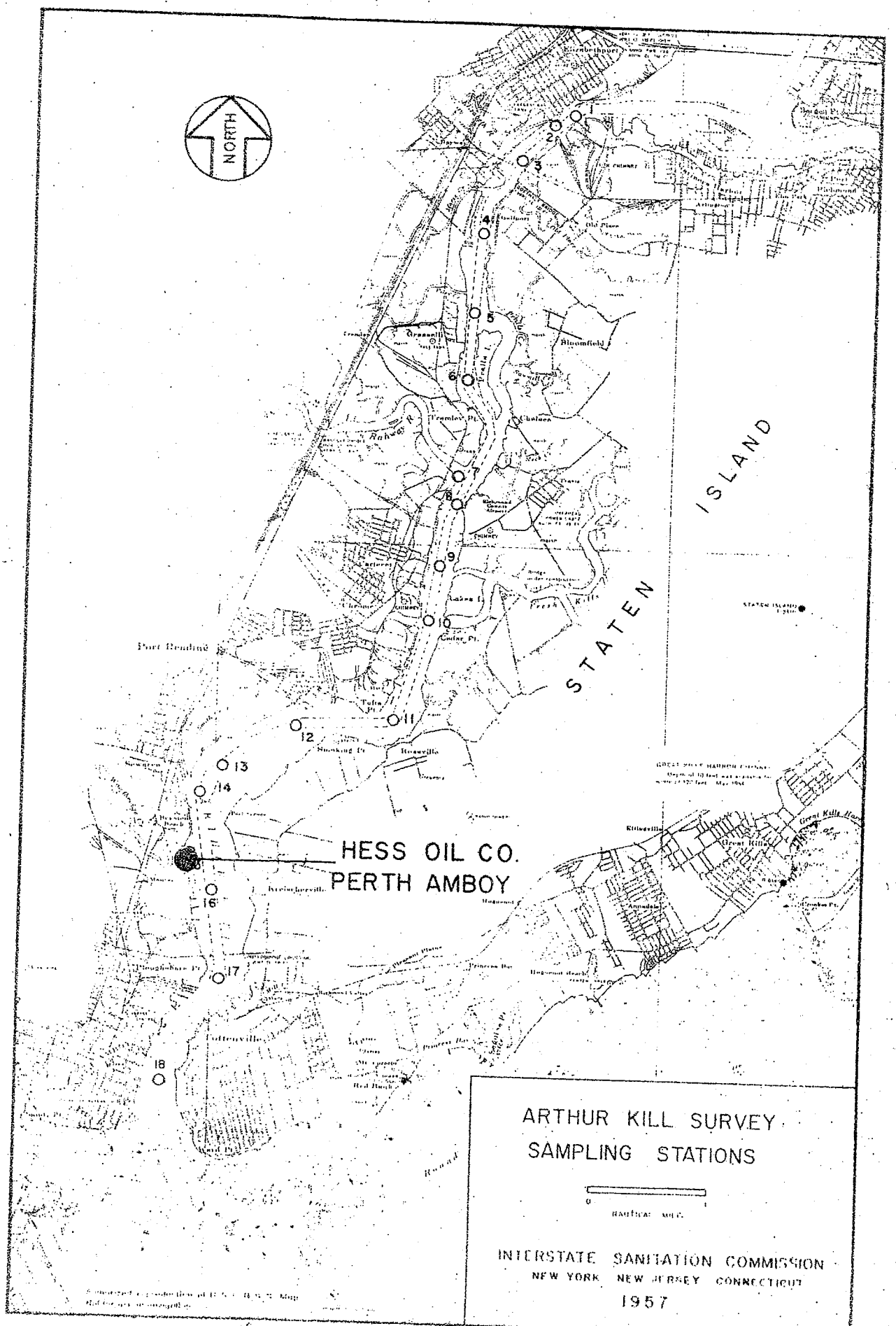
PLANT: Hess Oil Company

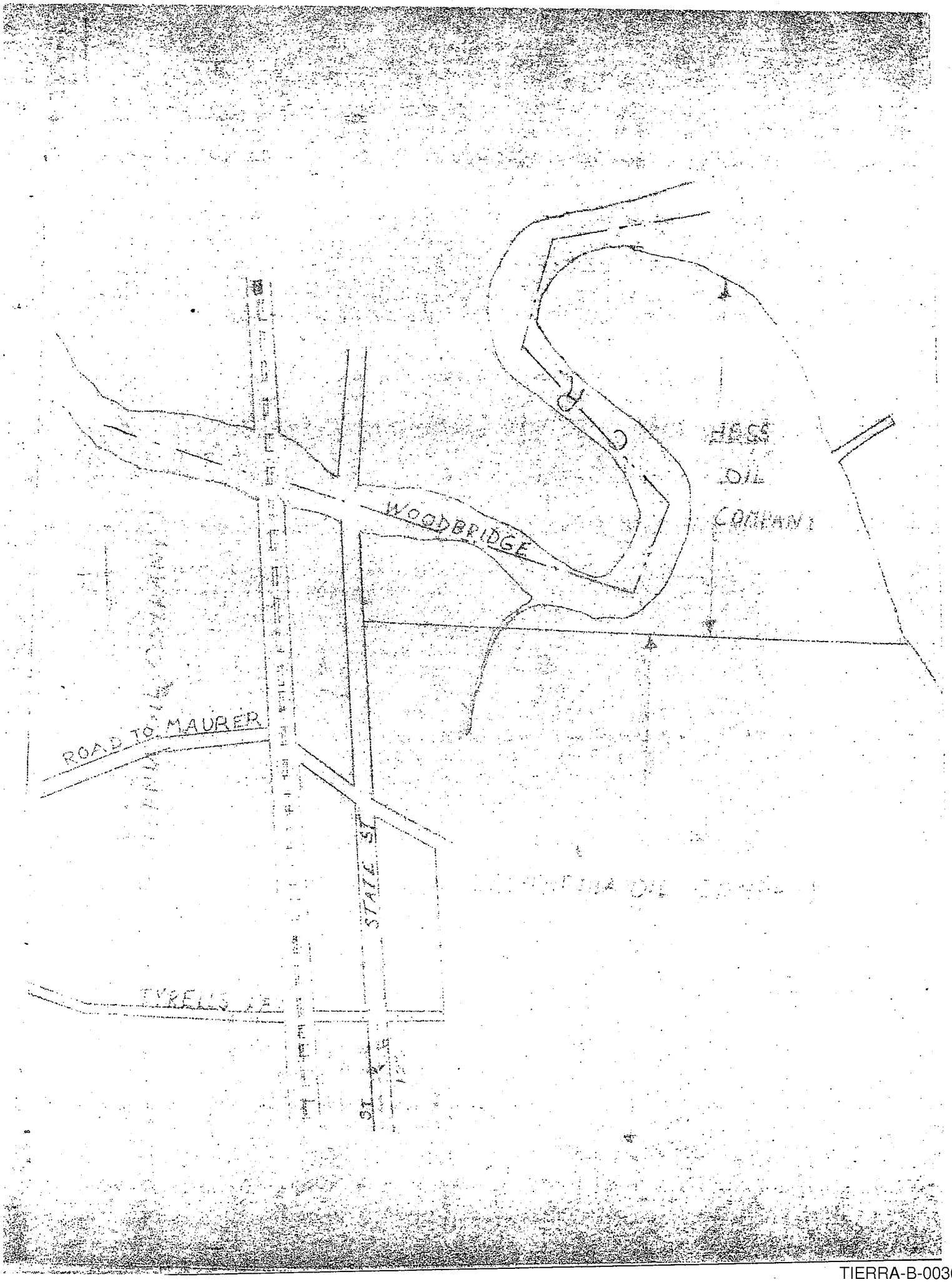
LOCATION: State Street, Perth Amboy, N.J.

This plant, which is located at the extreme northerly end of the City of Perth Amboy is situated on the east side of State Street and is bordered by the Arthur Kill and Woodbridge Creek.

The nearest city sewer to this unit is approximately 1600 feet. This 12" sewer starts at Tyrell's Lane and State Street and flows in a southerly direction to the intersection of State Street and Garretsen Avenue where it is connected to the 48" interceptor which discharges its sewage at the State Street pumping station.

1/8/65
FG:k


NORTH
STATEN ISLAND
HESS OIL CO.
PERTH AMBOY
Port Reading
Bloomfield
Rahway R.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


WOODBRIDGE
ROAD TO MAURER
STATE ST
TYRELL AVE
31
HESS
OIL
COMPANY

GENERAL MAP
SEWERS & INTERCEPTOR
CITY OF PERTH AMBOY

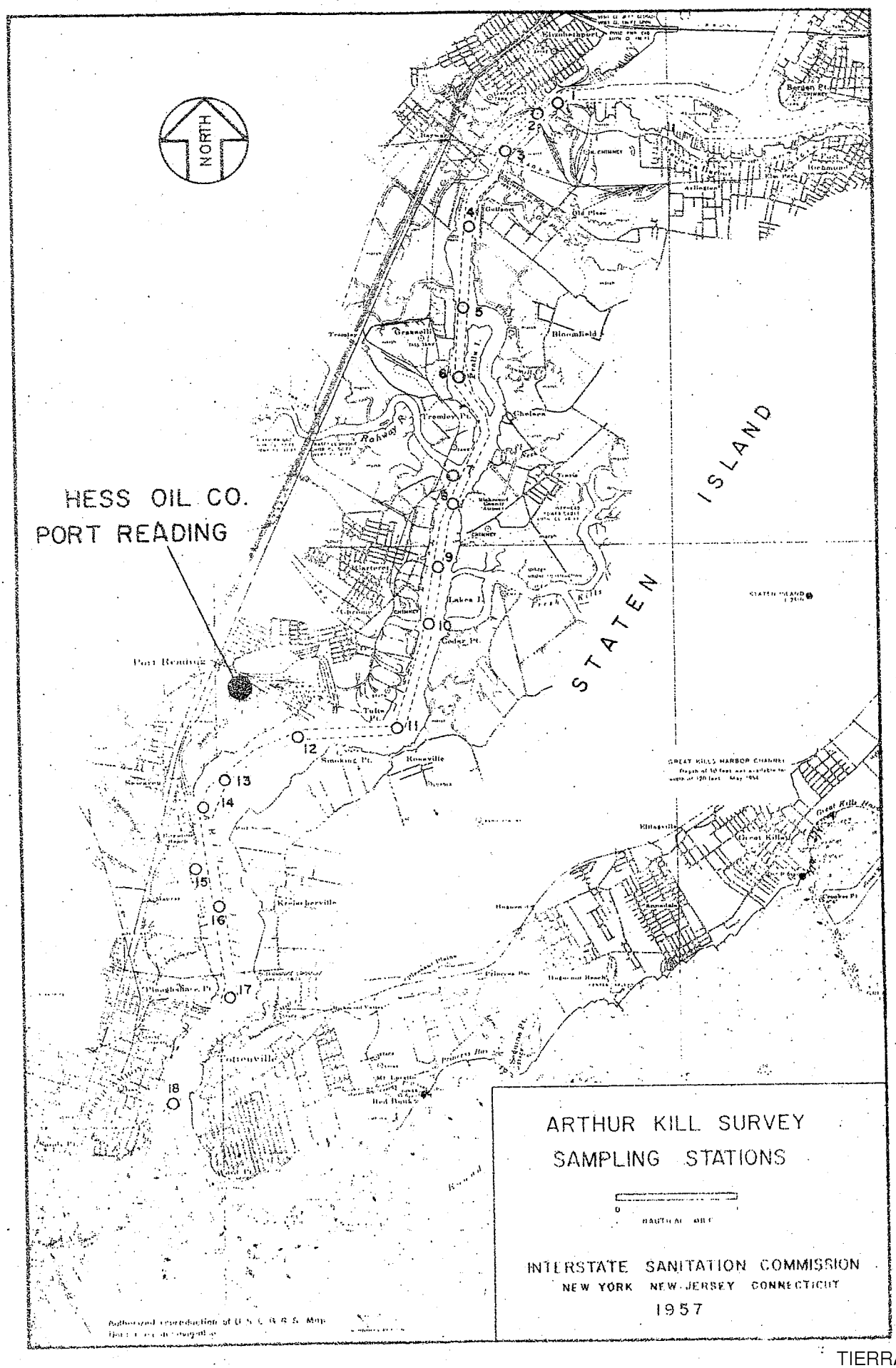
EXISTING SEWERS
INTERCEPTOR

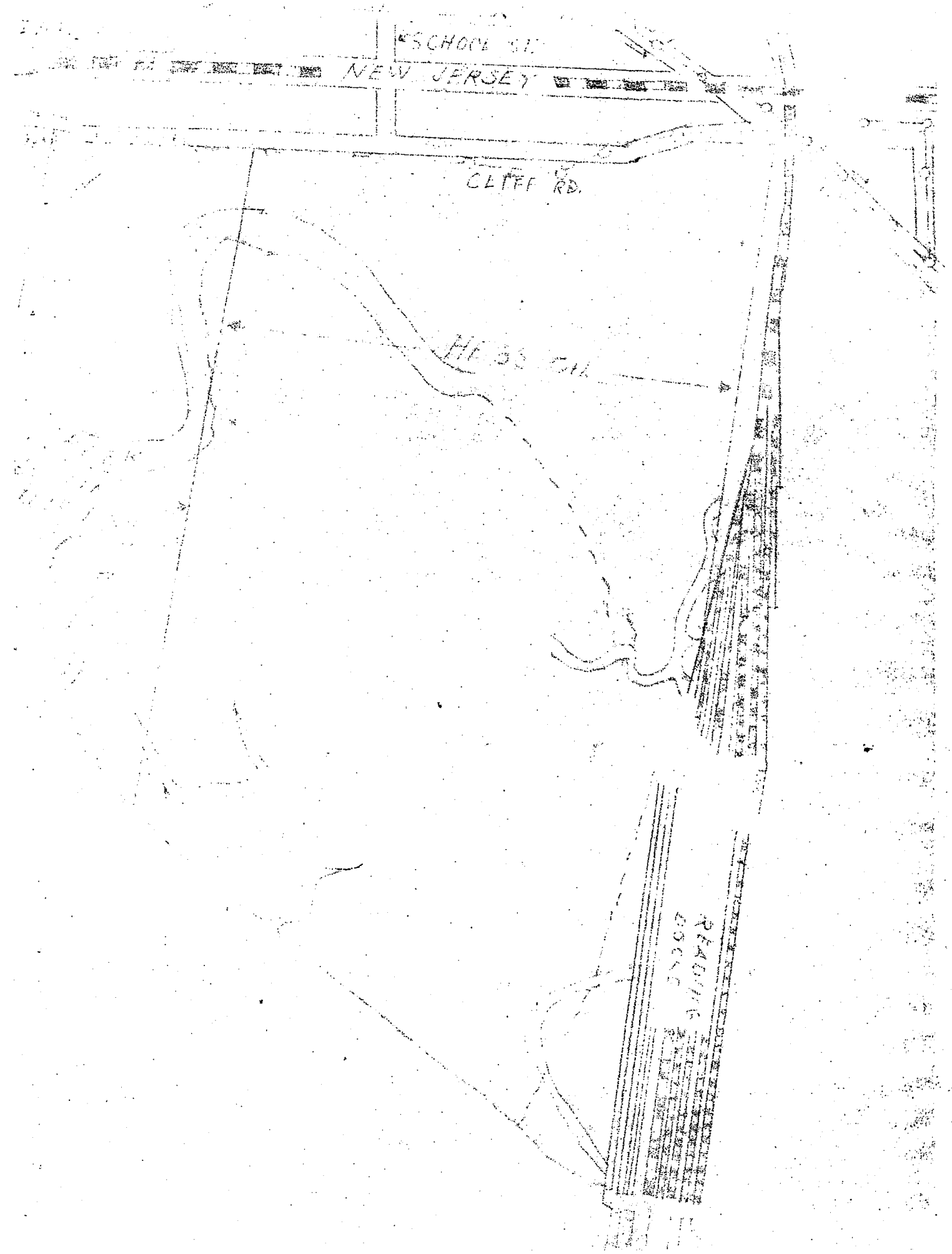
N

PLANT: Hess Oil Company

LOCATION: Cliff Road, Port Reading, N.J.

The Hess Oil Company refinery is located on the east side of Cliff Road, Port Reading, This unit is bordered on the north by the Reading Railroad Coal Dock Yards and on the south by the Sewaren Generating Station. Located on Cliff Road an 18" intercepting sewer flows in a southerly direction to the Woodbridge Treatment Plant. From observations made through a manhole at street level, it is estimated that this line was flowing less than one quarter full. Our Industrial Waste Survey indicates that 1400 gpm is discharged from this refinery.


NORTH
HESS OIL CO.
PORT READING
STATEN ISLAND
Port Reading
Rahway R.
Tremley Pt.
Chelsea
Bloomfield
Grasselli
Tremley
Lakes I.
Cedar Pt.
Tulie Pt.
Smoking Pt.
Roosevelt
Kreischerville
Pleasant Plains
Pleasant Bay
Huguenot Beach
Great Kills
Great Kills Harbor
Red Bank
Mt. Loretto
Arlington
Richmond
Old Place
Gulland
Kills
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

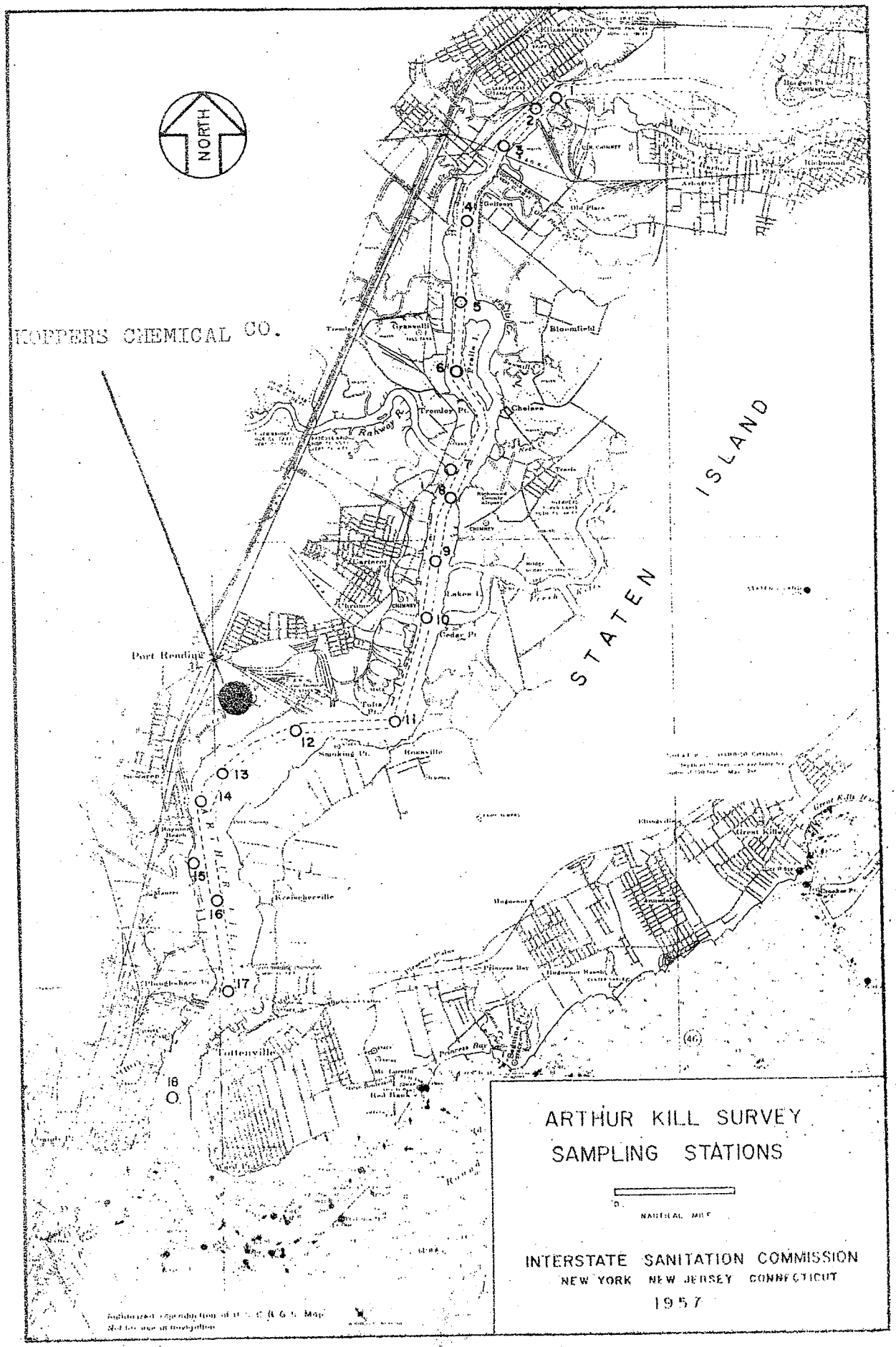

SCHOOL ST.
NEW JERSEY
CLIFF RD.
HILLSIDE
PARKING
LOT

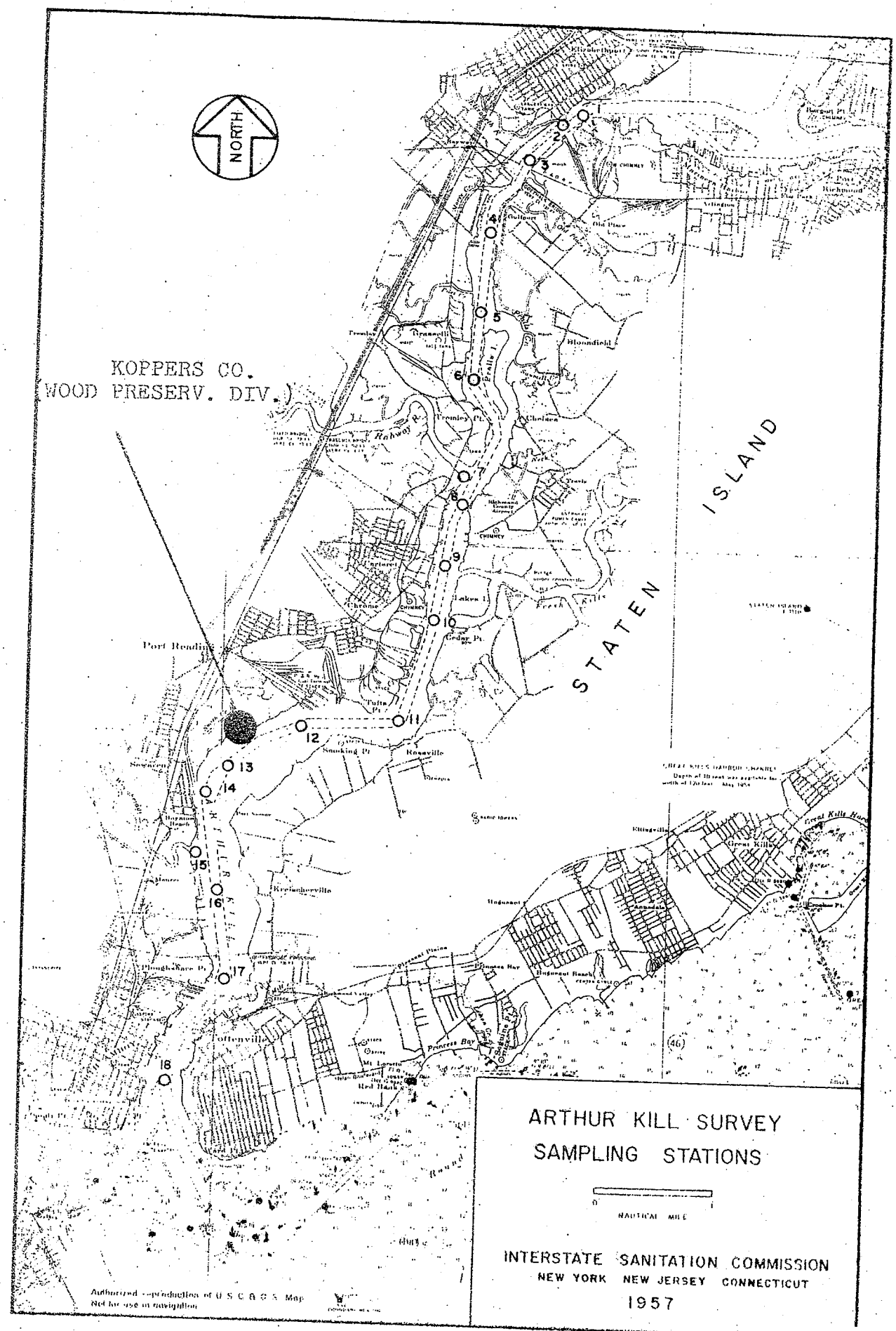
PLANT: Koppers Chemical & Plastics Division -
Koppers Wood Preserving Division

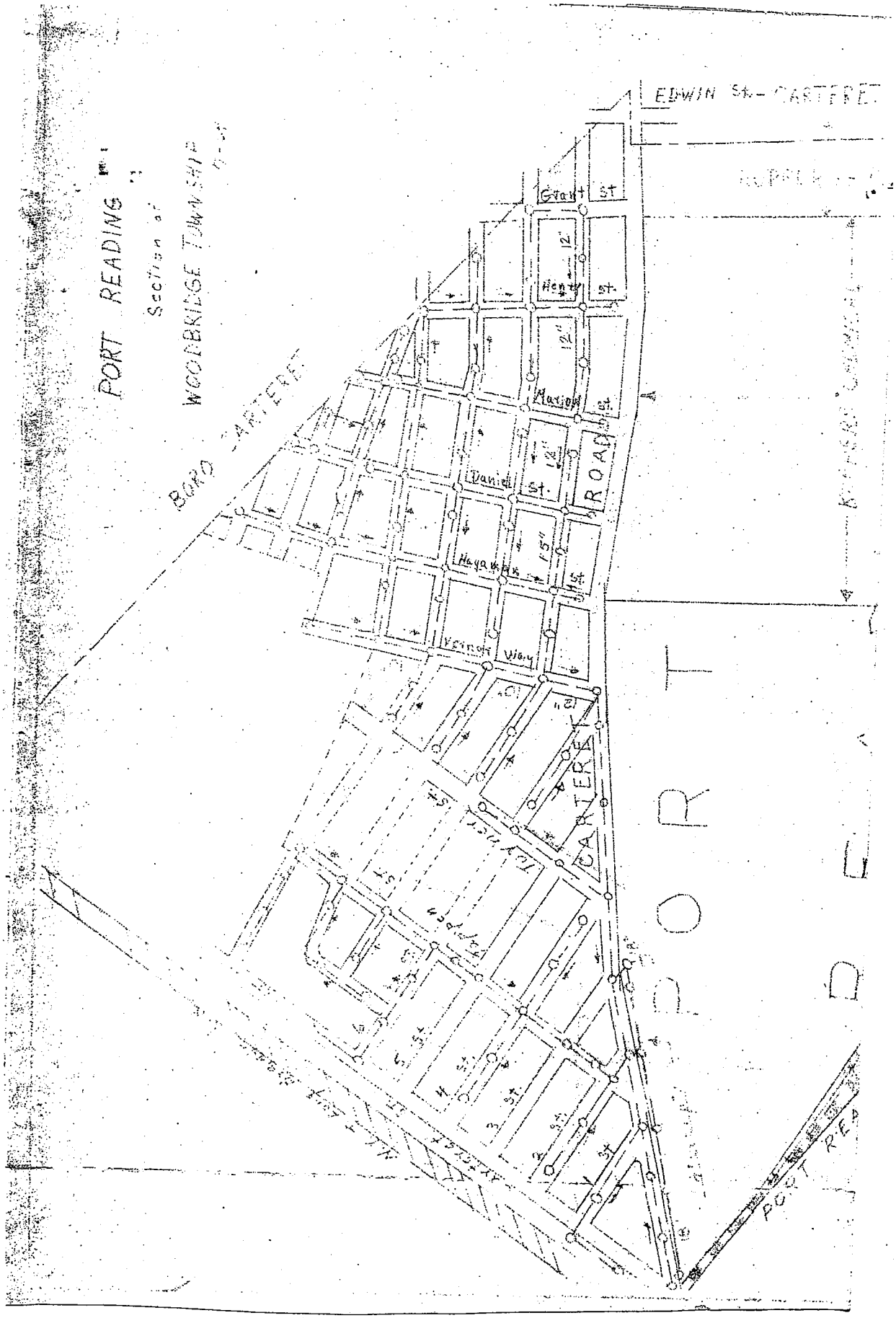
LOCATION: Carteret Road, Port Reading, N.J.
End of Edwin St., Carteret, N.J.

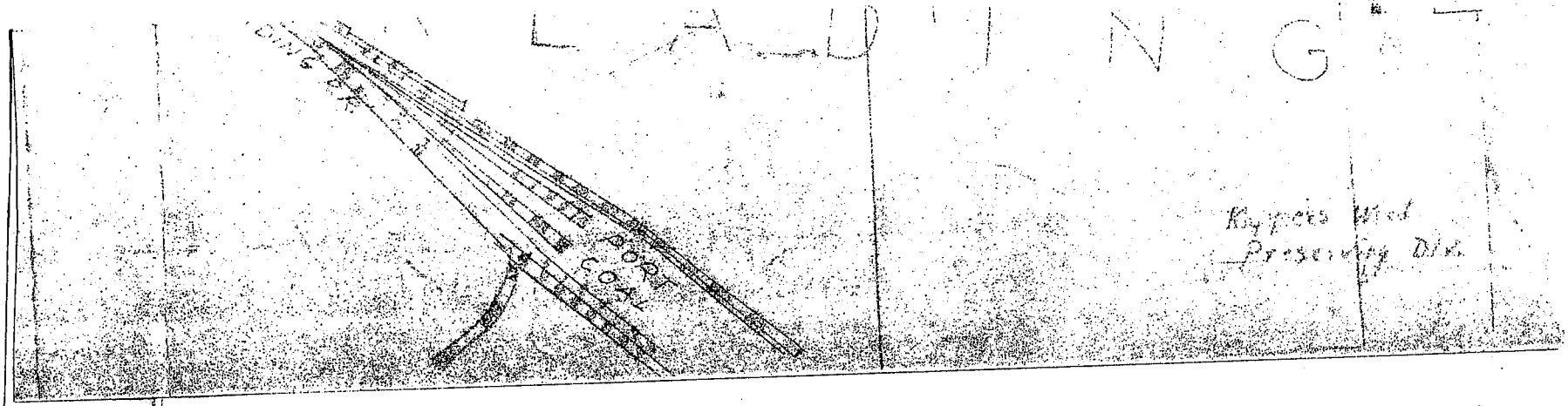
The Koppers Chemical and Plastics Division Plant is located between the Arthur Kill and Carteret Road. This section of Carteret Road which extends between the Borough of Carteret and Vernor Way is not sewered. However on all streets which run perpendicular to Carteret Road they have sewer lines. In this area the average size of the sewers is 12", all of which discharge to the 18" interceptor which starts at Carteret Road and Turner Street. From observations made through manholes at street level all lines appeared to be large enough to service the 530,000 gpd flow from this unit.

The Koppers Wood Preserving Division Plant is located at the foot of Edwin Street. Edwin Street is a city street owned by the Borough of Carteret but the plant mentioned is located in the Port Reading section of the Woodbridge Township. There are no city sewers available in this area, the nearest one being located in the Borough of Carteret at the intersection of Edwin Street and Bergen Street which is approximately 1200 feet away. At this point the Edwin Street pump station is located. All sewage entering this station is pumped to the Carteret Sewage Disposal Plant. This wood creosoting unit uses approximately 230,000 gallons of fresh water per year.


NORTH
KOPPERS CHEMICAL CO.
STATEN ISLAND
Port Reading
Tremley Pt.
Rahway R.
Cedar Pt.
Smoking Pt.
Rossville
Tottenville
Princess Bay
Great Kills
Bloomfield
Chelsea
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


NORTH
KOPPERS CO.
WOOD PRESERV. DIV.
STATEN ISLAND
Port Reading
Rahway
Tremley Pt.
Chelsea
Bloomfield
Tufts Pt.
Smoking Pt.
Rossville
Cedar Pt.
Kreischerville
Tottenville
Princess Bay
Great Kills
Great Kills Harbor
Hoffman Pt.
Mt. Loretto
Red Bank
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957
Authorized reproduction of U.S.C.&G.S. Map
Not for use in navigation

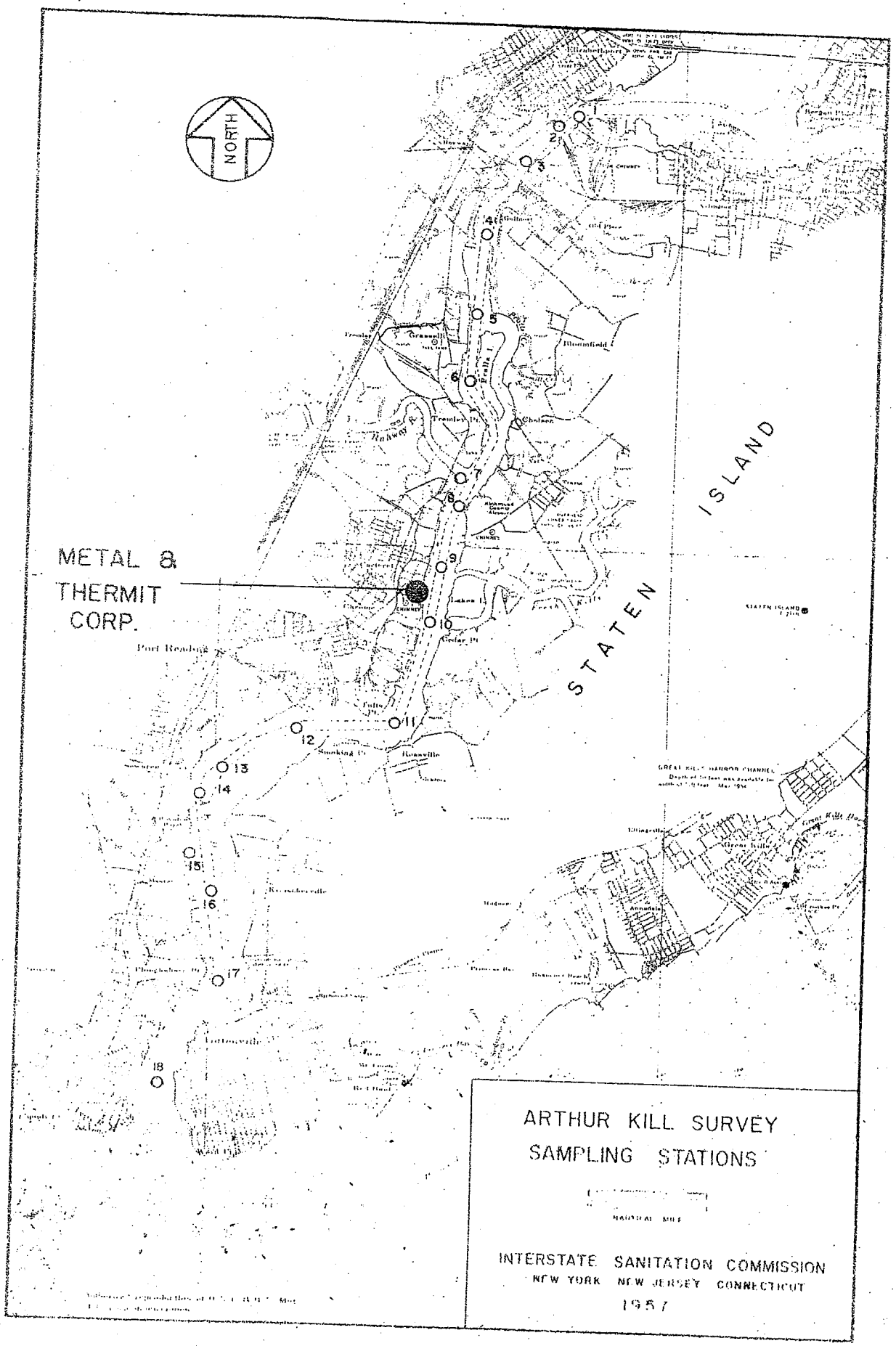

PORT READING
Section of
WOODBRIDGE TOWNSHIP
BORO CARTERET
EDWIN St.-CARTERET
Grant St.
Henry St.
Marion St.
Daniel St.
Hayes St.
Vernon Way
ROAD
CARTERET
PORT READING

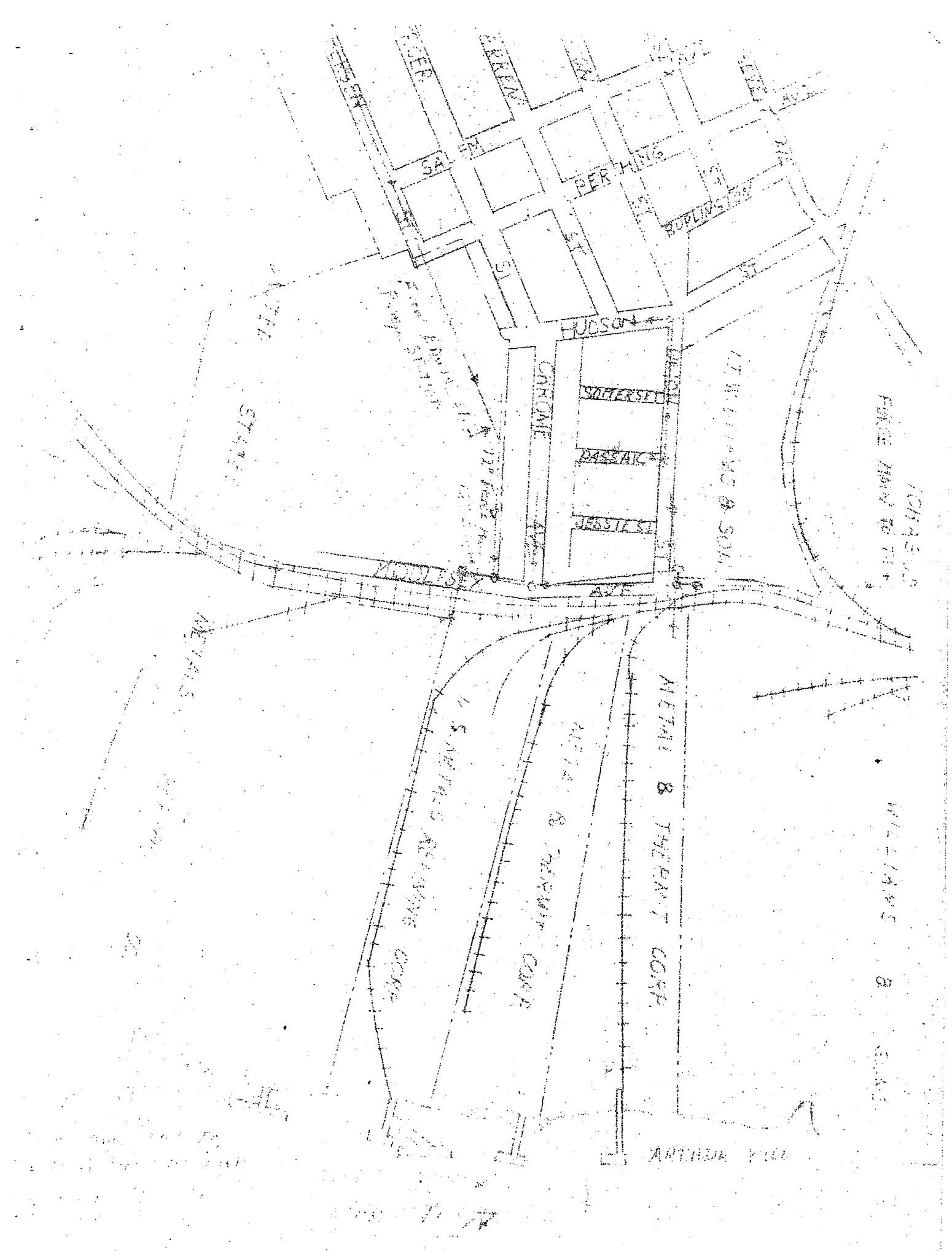


PLANT: Metal & Thermit Corporation

LOCATION: Foot of Union Street, Carteret, N.J.

The Metal and Thermit Corporation is located between the Arthur Kill and the intersection of Middlesex Avenue and Union Street. Located directly in front of the main entrance to this plant and on the west side of the Central Railway of New Jersey tracks is the main interceptor which flows to the Carteret Treatment Plant. From observation through several manholes in this area a sewer line of undetermined size was seen discharging some waste from this plant.

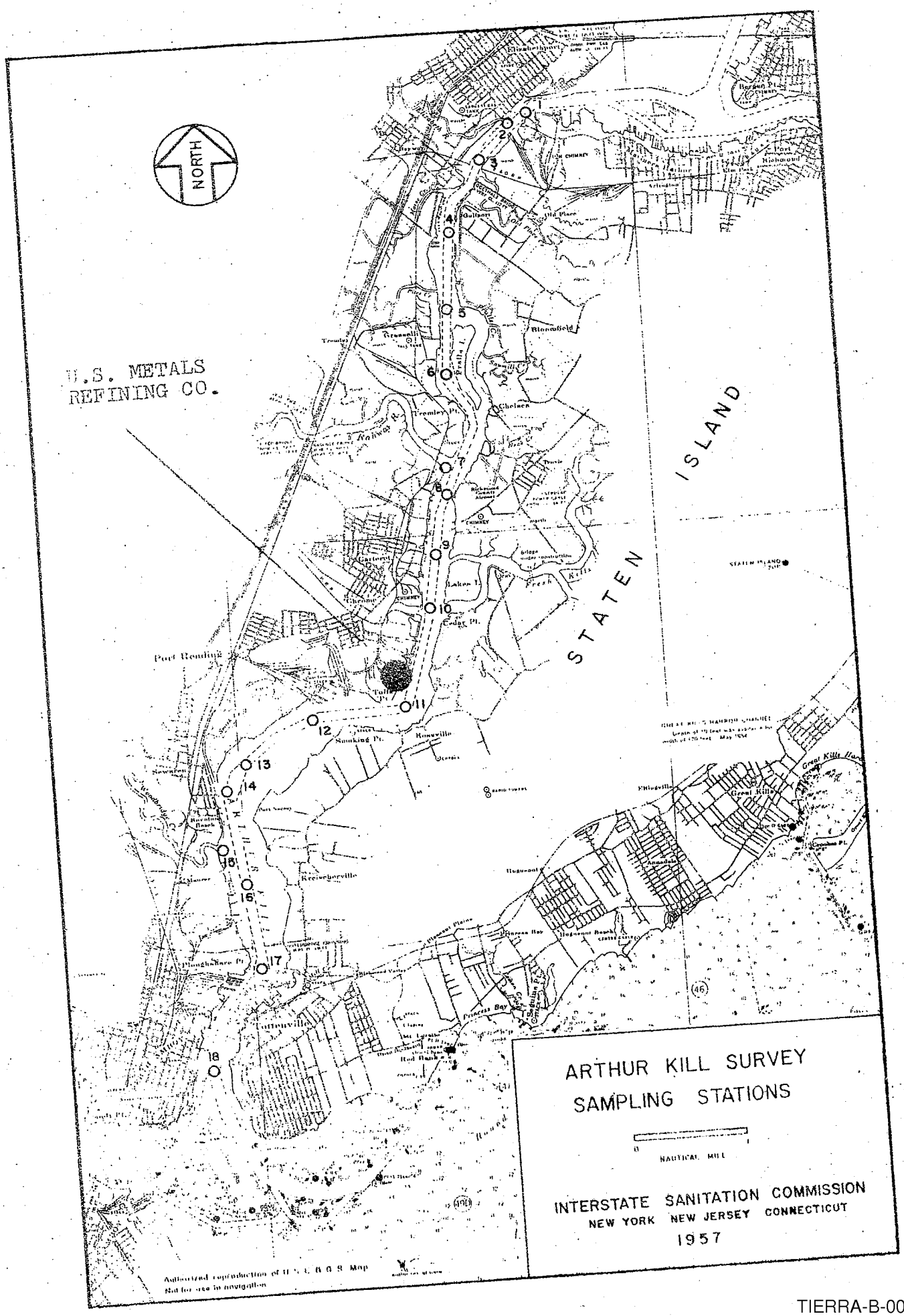

NORTH
METAL &
THERMIT
CORP.
STATEN
ISLAND
Port Reading
Bloomfield
Rahway
Cedar Pt
Rossville
Great Kills
ARTHUR KILL SURVEY
SAMPLING STATIONS
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957

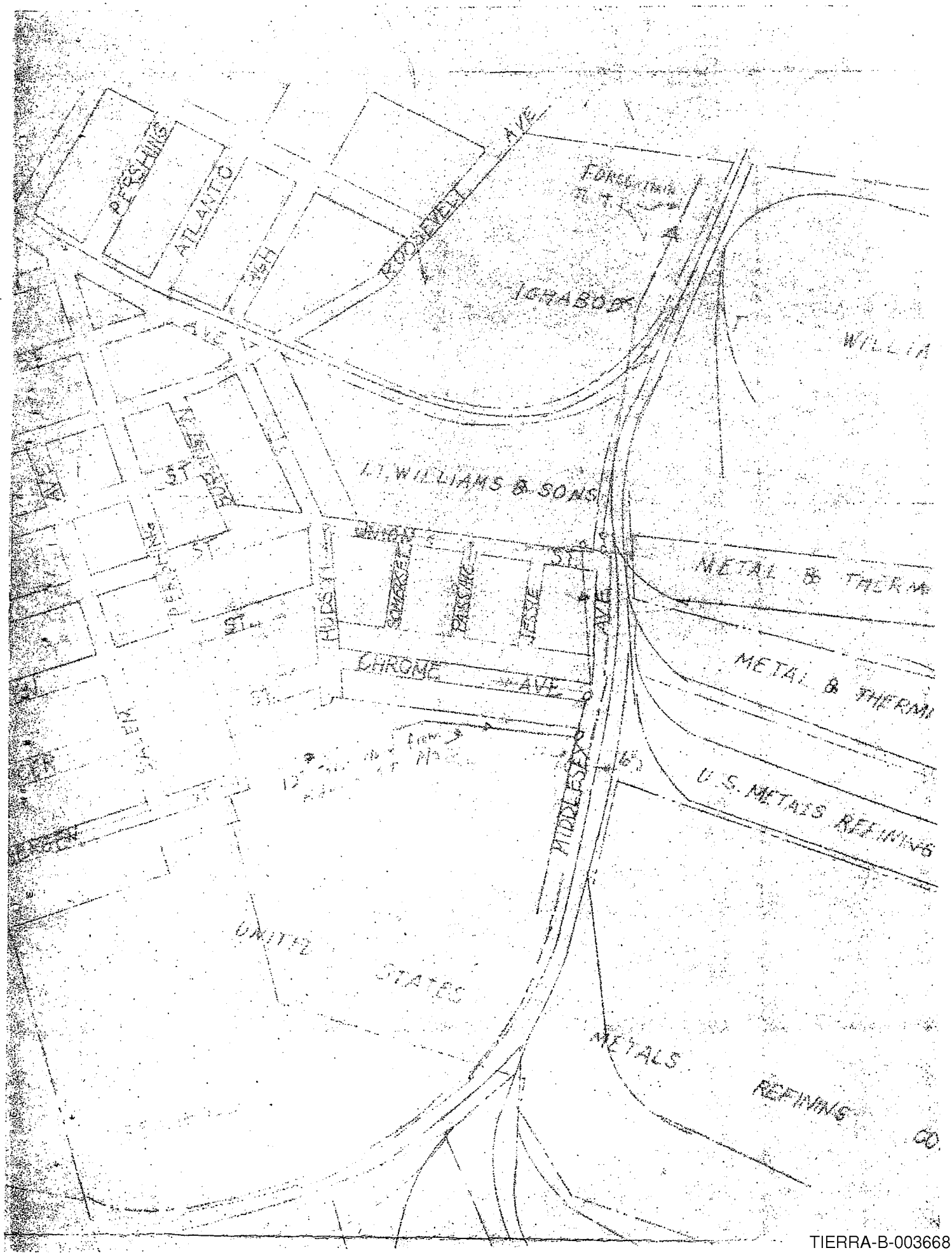

PERSHING
HUDSON
SOMERSET
PASSAIC
JESSIE ST
MIDDLESEX
ARTHUR KILL

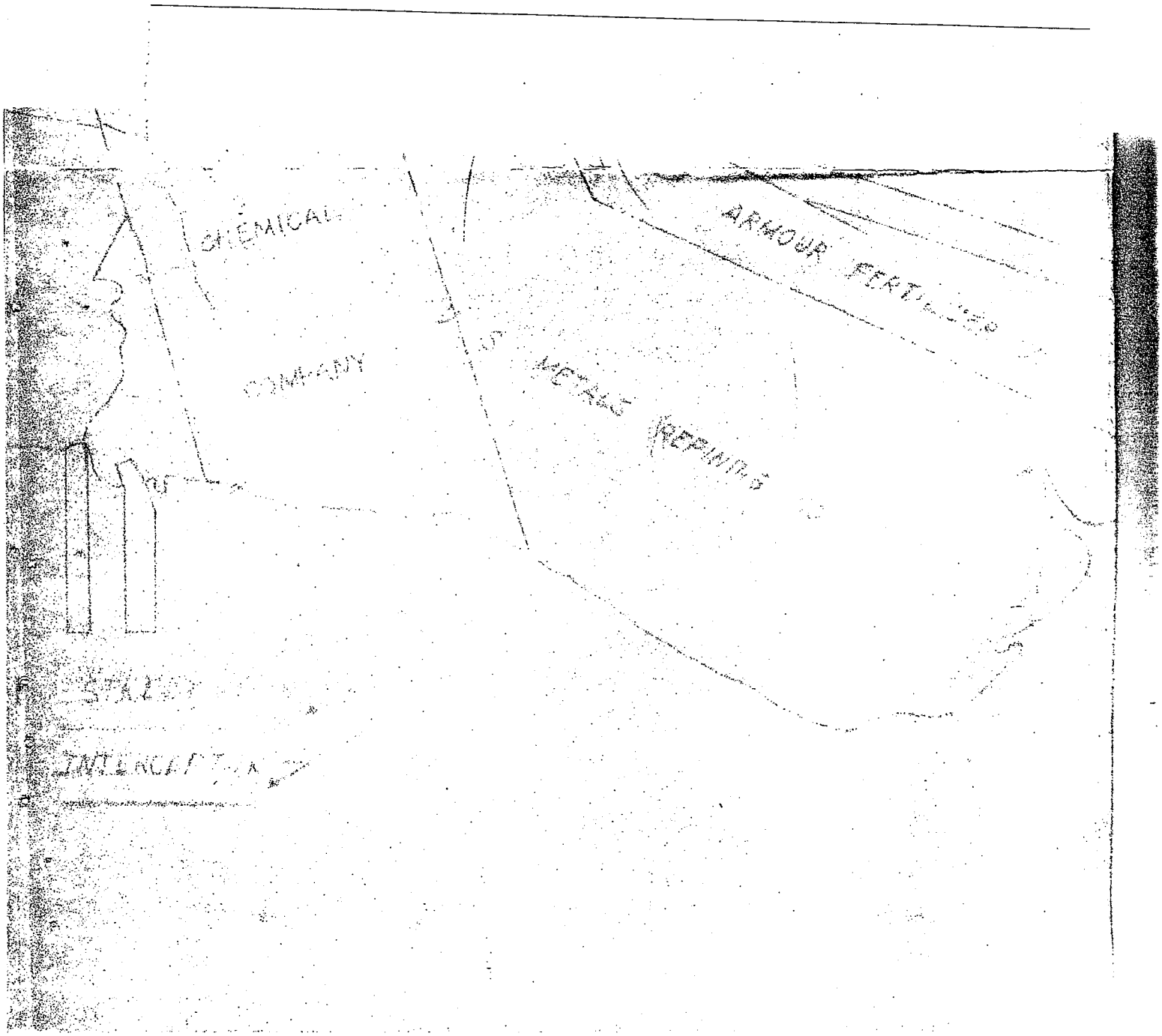
PLANT: United States Metals Refining Co.

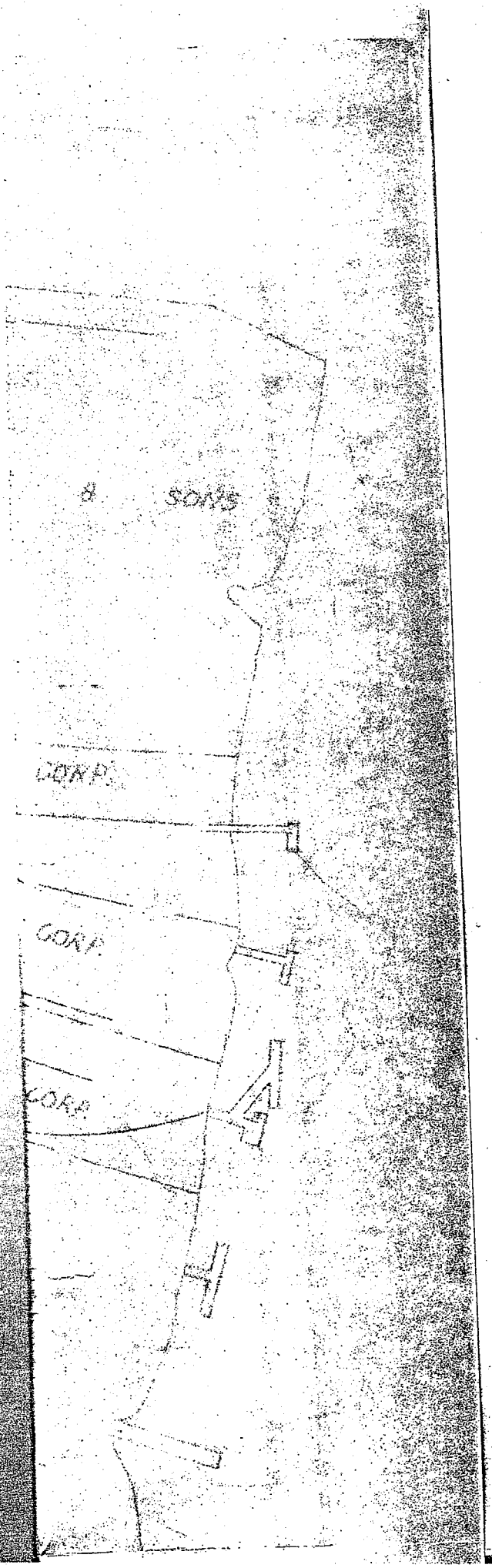
LOCATION: Middlesex Avenue, Carteret, N.J.

This metal refining plant is located between the Arthur Kill and Middlesex Avenue. Bordering the plant on the north is Metal & Thermit Corporation and on the south is the Armour Fertilizer Company. At the northern portion of their property a 6" private sewer was observed entering into a 12" city sewer. This 12" city sewer empties into the force main which is located approximately 200 feet to the north of this connection between the 6" and 12" sewer. This 6" private sewer seemed to originate from the U.S. Metals property. The flow during the time of inspection was very slight. From observations made through the manholes at street level it is estimated that the 12" line was flowing approximately 1" full. Our Industrial Waste Survey indicates that the approximate discharge from this refining unit is 36.0 mgd.


NORTH
U.S. METALS
REFINING CO.
STATEN
ISLAND
Port Reading
Tolls Pt.
Smoking Pt.
Rossville
Great Kills
Princess Bay
Bloomfield
Chelsea
Tremley Pt.
Lakes I.
Cedar Pt.
Ploughshare Pt.
Kreischerville
Tottenville
Hugenot
Amanda
Philadelphia
Bergen Pt.
Richmond
Arlington
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


PERSHING
ATLANTIC
ROOSEVELT
AVE
FORSYTHE
ICHABOD
WILLIA
L.T. WILLIAMS & SONS
UNION
ST
SOMERSET
PERSHING
JERSEY
AVE
METAL & THERM
CHROME
AVE
METAL & THERMI
U.S. METALS REFINING
MIDDLESEX
UNITED
STATES
METALS
REFINING
CO.


CHEMICAL
COMPANY
ARMOUR FERTILIZER
METALS REFINING

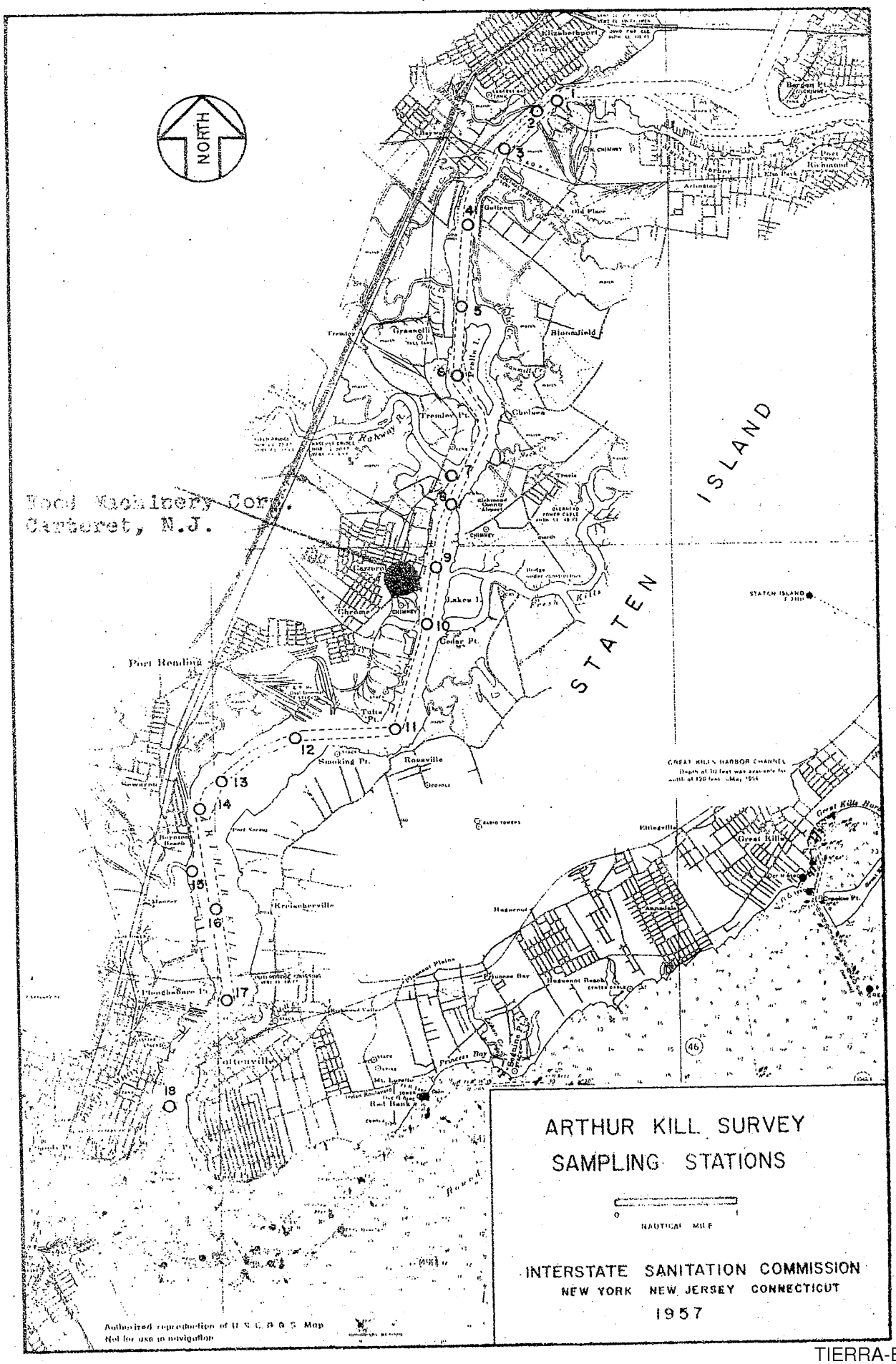

SONS
CORP.
CORP.
CORP.

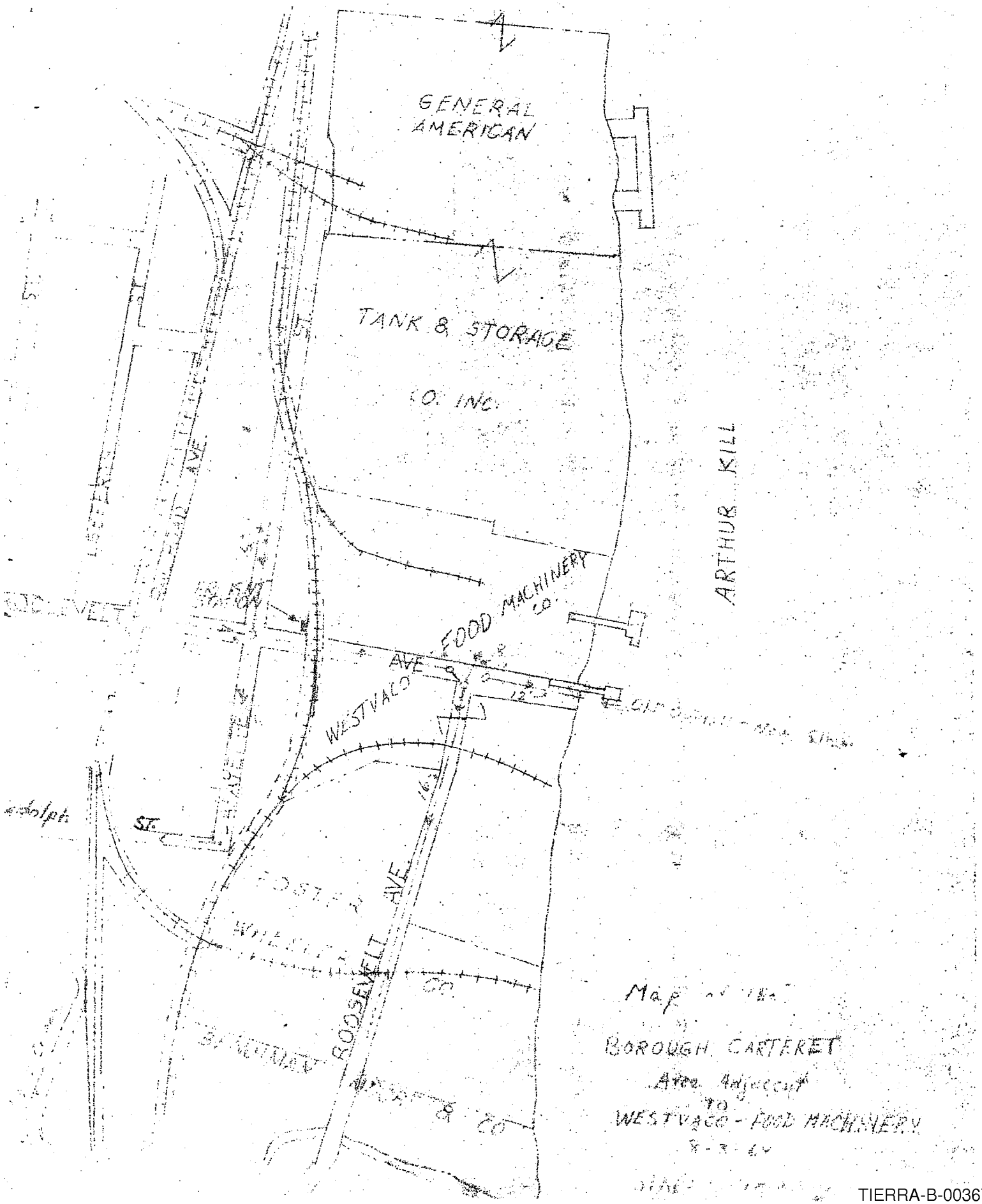
AREA ADJACENT TO
U.S. METALS REFINING CO.
BOROUGH CARTERET

PLANT: Westvaco - Food Machinery Corp.

LOCATION: Roosevelt Avenue, Carteret, N.J.

This plant is located on the north side of Roosevelt Avenue and also has buildings located between the west side of Roosevelt Avenue and the east side of Lafayette Street. All units which are located to the north of Roosevelt Avenue border on the Arthur Kill. City sewers are located on all streets which border this plant. From observations made through manholes at street level it was estimated the sizes of sewers and their approximate flow. The 12" and 16" sewers on Roosevelt Avenue were estimated to be flowing approximately one quarter full. The 8" sewer on Lafayette Street which starts at the south side of Roosevelt Avenue and flows southerly to Randolph Street had very little flow in it during the time of inspection. At the bend in Roosevelt Avenue an 8" stub with no flow was observed coming from the units located to the north of this Avenue. Our Industrial Waste Report indicates that all units north of Roosevelt Avenue discharge approximately 2560 gpm and the units located between Roosevelt Avenue and Lafayette Street discharge approximately 110 gpm. All discharges go directly to the Arthur Kill.


NORTH
Good Machinery Corp.
Carteret, N.J.
STATEN ISLAND
Port Reading
Tufts Pt.
Smoking Pt.
Rossville
Cedar Pt.
Lakes I.
Great Kills
Great Kills Harbor
Princess Bay
Hugenot Beach
Hugenot
Annadale
Tottenville
Rest Bank
Kreischerville
Bloomfield
Greenville
Tremley Pt.
Chelsea
Arlington
Richmond
Old Place
Gulfport
Kilmeadow
Kilmeadow Pt.
Great Kills Pt.
Hugenot Plains
Hugenot Valley
Princess Bay
Pleasant Plains
Tompkinsville
Port Ivory
Chrome
Carteret
Tremley
Rahway R.
Fresh Kills
Arthur Kill
Raritan Bay
Great Kills Harbor
Great Kills Harbor Channel
Depth of 10 feet was available for width of 120 feet - May 1954
Radio Towers
Staten Island
Authorized reproduction of U.S.C.&G.S. Map
Not for use in navigation
ARTHUR KILL SURVEY
SAMPLING STATIONS
0
1
NAUTICAL MILE
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1957


GENERAL AMERICAN
TANK & STORAGE CO. INC.
ARTHUR KILL
FOOD MACHINERY CO.
WESTVACO
AVE
ROOSEVELT AVE
ST.
Map of the
BOROUGH CARTERET
Area Adjacent
TO
WESTVACO - FOOD MACHINERY

CONCLUSION

After carefully reviewing the city sewer maps and from on the site observations in the following communities: Carteret, Perth Amboy and Port Reading in the Woodbridge Township, it is reasonable to assume that of the 13 industrial plants in question 8 of them could divert their waste discharges to the city sewer system.

The following plants located in the Borough of Carteret have city sewers which are adequate in size and within reasonable distance to their respective plants:

1. Agrico Chemical Company
2. Foster Wheeler Company
3. Metal & Thermit Corporation
4. Westvaco Company

However, it should be kept in mind that the designed flow of the Carteret Sewage Disposal Plant is 3.0 MGD. The average daily flow for the past year at this plant was reported as 2.9 MGD. While U. S. Metals already has a 6" sewer line connected to the 12" city sewer, their reported average discharge of 36.0 MGD would need further study. The problem arising with Armour Fertilizer Company and General American Tank & Storage Company is that they are situated over 1200 feet from the nearest city sewer.

In the Port Reading section of Woodbridge Township Hess Oil Company and Koppers Chemical Company would connect to the local sewer system. Their respective flows would be diverted to the Woodbridge Sewage Disposal Plant via the 18" gravity line which at the present time has sufficient capacity for this additional flow. The Woodbridge Treatment

Plant has a designed flow for 10.0 MGD and the daily average flow as reported for this plant was only 3.4 MGD. The only industrial plant in this area which would encounter some problems is the Creosoting Plant of Koppers Company.

In the Perth Amboy area, the following industrial plants could be served by the city sewer system: American Smelting & Refining Company and California Oil Company. The city sewer system and pumping stations have adequate capacity for this additional flow. The Perth Amboy Sewage Disposal Plant has a designed capacity of 10.0 MGD and last year their average daily flow was reported at 5.4 MGD. In this area some difficulties would be encountered at the Hess Oil Company due to the distance involved between their plant and the nearest city sewer.

FG:k
11165

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
GRASSELLI PLANT
LINDEN, NEW JERSEY 07036

CHEMICALS AND PIGMENTS DEPARTMENT

March 30, 1990

N.J. Department of Environmental Protection
Division of Hazardous Waste Management
2 Babcock Place
West Orange, New Jersey 07052

Attn: Gary Greulick

GRASSELLI PLANT VOLUNTARY ENVIRONMENTAL INVESTIGATION

As discussed, we are in the early stages of a voluntary environmental investigation.

As suggested, we will use ECRA standards as a guiding protocol in developing our plan.

We expect to complete the operating history assessment by the end of the third quarter 1990. We will advise of remediation plans when formulated.

Attached for your file -

1) Topographical elevation plot plan of the test holes to determine an affective remediation plan for the diesel spill (Drawing No. NJ 76173).

2) Our proposed bid package for the operation history/remedistion investigation.

3) The landfill/history of the site known at this time (Drawing No. SK 7692-ML).

Michael P. O'Brien

Michael P. O'Brien
Plant Manager

MPO/jhw
Attach.

BAA000039

CC: Brian L. Crisafulli, Hydrogeologist
Division of Water Resources
401 E. State Street - 3rd Floor
Trenton, New Jersey 08625

932170137

TIERRA-B-003677

REQUEST FOR BIDS FOR:

GRASSELLI PLANT
OPERATIONAL HISTORY

INTRODUCTION

The Grasselli Plant (GNJ) Linden, N.J. is seeking bid proposals on a contract for the compilation of a GNJ Operational History. This history will consist of information from various sources (i.e. remote sensing, aerial photos, maps, environmental documents, operational documents, regulatory documents, etc.) assembled so the GNJ site has a sequential history of plant buildings, the operations within these buildings and the waste disposal practices with these buildings and/or operations.

This document describes the nature of the work requested, the time constraints, the format of the bid proposal and how the bid proposals will be evaluated.

BACKGROUND INFORMATION

The GNJ is a manufacturing facility that has been producing a variety of organic and inorganic chemicals at this location for approximately 124 years. Du Pont purchased the site in 1928. During this time th regulaltions governing waste handling or disposal have gone from nonexistent to very stringent. Not only are past practices no longer acceptable for today's plant operations, but the impact of past practices must be assessed and possibly reversed.

The Grasselli Plant is in the initial stage of a voluntary enviromental investigation. We require

- o A Remedial Investigation (RI) to assess site contaminants, contaminant movement, and potential impact.
- o A Feasibility Study to evaluate the contamination and determine an appropriate remedial action.
- o A Remedial Action to mitigate any discharges discovered and potential risks to public health and the environment from hazardous substances detected at the site.

An initial part of the RI is a compilation of the GNJ Operational History. This history will be used to determine the locations of (and the processes used in) all present and past buildings (many buildings have been "lost" to history). Once this information is compiled, GNJ will have a better understanding of potential waste site locations and their types of waste.

REQUIREMENTS

The CONTRACTOR must meet the following requirements to be considered for this contract.

- o Five years experience with environmental record searchs.
- o Demonstrated ability to compile a site history using the general methods presented in the Scope of Work.

SCOPE OF WORK

This Scope of Work presents Du Pont's requirements for the general direction of the study and describes what Du Pont wants the study to accomplish. The Scope of Work does not contain specific study details, Du Pont is relying on the expertise of the CONTRACTOR to provide the operational specifics.

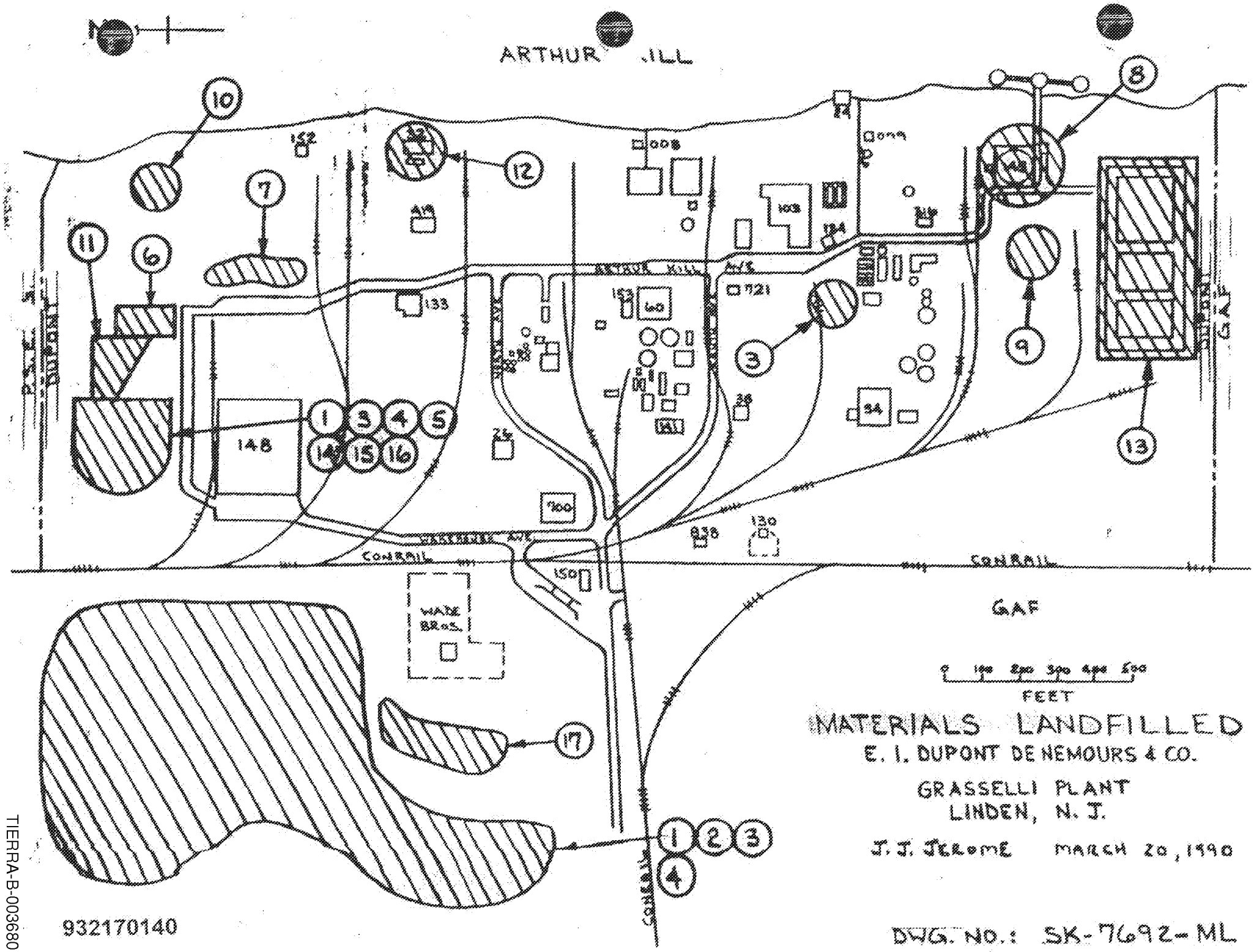
The CONTRACTOR is requested to compile a series of maps showing the evolution of GNJ plantsite. These maps must contain building locations, prominent landmarks, topogragphic features and associated waste sites. These maps should be sequential, a new map for each major change (i.e. the addition of: a large building, a group of smaller buildings, a new process, etc.). Accompaning these maps must be a report that details the operational processes for each building (or group of buildings) and describes the waste disposal processes. In addition there must be several maps that provide an overview of the study.

The Operational History is a research document; a determination of where waste might be, or probably was, disposed of. It is to include only "hard" facts gained from research and interviews. Information gained during the interview process must be identified as such, and verified before it is included in the report. The CONTRACTOR is not being asked to verify the report results (i.e. sampling, etc.) or to make any judgements on the potential waste sites (i.e., priority, risk assessment, etc.).

The CONTRACTOR is to review all possible sources for research information. These should include, but not be limited to: remote sensing, aerial photos, maps, environmental documents, operational documents, regulatory documents and any additional documentation or records that detail plant operations.

All phases of the project must be documented, and this documentation is to include the rationale for all decisions.

To ensure that the project direction is acceptable to GNJ, the CONTRACTOR must work closely with GNJ and include them in all



932170140

TIERRA-B-003680

GRASSELLI PL. ., LINDEN, N.J.

LOCATION	GENERAL DESCRIPTION OF FACILITY	DATES	GENERAL DESCRIPTION OF MATERIAL	FACILITY CONSTRUCTION	SITE AND GROUNDWATER CONDITION
1.	Landfill	1955-75	Coal, coal ash and celestite ($SrSO_4$) residues (Strontium nitrate muds)	5 acres; pumped directly onto ground; no dikes	Groundwater condition unknown; non-hazardous material*
2.	Landfill	1928-50	$CaSO_4$ with an estimated 2-3% phosphate residual (Phosphate Plaster)	10-12 acres; pumped directly onto ground; no dikes	Groundwater condition unknown; non-hazardous material*
3.	Landfill	1928-75	Sand, filter aid and minor quantities of sodium silicate (Silicate muds)	3 acres; pumped directly onto ground; no dikes	Groundwater condition unknown; non-hazardous material*
4.	Landfill	1928-73	Diatomaceous earth, sulfur, carbon, and rust particles (Hypo muds)	3 acres; pumped directly onto ground	Groundwater condition unknown; non-hazardous material*
5.	Landfill	1928-71	Salt cake (Sodium Sulfate)	3 acres; spread on top of ground; no dikes	Groundwater condition unknown; non-hazardous waste*
6.	Buried Tanks	1960-71	Polystyrene, bromo ethyl benzene, and tars (SSS still bottoms)	3 inground tanks	Contents of all 3 tanks disposed of through Rollins Environmental and tanks removed 1978
7.	Landfill	1955-75	Iron sulfides (Strontium sulfide)	3 acres; pumped directly onto ground	Groundwater condition unknown
8.	Landfill	1928-60	Sulfur	0.5 acre; remains of sulfur pile used as raw material for the manufacture of sulfuric acid	Groundwater condition unknown

*Non-hazardous material according to current regulations (federal and state).

LOCATION	GENERAL DESCRIPTION OF FACILITY	DATES	GENERAL DESCRIPTION OF MATERIAL 2	FACILITY CONSTRUCTION	SITE AND GROUNDWATER CONDITION
9.	Landfill	1964	$AlCl_3$ and hydrochloric acid ($AlCl_3$ wastes)	0.2 acres; estimated 8000 gallons discharged into area with ground dikes	Groundwater condition unknown; dikes no longer in existence
10.	Surface Pond	1947-77	Aqueous waste from chloronch's and methoxychlor processes	Small above ground pond; lining material unknown	Groundwater condition unknown; ponds were deinventoried through Rollins Environmental and dismantled about 1978
11.	DMS Equipment Burial	1961-83	Wood scaffold and metal pipe used in DMS - decontaminated prior to disposal	Open trench area	Groundwater condition unknown
12.	Lithopone Production Facility	1901-30	Lithopone is a lead based compound.	Unknown	Unknown
13.	Pond A Pond B Pond C 2MM Gallon Hypalon-lined Ponds (3 Ponds)	1968-88	Wastewater from DMHA process. Largely water with dissolved sodium sulfide. Contained less than 1% organics	3-45 mil; hypalon-lined ponds. Above ground construction	Wastewater was barged to sea until DMHA production was discontinued in 1986
14.	SO3 Drum Neutralization Area	1978	Frozen SO3 drums were punctured and covered with limestone	Open area	Unknown
15.	Landfill	1970-80	008 pond dredging	Open ground	Unknown
16.	Landfill	1964-74	Symetrel	Open ground	Unknown
17.	?	?	Discovered what appears to be buried drums	?	Removed on 3/27/90 by Chemical Waste Mgt. Found to be empty drums - no hydrocarbons or hazardous material

1912

NWER - LU -

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO Ron Corcory

FROM Tom Sherman DATE November 13, 1981

SUBJECT Formaldehyde incineration at DuPont - Linden Plant

Tessie Wishart of Cancer & Toxic substances called in regards to DuPont - Linden. She is reviewing 1978 Industrial Waste Survey Reports and DuPont - Linden reported on-site incineration of 136,000 pounds formaldehyde in 1978.

I told her there was no SWA registration for it, but it may have been okayed by Air Pollution without our knowledge of the operation. I also told her there was no DuPont - Linden incinerator in the EPA Part A filings that Mohammed Elsaady has, so the operation may be terminated.

I told her I would pass this on to our inspection staff (namely you) to inquire if a RCRA inspection for DuPont - Linden has been/will be done, and if so whether it can be ascertained whether formaldehyde or other incineration is continuing at the site.

She would appreciate a return call (4-2301) if anybody has any further information on the matter.

Tom Sherman

Tom Sherman

TS:eom

EPA Inspector.

Wayne - Follow-up. RC

BAA000019

932170010

TIERRA-B-003683

Follow Up Date: 1/2/85

D: December 19, 1984

Time: 3:15 p.m.

Subject: Spill-Molten Sulphur

Location of Complaint: Foot of South Wood Avenue
Du Pont's

Complainant's Name: Peter Sampson

Address: Associated Press

Phone No.: 643-1887

Complaint: 10-12 tons of Molten Sulphur spilled at the docks in Linden. The Coast Guard is going there. lvo

Owner: Du Pont

8AA000024

REMARKS: Investigated by: ..... Date .....

12/19/84 I telephoned the Coast Guard and spoke with Sid Marsen (MK I). The spill took place at DuPont and most of it right on the dock. They had men there to verify this. HFG:lvo

12/20/84 Visited Dupont Co. plant, spoke to Harry McDowell, Plant Engineer, and Jim Koterski, Plant Engineer. Richard Kozub, Middlesex County Air Pollution also in attendance at time of visit. Visited dock, site of spill. Incident: Ship Line unloading Molten sulfur spilt approximately 3 tons (Estimate by Coast Guard) onto dock and into water (solidifying. Sulfur on dock cleaned up. Evaluation of contents in water to be made and method to remove same from water in progress. PS:sd

12/20/84 I spoke with J.R. Goughnour, Plant Manager of DuPont, regarding spill of sulfur Also spoke with Richard Hills, Middlesex County Air Pollution, regarding spill of Oleum on 12/20/84, at 8:05 a.m., lasting approximately 1 minute. HFG:sd

12/21/84 Letter sent this date to J.R. Goughnour, DuPont. (cc: CRRR). HFG:sd

12/31/84 Visited DuPont, spoke with Mr. Joe Demeter. Checked dock area where spill occurred. Area appears clean. Mr. Demeter stated that U.S. Coast Guard had monitored clean up activityes. Mr. Demeter stated spill was due to a rupture in a transport hose. NK:sd

12/24/84 Letter received this date from J.R. Goughnour, Plant Manager, Dupont, regarding Sulfur Spill

932170022

TIERRA-B-003684

41076 REV. 12-80

DU PONT

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

GRASSELLI PLANT
LINDEN, NEW JERSEY 07036

CHEMICALS AND PIGMENTS DEPARTMENT

RECEIVED
DEC 24 1984
BOARD OF HEALTH

December 20, 1984

H. Gaven
Linden Board of Health
N. Wood Avenue
Linden, N.J. 07036

SULFUR SPILL
E. I. DuPont de Nemours & Co.
Grasselli Plant

At approximately 1:20 PM on 12/19, a leak developed in the unloading line (hose) of the Harold H. Jaquet, a Ship delivering sulfur to the Grasselli Plant. No injury occurred. The leak lasted for 1 to 2 minutes. Based upon pumping rate, it is estimated that 202 to 250 tons of sulfur was spilled, part on to the plant loading dock and part into the Arthur Kill River. Of the material spilled into the River, the vast majority solidified and is resting under water between the ship and the Riverbank.

The Ships Representative notified the Coast Guard at our request within 15-30 minutes of the incident. We then talked directly with the Coast Guard in a separate conversation to insure adequate reporting.

According to Ship's Representative, unloading hoses are pressure tested at 200 psi every two months. Also the hoses are not used for more than 2000 hours. Inspection of the Ship's records verified the status of the failed hose as last tested in October and in service 1100 hours.

J. R. Goughnour

J. R. Goughnour

Plant Manager

JRG/dwm

932170023

Douglas E. Henry

December 21, 1984

J.E. Goughnour, Plant Manager
E.I. du Pont de Nemours & Company
Grasselli Plant
Linden, New Jersey 07036

Dear Mr. Goughnour:

On December 20, 1984, I spoke to you over the telephone regarding the incident concerning the sulfur spill. At that time, I requested that you send me a letter concerning our conversation.

I wish to call to your attention the Public Health Nuisance Code of the State of New Jersey, which was adopted by the Linden Board of Health. You will note Section II, Nuisances Defined and Prohibited.

Sincerely yours,

Henry T. Cavan
Health Officer

RECEIPT FOR CERTIFIED MAIL
NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

Sent to J.E. Goughnour, Plant Mgr.
E.I. duPont deNemours & Co.
Street and No. Grasselli Plant
P.O., State and ZIP Code Linden, NJ 07036

Postage	$ .37
Certified Fee	.75
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	.60
Return receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$ 1.72
Postmark or Date	

PS Form 3800, Feb. 1982 * U.S.G.P.O. 1984-446-014

RETURN RECEIPT

811, July 1982

20

932170024

TIERRA-B-003686

Follow Up Date .....

Date: December 26, 1994

Time: 12:30 pm

Subject: Air Pollution

Location of Complaint: DuPong

Complainant's Name: Mrs. Catalano

Address: 207 Lower Road

Phone No.: would not give phone

Complaint: She heard there was another "spill" at DuPong. She wants to know why the residents aren't notified to stay indoors. sd

Owner: DuPont

REMARKS: Investigated by: ..... Date .....

932170025

Improve our earth

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
METRO BUREAU OF REGIONAL ENFORCEMENT
2 BABCOCK PLACE
WEST ORANGE, NEW JERSEY 07052

RECEIVED
JUL 5 1988
BOARD OF HEALTH

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

June 29, 1988

Mr. Harry McDowell, Senior Consultant
E.I. duPont de Nemours and Company, Incorporated
Grasselli Plant
South Wood Avenue
Linden, NJ 07036

Re: Compliance Evaluation Inspection
E.I. duPont de Nemours and Company, Incorporated
NJPDES No. NJ 0002640
Linden/Union County

BAA000032

Dear Mr. McDowell:

A Compliance Evaluation Inspection of your facility was conducted by a representative of this Division on May 18, 1988. A copy of the completed inspection report form is enclosed for your information.

Your facility received a rating of "UNACCEPTABLE" due to the following deficiencies:

1) The permittee did not conduct toxicity (bioassay) analysis at DSN's 005, 008 and 009 during monitoring periods August through October, 1987, and November, 1987 through January, 1988 as required by the facility's NJPDES permit.

2) The permittee has not submitted to this Division an Emergency Plan or exemption as required by Part III, Section C of the facility's permit.

3) Processes which formerly discharged to surface waters via DSN 005 have been shut down. However, a heavy discharge was observed at DSN 005 during this inspection. In addition, a sulfurous smell could be detected at this outfall.

4) Subsequent to the issuance of the facility's Draft Discharge to Ground Water (DGW) permit, the permittee agreed to submit to the Bureau of Ground Water Discharge Control (BGWDC) a proposal regarding

the resiting of several monitoring wells which would be required pending issuance of a Final DGW permit. As of the date of this correspondence, the required submittal has not been received by BGWDC.

Since the deficiencies cited are presently, or could, in the future, adversely affect effluent quality, you are DIRECTED to institute measures to correct the deficiencies. A written report concerning specific details of remedial measures to be instituted, as well as an implementation timetable, must be submitted to this Department and USEPA, Permits Administration Branch, within thirty (30) calendar days of the date of this correspondence.

Both the New Jersey Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.,) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq.) provide for substantial monetary and criminal penalties in cases of permit violations.

Please direct all correspondence and inquiries to Richard G. Perusse, the Compliance Investigator responsible for this case, who can be reached at (201) 669-3900 or by letter through this Division.

Failure to fully comply with the above will result in the initiation of enforcement action by this Department and/or the United States Environmental Protection Agency. This shall in no way be construed, however, to indicate any exemption on your part from possible penalties for violations indicated by the Compliance Evaluation Inspection, as stated above.

Very truly yours,

Thomas B. Harrington

Thomas B. Harrington
Supervisor, Compliance
Monitoring Unit
Metro Bureau of
Regional Enforcement

A27:G25

c: Dr. Richard A. Baker, USEPA
Mr. Paul Molinari, USEPA
Mr. Ted Hayes, BGWDC
Mr.Guatem Patel, BIWM
Mr. Jaff Redding, BIWM
Mr. Henry F. Gavan, H.O.

Enclosure

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0002640 NO. OF DISCHARGES 004, 5, 8 & 9 CLASS MAT-IND-DSW

DISCHARGER E. I. duPont de Nemours and Company, Incorporated

OWNER Same as above

MUNICIPALITY Linden COUNTY Union WATERSHED CODE Metro

LOCATION South Wood Avenue - Grasselli Plant

RECEIVING WATERS Arthur Kill STREAM CLASS TW-3

LICENSED OPERATOR & PLANT CLASS Mr. Frank Drewsicke

TRAINEE/ASSISTANT has tested, not yet licensed OTHER INFO. Main Gate # 908 474-1245

DEFICIENCIES OR COMMENTS 1) Facility did not perform required toxicity (Bioassay) testing at DSN's 005, 8 + 9 during the Aug. through Oct. '87 and Nov '87 through Jan '88 monitoring periods. 2) Facility has not submitted an Emergency Plan or exemption as req'd by Part III Sect C of permit 3) Facility may not have applied for a Treatment Works Approval (TWA) or Waiver for the treatment systems for DSN's 008 + 9 as req'd by NJAC 7:14A-1 et seq 4) Processes which formerly discharged via DSN 005 are reportedly shut down, see (cont. page) *

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☑ Unacceptable

EVALUATOR Richard G. Perosse TITLE Environ. Compliance Investigator

INFORMATION FURNISHED BY (Name) Messers Harry McDowell + Stanley Larrice

(Title) Sr. Consult + Operations Mngr. (Organization) E. I. duPont de Nemours + Co., Inc.

DATE OF INSPECTION May 18, 1988

932170095

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002410
Date: May 15, 1985

E.I. DuPont

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 004	---	Water source - Arthur Kill
	WASTEWATER SOURCE(S)	---	NCCW for condensers - process shut down *
	CONTINUITY OF OPERATION	---	005 for ~ 1 yr.
	BYPASSES/OVERFLOWS	M	
	S.P.C.C. PLAN	S	5/85
	ALARM SYSTEMS	M	
	ALTERNATE POWER SUPPLY	—	Plant has back-up generators
	DEC/DCR	—	Scheduled to BWP 5/1/85 as requested - no reply
	BWP	S	OK'd by BWP on 5/20/85
TREATMENT PROCESSES			* Dimethyl Hydroxylamine (DMHA) process
		NA	* Continued from pg 1
			see yet a discharge was observed at DSN 005 at the time of this inspection. In addition there was a sulfurous smell in the DSN 005 area.
SLUDGE HANDLING	Tank Cleaning and Gas Purging of Plant 12 tanks from Octanol	—	Gen. # DEA1D002185965 to Chambers Waste Treatment Plant - duPont
	Process Wastewater	—	3 DMHA lagoons lined & liquid OCS - to be addressed on DSN Permit
	DISPOSAL SITE	—	Sea dump (wastewater/sludge from DMHA lagoons)
INFORMATION	FLOW METER & RECORDER	S	gates O.
	RECORDS	S	Permit, DMR's
	SAMPLING PROCEDURES	—	Co. personnel + autosampler
	ANALYSES PERFORMED BY	S	duPont Louden Lab #50050
		S	NY Test (Corp, Inorganic) Lab #73159
	Manufacture sulfuric acid, acid salt and Fume Metallic		Physical Connection Permit #528
	~110 employees		
AER	FINAL EFFLUENT APPEARENCE	—	No discharge
	REC. WATERS APPEARENCE	—	Arthur Kill

932170096

TIERRA-B-003691

Form DWR.053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: May 18, 1988

E.I. DuPont

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 005	---	Water source - Arthur Kill + city water
	WASTEWATER SOURCE(S)	---	Acid for condensers + scrubbers - process ops.
	CONTINUITY OF OPERATION	---	
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	NA	
	ALTERNATE POWER SUPPLY	—	Plant has back-up generators
TREATMENT PROCESSES		NA	
SLUDGE HANDLING	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Metered
	RECORDS	S	
	SAMPLING PROCEDURES	—	
	ANALYSES PERFORMED BY	S	DuPont + NY Test
OTHER	FINAL EFFLUENT APPEARENCE	M	Appeared reddish to be acid, [illegible] There is disp. from outfall - subsides small
	REC. WATERS APPEARENCE	—	Arthur Kill

932170097
TIERRA-B-003692

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Page 4 of 6 (I)
Permit #: NJ0002240
Date: May 15, 1988

E. I. du Pont

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 003	---	Water Sources - Arthur Kill + city water
	WASTEWATER SOURCE(S)	---	Cooling water, scrubber water
	CONTINUITY OF OPERATION	---	24 hr/day
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	S	
	ALTERNATE POWER SUPPLY	S	Plant has back-up generators
TREATMENT PROCESSES	Neutralization	S	NaOH, High/low pH indicator
	Clarification	S	4 - Mixing pond - unlined 1 - Settling pond - unlined → to be addressed in DGW permit
SLUDGE HANDLING			Sludge to Chambers Works
	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Parshall Flume
	RECORDS	S	
	SAMPLING PROCEDURES	—	
	ANALYSES PERFORMED BY	S	du Pont - NY Test
OTHER	FINAL EFFLUENT APPEARENCE	S	
	REC. WATERS APPEARENCE	—	Arthur Kill

932170098

TIERRA-B-003693

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002140
Date: May 15, 1985

E.I. duPont

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 009	---	Water source = Arthur Kill
	WASTEWATER SOURCE(S)	---	Acid for H_2SO_4 unit
	CONTINUITY OF OPERATION	---	24 hrs/day
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	S	
	ALTERNATE POWER SUPPLY	—	Plant has backup generator
TREATMENT PROCESSES	Automatic Neutralization	S	NaOH
SLUDGE HANDLING	DISPOSAL SITE		
OTHER INFORMATION	FLOW METER & RECORDER	S	Rockwell Flume
	RECORDS	S	
	SAMPLING PROCEDURES	—	
	ANALYSES PERFORMED BY	S	duPont + NY Test
	FINAL EFFLUENT APPEARENCE	S	
	REC. WATERS APPEARENCE	—	Arthur Kill

932170099

932170100

Form DWR-053
3/81

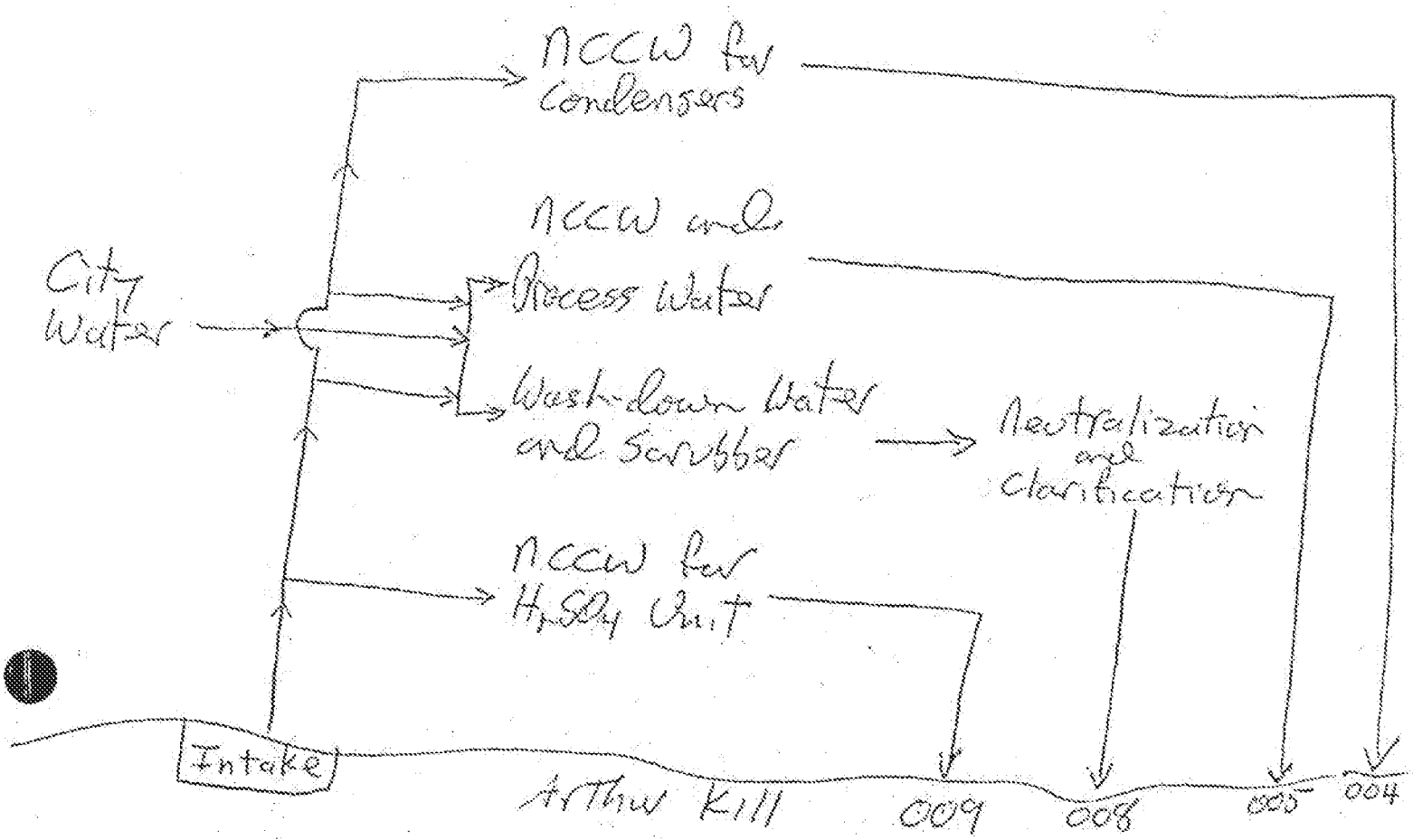
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

Permit # NJ0002246
Date May 19, 1983

I. duPont

PLANT DIAGRAM AND FLOW SEQUENCE:



Samples Not Taken

DISCHARGE DATA

~~SOURCE~~ Jan 88 non-compliance ~~PERIOD~~ duPont - Dubl case 1/12/88

DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA	DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA
009	TSS	Comp.	365 Kg/day	563					

MONITORING DEFICIENCIES: as stated above - attributed to sweep removal activities.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0002640 NO. OF DISCHARGES 5 Surf Disp. - 8 MW's proposed CLASS MAT-IAD-DGW

DISCHARGER E.I. duPont de Nemours and Company, Incorporated

OWNER Same as above

MUNICIPALITY Linden COUNTY Union WATERSHED CODE 11026

LOCATION South Wood Avenue - Grasselli Plant

RECEIVING WATERS Groundwater ~~STREAM~~ CLASS 5 Surface Impoundments

LICENSED OPERATOR & PLANT CLASS Mr Frank Drewicke

TRAINEE/ASSISTANT has tested, not yet licensed OTHER INFO. Main Contact # (201) 474-1045

DEFICIENCIES OR COMMENTS

Draft Permit - Not Rated

The permittee had agreed to submit to the Bur of Ground Water Discharge Control (BGWDC) a proposal re: the monitoring of monitoring wells req'd by the draft DGW permit by 6/21/1988. The req'd submittal has not been rec'd

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☐ Unacceptable
DRAFT PERMIT ☒ NOT RATED

EVALUATOR Richard G. Rocco TITLE Gwn Compliance Investigator

INFORMATION FURNISHED BY (Name) Messrs. Harry McDowell + Stanley Lacuna
(Title) Sr. Consult + Operations Mgr (Organization) E.I. duPont de Nemours + Co., Inc.

DATE OF INSPECTION May 16, 1989

932170101

CN 029, Trenton, N.J. 08625

Permit # NJD002640

DISCHARGE SURVEILLANCE REPORT

Date May 15, 1988

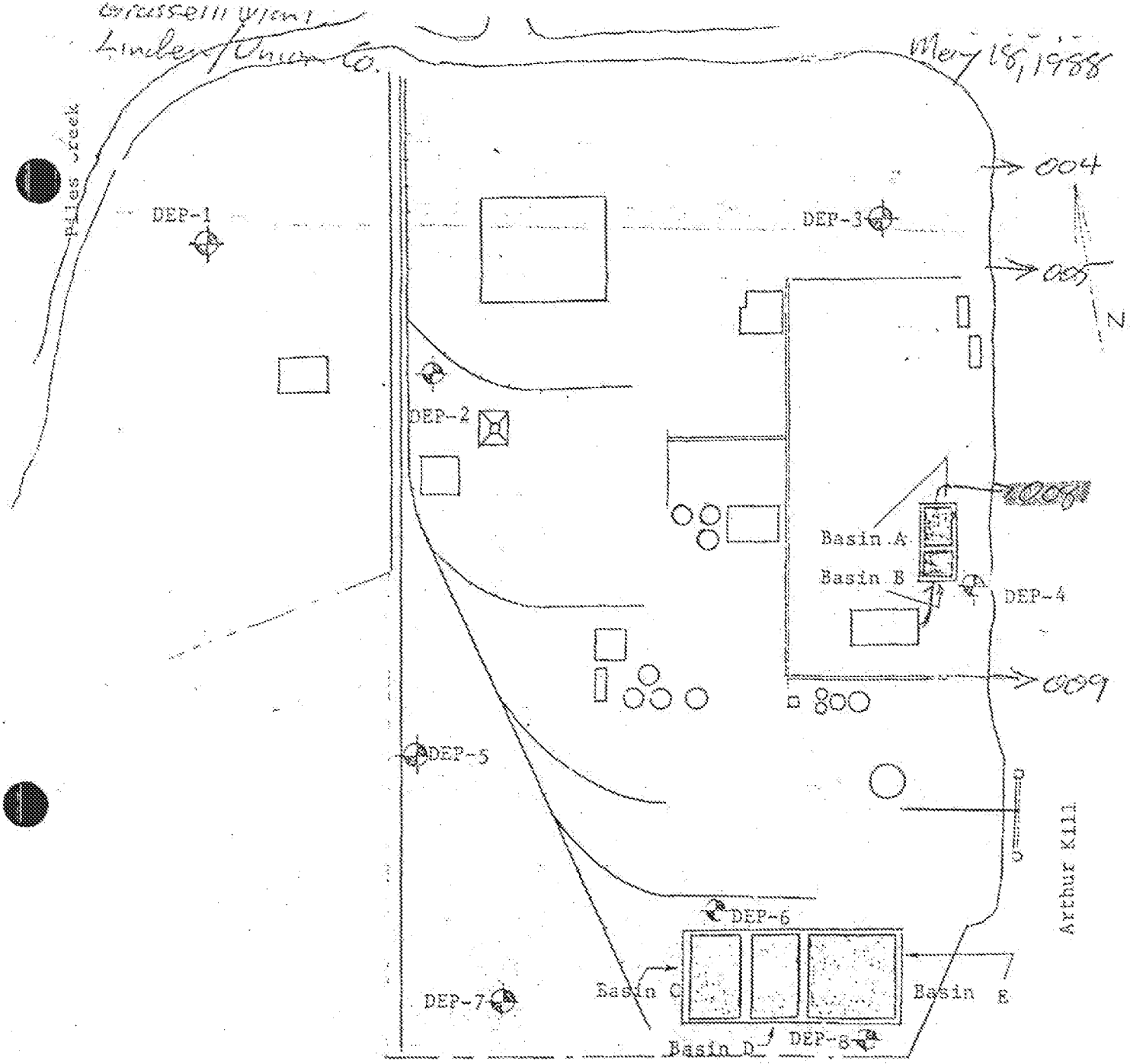
E.I. du Pont

GROUND WATER DISCHARGE EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	TYPE DGW	—	Surface Impoundment (SI)
	RCRA FACILITY	—	NJD002188965 Generator
	DISCHARGE NUMBER	—	17 Basins EPTE 17 Basins A+B
	WASTEWATER SOURCE/FREQ.	—	3 STP's 005, 2 process wastewater → 001 005
	PUMPS AND PIPING	S	
	ALTERNATE POWER/ALARM	—	pH – 002 + 9 NJPDES DSW
	BYPASS	—	
MONITORING SYSTEM	WATER SUPPLY/MONITORING	—	
	AQUIFERS MONITORED	—	
	UPGRADIENT WELLS	—	3 to 8 wells proposed
	DOWNGRADIENT WELLS	—	5
	SAMPLING PLAN	NA	wells not yet installed
	SAMPLING PROCEDURES		
	LAB CERTIFICATION		
	RECORDS		
	REPORTING	✓	
LYSIMETER/ MONITORED WELLS	DRILLING PERMIT NUMBERS	NA	wells not yet installed
	WELLS NUMBERED/IDENTIFIED		
	LOCKS/INTEGRITY		
	ABANDONMENT PLAN		
	ELEVATION INFORMATION		
	WATER LEVEL MEASUREMENT		
	TURBIDITY FREE		
	SUFFICIENT YIELD	✓	
UIC	CLASSIFICATION	NA	
	PERC/LEACHING PROBLEMS		
	SOLVENTS/REPAIRS MADE		
	MAX. PRESSURE & VOLUME		
	CLOSEST USDW/SUPPLY WELLS		
	MOUND INTEGRITY/COVER	✓	
IMPOUNDMENT	LINING INTEGRITY	—	no lining Basins A+B, Hypalon in Basins EPTE visually inspected
	EMBANKMENT INTEGRITY	S	
	LEACHATE COLLECTION SYS.	NA	
	SOLIDS BUILDUP/REMOVAL	S	[redacted] Basins A+B
	HEIGHT TO FREEBOARD	S	~3 ft. Basins A+B
	APPEARANCE	S	
LAND APPLICATION/ SPRAY SYSTEM	EVEN DISTRIBUTION	NA	
	PONDING/RUNOFF/EROSION		
	SPRAY HEADS		
	DISCING		
	COVER CROP		
	APPEARANCE		
	BUFFER ZONE		
	SLUDGE STOCKPILED	✓	
OTHER	SEEPAGE/LEACHING	—	None observed
	ODOR/AEROSOLS	S	none
	FLOW MONITORING/RECORDING	—	

932170102



MONITORING WELL LOCATIONS FOR GRASSELLI PLANT
E.I. DUPONT DE NEMOURS AND COMPANY
NJ0002640

NOTE: Monitoring Wells 2,4,6 & 8 shall be shallow wells not to pentrate the semi-confining peat deposits

Monitoring Wells 1,3,5 & 7 shall be greater than 30' in depth.

* Not to scale

KEY

monitoring well
tank
basin

932170103
TIERRA-B-003698

DuPont Specialty Chemicals
Barley Mill Plaza-Bldg. 27
Lancaster Pike and Rt. 141
Wilmington, DE 19805

DuPont Specialty Chemicals

February 10, 1998

Mr. Robert Simpson
Bureau of Environmental Evaluation
Cleanup and Responsibility Assessment
N.J. DEP
CN028
Trenton, NJ 08625-0028

BAA000066

PRELIMINARY SEEP INVESTIGATION
Piles Creek Wetlands Mitigation Project Area
DuPont Grasselli Plant

Dear Mr. Simpson:

I have attached our preliminary report on the seeps at the Piles Creek Wetlands Mitigation Project Site adjoining our Grasselli Site. As you know, we agreed to propose a work plan for investigating the seeps following receipt of wetland investigation and construction data from the Turnpike Authority (NJTA). While we never received post-construction survey data from NJTA, we have completed a number of preliminary investigation activities to avoid further delay.

Our preliminary investigation consisted of review of relevant data and information, sampling and analysis of four seep locations, groundwater flow analysis and identification of potential contributors to seepage flow. A detailed description of methodology, findings, conclusions and recommendations can be found in the attached preliminary report.

Conclusions of our preliminary investigation are summarized below.

1) Seep water samples collected by DuPont on August 29, 1997 found only arsenic at levels exceeding state groundwater quality criteria. When analytical results were compared to surface water quality criteria, copper and several priority pollutant pesticides also were detected at levels exceeding the criteria.

2) Seep flow rates estimated during our site visit on November 13, 1997 are consistent with hypothetical groundwater flow rates calculated from site-specific data. Thus, natural groundwater flow may be the sole source of observed seep discharge.

932170277

3) Water supply mains that parallel Grasselli Road and feed a fire hydrant near a metal building in the Wade Brothers yard are also potential contributors to observed seep discharges. However, water pressure in the lines has not noticeably decreased over the years according to Mr. Wade.

Based on these conclusions, we propose the following additional investigation to 1) gain better understanding of groundwater flow, influence of tidal change, and other potential flow contributions; and, 2) help determine the source of contaminants detected in seep samples.

1) Install as many as nine (9) hydropunch piezometers upgradient from the seeps (see Figure 9 of preliminary report for proposed locations). Collect groundwater samples from the piezometers and analyze the samples for selected metals and pesticides.

2) Install a staff gauge in the wetland channel upstream from seep discharge locations (see Figure 9 for location). Collect water level data at the staff gauge, hydropunch piezometers and selected upgradient monitoring wells (MW-7A, MW-31A, and MW-11A) to gain an understanding of groundwater flow and tidal influences.

3) Sample and analyze seeps for free and total chlorine using a field test kit. Presence of these analytes, characteristic of municipal water quality, may indicate that underground mains at the site are leaking and contributing to seep flows.

We will initiate this additional investigation upon your agreement to proceed.

Please call me at 302-992-6715 if you have any questions. Thank you for your help with this matter.

Sincerely,

John L. Riddle, Ph.D.
Project Director

PRELIMINARY SEEP INVESTIGATION
PILES CREEK WETLANDS MITIGATION PROJECT AREA

prepared for
DuPont Grasselli Site
Linden, New Jersey

February 10, 1998

Corporate Remediation Group
A Partnership between
DuPont and The W-C Diamond Group
Barley Mill Plaza, Bldg 27
Wilmington, DE 19880

Laurie P. Leitzinger
Laurie P. Leitzinger
Project Scientist

Alan P. Egler
Alan P. Egler
Project Manager

Background

Two seeps were observed by the New Jersey Turnpike Authority's (NJTA's) consultant, Paulus, Sokolowski and Sarter, Inc. (PS&S) in July 1996, during a site visit to the Piles Creek Wetlands Mitigation Project Site. In August and September of 1996, PS&S collected samples from the two seeps (PCA-1 and PCA-2). In addition, a surface water sample (PCA-3) was collected from Piles Creek, at a downgradient location, where the mitigated wetland channel discharges to Piles Creek (see Figure 1). The samples were analyzed for priority pollutant (PP) parameters, and the results were reported in a Memorandum Report dated November 25, 1996. PS&S also reported elevated hydrogen sulfide vapors, detected by air monitoring instruments in the vicinity of the seeps. DuPont was subsequently notified about the existence of the seeps by the New Jersey Department of Environmental Protection (NJDEP). The NJTA seep and surface water sample results are summarized in Table 1 (attached).

New Jersey surface water quality criteria (SWQC) were exceeded for copper, arsenic, mercury, DDD, and DDE. However, it should be noted that, with the exception of copper, these criteria are based on human health risk, which is probably not relevant for discharges to Piles Creek, since no one swims in the stream. GW-IIa groundwater quality criteria (GWQC) were exceeded for arsenic, lead, mercury, and DDD. There were no exceedances for volatile or semivolatile constituents.

A site meeting, that included the NJTA, PS&S, GAF, DuPont, and NJDEP, was held on August 1, 1997. At that time, DuPont agreed to submit a work plan to the NJDEP for investigating the seeps, following the receipt of needed wetland investigation and construction data from the NJTA. With the exception of as-built survey data, which was requested on multiple occasions, the requested information was transmitted by PS&S in October, 1997. As-built survey data has not yet been received by DuPont at this time.

Objective

The primary objective of this document is to present the results of activities conducted since the August 1, 1997 meeting, and to compile all pertinant data that are available for use in determining an appropriate path forward for investigation and remediation of the seeps.

932170280

field duplicate precision, method of standard addition recoveries, and a comparison of the total and dissolved analyte results.

Marsh Disposal Data Review

Available data from the Grasselli Plant history were reviewed to determine the composition of aqueous production wastes (commonly referred to as 'strontium muds') disposed of in the former marsh area from approximately 1928 until 1975. The aqueous wastes, which were pumped directly onto the ground, included industrial sludges composed of: phosphate plaster ($CaSO_4$, with 2-3% phosphate residual), silicate muds (sand, filter aid, and minor quantities of sodium silicate), hypo muds (diatomaceous earth, sulfur, carbon, and rust particles), salt cake (sodium sulfate), strontium sulfide, and strontium nitrate mud (coal, coal ash, and celestite [$SrSO_4$] residues).

The production wastes contain sulfates, which provide electron receptors for sulfur-reducing bacteria (if present). This may explain the presence of elevated hydrogen sulfide readings detected in the vicinity of the seeps.

Review of Site Groundwater Data

Groundwater data collected during remedial investigation activities at the Grasselli plant (September, 1997) are not yet available at this time. However, filtered and unfiltered groundwater data from upgradient wells (e.g., MW-11A, MW-13A, MW-30A, and MW-31A), collected as part of the ECRA investigation (August 1993), were reviewed to determine possible source areas for the elevated constituents detected in seep samples.

ECRA investigation sample results showed elevated levels of metals in upgradient wells at the Grasselli site. Arsenic concentrations detected in unfiltered groundwater samples from the upgradient wells at the Grasselli plant show arsenic concentrations ranging from 0.17 mg/l to 46.1 mg/l. Arsenic concentrations in filtered samples from these wells ranged from no detection (<0.005 mg/l) to 3.0 mg/l. Mercury was detected in unfiltered samples from the potential upgradient wells at concentrations ranging from no detection (<0.0002 mg/l) to 0.053 mg/l, but it was not detected in the filtered samples from these upgradient wells. Copper concentrations in unfiltered samples from the upgradient wells ranged from no detection (<0.01 mg/l) to 6.6 mg/l. Copper concentrations in filtered samples from these wells ranged from no detection (<0.01 mg/l) to 0.01 mg/l. It should be noted that elevated levels of arsenic, mercury, and copper have been detected in groundwater samples from wells on the adjacent GAF property.

932170281

ECRA investigation results showed slightly elevated levels of some pesticide compounds in upgradient wells at the Grasselli site. DDD was detected in unfiltered samples from these wells at concentrations ranging from no detection (<0.10 ug/l) to 2.8 J ug/l, but it was not detected in filtered samples. DDE was detected in unfiltered samples from potential upgradient wells at concentrations ranging from no detection (<0.10 ug/l) to 0.098 J ug/l, but it was not detected in filtered samples. Dieldrin was not previously detected in unfiltered or filtered samples from potential upgradient wells at the Grasselli plant. Methoxychlor was previously detected in unfiltered samples from potential upgradient wells at concentrations ranging from no detection (<0.5 ug/l) to 830 ug/l. Filtered sample results for these wells show methoxychlor concentrations ranging from no detection (<0.5 ug/l) to 0.7 ug/l. Pesticide compounds were not previously detected in groundwater samples from GAF site wells; however, elevated detection limits may have precluded detection.

Dames & Moore also collected groundwater samples from seven shallow monitor wells (e.g., PCMW-1, PCMW-2, PCMW-3, MW-5A, MW-6A, MW-8A, and PCMW-17) and one deep well (MW-8B) as part of the environmental investigation for the proposed Piles Creek East Wetland Mitigation Site (January, 1993). The Dames & Moore sample locations are shown on Figure 3. The groundwater samples were analyzed for TCL volatile and semi-volatile organic compounds, pesticides, PCBs, TAL metals and strontium (filtered and unfiltered), cyanide, and pH. With a few exceptions, no organic compounds were detected. Metals were detected in every sample. The sample results are included here as Attachment 1.

Seep Observation

DERS conducted a site visit on November 13, 1997, to observe the seeps at high and low tide conditions. Quantitative flow measurements were not taken; rather, flow rates were visually estimated. A strong flow was observed at seeps PCA-1 and PCA-2 (QWL01 and QWL02). During the November 1997 site visit, it was visually estimated that flow rates at these two seeps were greater than 5 gpm each. Seeps QWL03 and QWL04 flowed at lower rates. During the November 1997 site visit, the seep discharge rates were visually estimated to be 3 gpm or less at QWL03 and less than 1 gpm at QWL04. Erosion and undermining of the ground surface above the rip-rap bank were observed between PCA-1 and PCA-2.

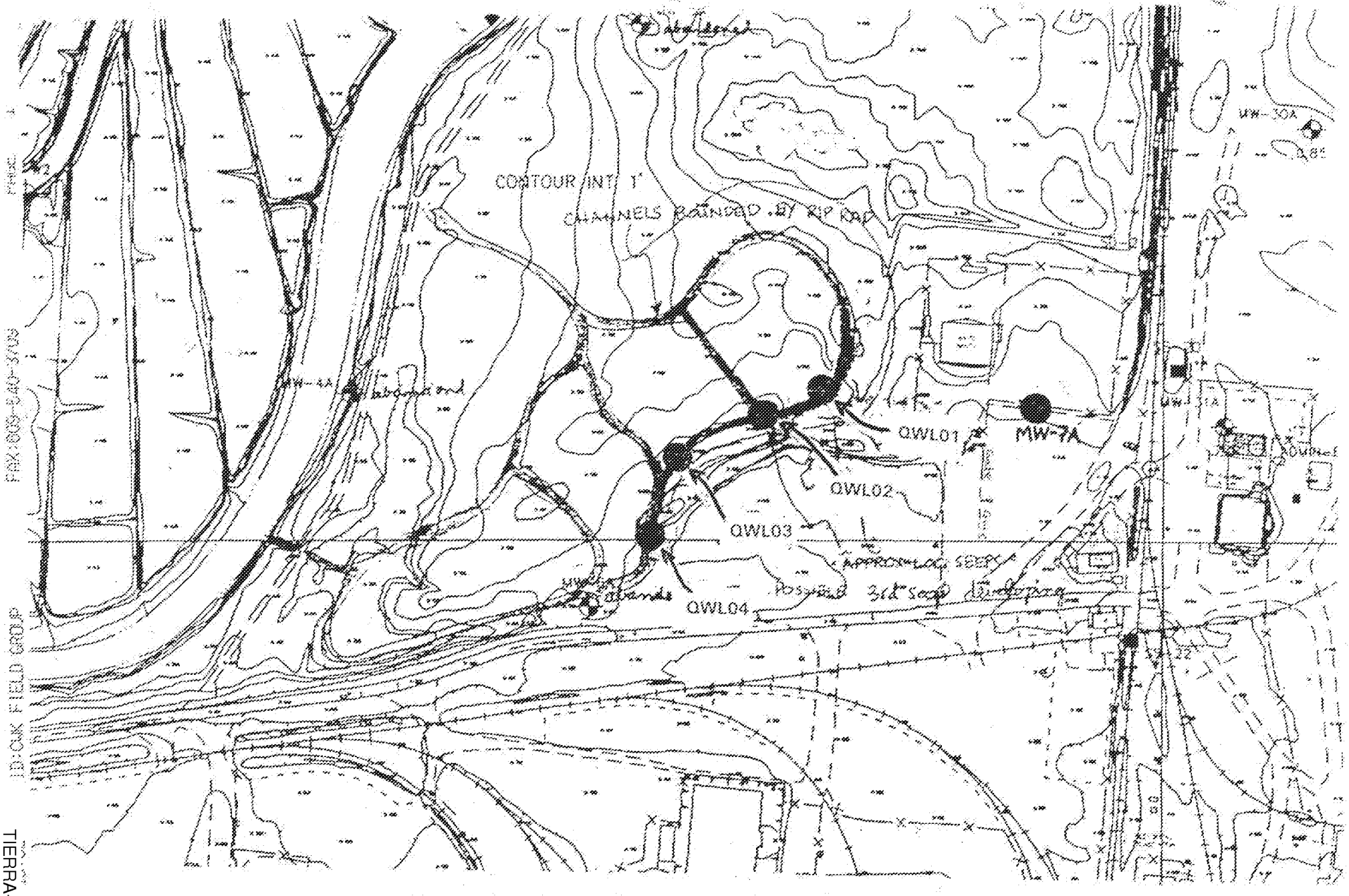


Figure 2 Approximate Locations of Dupont Seep Samples

Piles Creek Mitigated Wetland Project Area (8/29/97 932170283

Underground Utility Location

The Elizabethtown Water Company in Westville, New Jersey was contacted by phone on November 4, 1997, to obtain information on underground water supply lines at the site. A 16-inch water supply main was identified, running parallel to Grasselli Road, but no written record was available to document any secondary mains extending northward from the primary main. However, Mr. Tom Wade of Grasselli Point Industries identified the location of a 2-inch plastic water-supply pipe leading to the metal building in the Wade Brothers yard from a nearby fire hydrant. The fire hydrant is fed by a 6-inch water main, connected to the 16-inch main along Grasselli Road. Grasselli Point Industries installed the line, under contract to the Elizabethtown Water Company. The three water mains are identified on Figure 4. According to Mr. Wade, fill in the area excavated for the water line consists primarily of brick and building rubble.

The primary reason for determining the presence of underground water mains was to evaluate the possibility that leaky mains could be a source for the seeps. A leak in the existing lines would not likely be detected without excavation, though. Mr. Wade has indicated that he has not detected a noticeable decrease in water pressure over the years.

The Water Quality Division at Elizabethtown Water Company was subsequently contacted by phone, to inquire about potential leak indicator parameters that DuPont might test for (e.g., fluoride, chlorine). The water quality representative confirmed that fluoride is not used by the Elizabethtown Water Company, but chlorine is used routinely. She estimated that chlorine (free and total) levels in tap water would be expected to be in the range of <0.05 mg/l to 0.10 mg/l. Because available field test kits can detect free and total chlorine in this range, the indicator parameter may be tested for at seeps in the future. If chlorine is detected in seep discharge, it will indicate that leaking water mains are contributing to the flow.

Surface Water Drainage Pattern Observation

During the November 13, 1997 site visit, surface drainage patterns in the vicinity of the mitigated wetland area were observed. The area to the northeast of the mitigated wetland drains toward the north-south fence line around the Wade Brothers yard, rather than toward the wetland. During periods of heavy precipitation, surface water flows along the fence line and infiltrates the ground in the reed-covered area underlain by rubble fill. According to Mr. Wade, the surface drainage frequently infiltrates an old drain field along his fence line, located at the southwest corner of his metal building, causing it to

completely fill with water. This filled drainfield may act as a continuing source, contributing to downgradient seep flow.

Water-Level Data Review

Shallow water-level data collected on July 14, 1993 indicate that, prior to excavation, there was a groundwater high centered over the mitigated wetland area (see Figure 5). At that time groundwater flowed radially from the mound, toward Piles Creek to the north and west, and toward the Arthurkill River to the east.

Post-excavation water-level measurements were collected from existing site-wide wells, at high- and low-tide, on August 19, 1997. With the exception of a few wells that are tidally influenced (e.g., MW-7A, MW-10A, and MW-18A), shallow monitor wells on site show less than 0.1 foot of tidal water-level variation. Review of the data indicates that there has been a groundwater flow reversal in the area east of the mitigated wetland. The average of high- and low-tide water levels are posted and contoured on Figure 6. The divide that separates groundwater flow to the east and west now runs through the former Grasselli Plant manufacturing area to the east. Based on the contoured water-levels, it has been estimated that the area that currently discharges to the mitigated wetland covers approximately 66 acres to the south and east.

In addition to the groundwater flow reversal that followed excavation of the mitigated wetland area, one of the wells that previously showed no tidal influence (MW-7A) now appears to be strongly influenced by tidal ebb/flow. Recent water-level measurement data for MW-7A indicate a 1.3 foot variation between high- and low-tide water-levels.

Hydraulic Conductivity Data Review

Slug-testing was conducted at 9 Grasselli site wells in September 1997, as part of ongoing remedial investigation activities. The results were comparable with results attained from slug-testing of 4 site wells (including well MW-7A) in 1991. A sitewide average (geometric mean) hydraulic conductivity of 6.5×10^{-3} cm/sec was calculated, based on recent slug-test data. This value is typical of silty sand to well-sorted sand. The hydraulic conductivity value calculated for well MW-7A, located in the Wade Brothers yard, is somewhat higher than the average sitewide value (2.5×10^{-2} cm/sec, which is typical of well-sorted sand or sand and gravel). The lithologic log for well MW-7A indicates that the well is screened in silty laminated 'strontium mud' fill, with some fine gravel. Based on observed secondary solution characteristics in the 'strontium muds' outcropping along the bank at QWL01, this lithologic description appears to be consistant

with the higher than average hydraulic conductivity value attained from slug-testing at well MW-7A.

Cross-Section Preparation

In order to gain a better understanding of the relationship between subsurface materials, groundwater elevations, post-construction surface topography in the vicinity of the seeps, and other site features, two cross-sections were prepared which bisect the mitigated wetland area (see Figures 7 and 8). Section A-A' runs from west to east, approximately 50 feet south of seeps QWL01 and QWL02, whereas Section B-B' runs from south to north between seeps QWL01 and QWL02. The locations of A-A' and B-B' are shown on Figure 4, together with boring and test pit locations, seeps, and other site features.

Sections A-A' and B-B' show the approximate wetland ground surface elevation, based on PS&S pre-construction plans. Post-construction survey data has not been obtained from NJTA to date. Although the nearest remaining water-level measurement point (well MW-7A) is located approximately 250 feet to the east of the mitigated wetland area, approximate water-level elevations (based on boring observations, temporary wells, etc.) are presented on Section A-A'. The approximated water-levels indicate a steep hydraulic gradient in the immediate vicinity of the seeps (particularly at low tide). The apparently steep gradient may be due, in part, to excavation below the former water-table surface, which resulted in groundwater flow direction reversals around the mitigated wetland area.

High permeability miscellaneous fill deposits (sand, cobbles, wood, and bricks), shown near the surface on Section A-A', may induce locally high surface water infiltration rates. Miscellaneous fill deposits (plant matter, wood beams, bricks, concrete, cinders/slag, and large pieces of broken glass), which were encountered within the saturated zone at test pit PC-1, are shown to be in close proximity to seeps PCA-1 and PCA-2 (see Section B-B'). Although the relationship is not clearly understood, the high permeability fill deposit may function as a temporary storage bank for tidal influx, dewatering rapidly with tidal ebb. Section A-A' indicates that the saturated zone occurs primarily in 'strontium mud' fill deposits. These deposits are typically described as 'light gray silt, with a little fine sand and occasional black organic silt and clay seams'. However, based on visual observation of the 'strontium mud', which outcrops in the undermined bank at PCA-1, these fill deposits are very susceptible to the development of secondary porosity (e.g., solution channeling).

Water Balance Estimation

A roughly approximated water balance was calculated for the study area, to determine whether it is possible that natural groundwater flow could support the observed seep flow. Recent water-level measurement data were contoured to determine the maximum possible area contributing to mitigated wetland area discharge (approximately 66 acres). The portion of this area (as much as 1,006,875 ft^2 or 23.1 acres) that might contribute to discharge at seeps PCA-1 and PCA-2 was then calculated. Based on sitewide water-level data, it was assumed that all groundwater flow discharging to the mitigated wetland area originates from direct infiltration of precipitation. An estimated infiltration rate of 9 inches per year was assumed, based on a mean annual crop runoff value of approximately 3 inches per year for the state of New Jersey (EPA, 1985 Water Quality Assessment, p. 152). Thus, the maximum total flow rate for the northernmost seeps, PCA-1 and PCA-2 (combined), was calculated to be 10.75 gpm.

Alternately, an estimated water balance was calculated using Darcy's Law. The hydraulic conductivity value calculated for nearby well MW-7A during September, 1997 slug testing (8.2×10^{-4} ft/sec or 2.5×10^{-2} cm/sec) was assumed to be representative of the study area. Due to the scarceness of wells in the study area, the estimated hydraulic gradient between well MW-31A and an arbitrary point between well MW-7A and the PCA-1 seep face (approximately 0.0025 ft/ft) was assumed to be representative of the study area. Based on a saturated thickness of 6.5 feet at well MW-7A and an average width of approximately 1,200 feet across the recharge area, the estimated discharge from PCA-1 and PCA-2 (combined) was calculated to be approximately 7.2 gpm. Although the calculation involves several estimated variables, the result is generally consistant with the recharge-based estimate (above).

The estimated water balance results, as calculated, fall within a range that would support visually estimated seep discharge rates. This evaluation suggests that normal groundwater flow may be providing the primary source for the seep discharge.

Proposed Investigation Activities

Additional data collection activities are recommended, to gain a better understanding of groundwater flow in the study area and how it is impacted by tides and other factors. The additional data will need to be evaluated prior to the selection of an appropriate remedy.

In order to evaluate the possibility that leaking water mains are the source of seeps, it is recommended that seeps be sampled for free and total chlorine, using a field test kit. The

detection of free and total chlorine would indicate that leaky municipal water supply pipes might be contributing to seep flow. However, due to the high potential for free and total chlorine to oxidize and dissipate, a non-detect result would not entirely rule out the possibility that leaky water mains are contributing to seep flow.

As many as eleven (11) hydropunch piezometers should be installed upgradient from seeps in the study area. In addition, a staff gauge should be installed in the wetland channel, upstream from seep discharge locations. The piezometers and staff gauge would need to be surveyed following installation. Locations of the proposed staff gauge and piezometers are depicted on Figure 9.

Filtered and unfiltered hydropunch groundwater samples should be collected from piezometers installed along the mitigated wetland bank and those bordering the adjacent GAF property. The samples would be analyzed for metal and pesticide constituents identified in the seep samples. Sample results will be used to evaluate upgradient groundwater chemistry and to determine the source(s) of constituents detected in seep samples.

Water-levels should be monitored continuously at the new piezometers and selected upgradient wells (i.e., MW-7A, MW-31A, and MW-11A), to evaluate tidal impacts in the study area. Periodic staff guage water-level measurements would be manually or electronically read and recorded from the staff guage at specified times. The water-level data would be correlated with predicted tide data for the Arthurkill River, obtained from Reeds Nautical Almanac. The continuous water-level data would then be evaluated for tidal impact by calculating and plotting a running, 24- or 72-hour filtered mean water-level for each well. Tidal study results will be used to determine mean groundwater flow directions in the tidally-impacted study area. In addition, the data will be used to determine groundwater flow rates in the study area.

Tables

Table 1

NJTA Seep Sample Results (ug/l)

NJTA Piles Creek Wetland Mitigation Project Site

DuPont Grasselli Plant

Parameter	Greater of GW Quality Criteria (GW-1A) and PQL (Fed. Reg. 2/1/93)	New Jersey Surface Water Quality Criteria for SE3 Waters	PCA-1 Seep Loc. #1 (adj. QW-01) 8/20/96	PCA-2 Seep Loc. #2 (adj. QW-02) 8/23/96	PCA-2 Seep Loc. #2 (adj. QW-02) 9/20/96	PCA-3 Piles Creek Inlet Sample Loc. #3 9/20/96
PRIORITY POLLUTANT METALS						
Beryllium	20	---	2.9	ND (<0.2)	ND (<0.4)	ND (<0.4)
Cadmium	4	---	2.3	ND (<0.4)	ND (<0.8)	ND (<0.8)
Chromium	100	3,230 (h)	97.7	3	ND (<1.8)	8.6
Copper	1,000	7.9 (a); 5.6 (c)	1,157*	3.9	9.1*	28.2*
Nickel	100	3,900 (h)	71	4.4	6.2	6.9
Silver	20	---	ND	ND	ND	ND
Zinc	5,000	---	889	41.4	99.1	51.7
Antimony	20	4,300 (h)	ND	ND	ND	ND
Arsenic	8	0.136 (hc)	115*	901*	106*	2,104*
Lead	10	---	173*	5.4	7.8	7.7
Mercury	2	0.146 (h)	2	ND (<0.1)	ND (<0.1)	0.56
Selenium	50	---	ND	ND	ND	ND
Thallium	10	---	ND	ND	ND	ND
PRIORITY POLLUTANT PESTICIDES						
Aldrin	0.04	1.3 (a); 0.000144 (hc)	ND	ND	ND	ND
Alpha BHC	0.02	0.0131 (hc)	ND	ND	ND	ND
Beta BHC	0.2	0.460 (hc)	ND	ND	ND	ND
Chlordane	0.5	0.09 (a); 0.0040 (c); 0.000263 (hc)	ND	ND	ND	ND
DDD	0.1	0.000837 (hc)	0.27	0.074	0.08	ND (<0.06)
DDE	0.1	0.000591 (hc)	0.03	ND (<0.02)	ND (<0.02)	ND (<0.02)
DDT	0.1	0.13 (a); 0.0010 (c); 0.000591 (hc)	ND	ND	ND	ND
Delta BHC	---	---	ND	ND	ND	ND
Dieldrin	0.03	0.71 (a); 0.0019 (c); 0.000144 (hc)	ND	ND	ND	ND
Endosulfan I	0.4	---	ND	ND	ND	ND
Endosulfan II	0.4	---	ND	ND	ND	ND
Endosulfan Sulfate	0.4	2.0 (h)	ND	ND	ND	ND
Endrin	2	0.037 (a); 0.0023 (c); 0.578 (h)	ND	ND	ND	ND
Endrin Aldehyde	---	0.81 (h)	ND	ND	ND	ND
Gamma BHC - Lindane	0.2	0.16 (a)	ND	ND	ND	ND
Heptachlor	0.4	0.053 (a); 0.0036 (c); 0.000214 (hc)	ND	ND	ND	ND
Heptachlor Epoxide	0.2	0.053 (a); 0.0036 (c); 0.000108 (hc)	ND	ND	ND	ND
Methoxychlor	40	0.03 (c)	NA	NA	NA	NA
Toxaphene	3	0.21 (a); 0.0002 (c); 0.000747 (hc)	ND	ND	ND	ND

ND = not detected
NA = not analyzed
* = above gw criterion
shaded = above sw criterion

SW Criteria:
a = acute aquatic life protection
c = chronic aquatic life protection
h = non-carc. effect-based human health
hc = carc. effect-based human health

932170290

Table 1

NJTA Seep Sample Results (ug/l)

NJTA Piles Creek Wetland Mitigation Project Site

DuPont Grasselli Plant

Parameter	Greater of GW Quality Criteria (GW IIA) and PQL (Fed Reg. 2/1/93)	New Jersey Surface Water Quality Criteria for SE3 Waters	PCA 1 Seep Loc. #1 (adj. QWL01)	PCA 2 Seep Loc. #2 (adj. QWL02)		PCA 3 Piles Creek Inlet Sample Loc. #3
			9/20/96	9/23/96	9/20/96	9/20/96
PRIORITY POLLUTANT VOCs						
Benzene	1	71 (hc)	0.9	0.5	0.9	ND (<0.2)
Toluene	1,000	200,000 (h)	0.3	ND (<0.2)	0.3	ND (<0.2)
Ethylbenzene	700	27,900 (h)	0.9	0.4	0.8	ND (<0.2)
Chloroform	100	470 (hc)	ND (<0.2)	ND (<0.2)	ND (<0.2)	0.4
PRIORITY POLLUTANT SVOCs						
Bis(2-ethylhexyl)phthalate	30	5.92 (hc)	1.3	1.6 J	ND (<1.3)	ND (<1.2)
Pyrene	200	6,970 (h)	0.6	ND (<0.6)	<0.6	ND (<0.6)

ND = not detected
NA = not analyzed
* = above gw criterion
shaded = above sw criterion

SW Criteria:
a = acute aquatic life protection
c = chronic aquatic life protection
h = non-carc. effect-based human health
hc = carc. effect-based human health

932170291

Table 2

DuPont Seep Sample Results (ug/l)

NJTA Piles Creek Wetland Mitigation Project Site

DuPont Grasselli Plant

Parameter	Greater of GW Quality Criteria (GW/IA) and PQL (Fed. Reg. 2/1/93)	New Jersey Surface Water Quality Criteria for SE3 Waters	Samples Collected by DERS 8/29/97					
			QWL01		QWL02		QWL03	
			Total	Dissolved	Total	Dissolved	Total	Dissolved
PRIORITY POLLUTANT METALS								
Beryllium	20		<2.1	<2.1	<2.1	<2.1	<2.1	<2.1
Cadmium	4	---	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
Chromium	100	3,230 (h)	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
Copper	1,000	7.9 (a); 5.8 (c)	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
Nickel	100	3,900 (h)	<7.8	<7.8	<7.8	<7.8	<7.8	<7.8
Silver	20	---	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7
Zinc	5,000	---	25	<9	24.4 J	10.4 J	17.6 J	14.2 J
Antimony	20	4,300 (h)	<1.7 UJ	1.8 J	<1.7 UJ	<1.7 UJ	<8.5 UJ	<8.5 UJ
Arsenic	8	0.136 (hc)	490 J*	380 J*	270 J*	290 J*	<2	28 J*
Lead	10	---	1.8 J	<1.1 UJ	6 J	<1.1 UJ	1.5 J	<1.1 UJ
Mercury	2	0.146 (h)	0.053 J	0.027 J	0.033 J	<0.02	0.024 J	<0.02
Selenium	50	---	<1.2 UJ	<1.2 UJ	<1.2 UJ	8.1 J	11.0 J	25 J
Thallium	10	---	<12 UJ	<12 UJ	<12 UJ	<12 UJ	<24 UJ	<24 UJ
PRIORITY POLLUTANT PESTICIDES								
Aldrin	0.04	1.3 (a); 0.000144 (hc)	<0.0063	<0.013	<0.032	<0.0063	<0.0063	<0.0063 UJ
Alpha BHC	0.02	0.0131 (hc)	0.0042 J	<0.0010 UJ	<0.0010	0.0033 J	<0.0010	<0.0010 UJ
Beta BHC	0.2	0.460 (hc)	<0.0011	<0.0011 UJ	<0.0011	<0.0011	<0.0011	<0.0011 UJ
Chlordane	0.5	0.09 (a); 0.0040 (c); 0.000283 (hc)	<0.020	<0.020 UJ	<0.020	<0.020	<0.020	<0.020 UJ
DDD	0.1	0.000837 (hc)	<0.0048	<0.0096 UJ	0.02	<0.0048	0.0051 J	<0.0048 UJ
DDE	0.1	0.000591 (hc)	<0.0010	<0.0010 UJ	<0.0010	<0.0010	0.0013 J	<0.0010 UJ
DDT	0.1	0.13 (a); 0.0010 (c); 0.000591 (hc)	<0.0090	<0.0090 UJ	<0.0090	<0.0090	<0.0090	<0.0090 UJ
Delta BHC	---	---	<0.0030	<0.0030 UJ	<0.0030	<0.0030	<0.0030	<0.0030 UJ
Dieldrin	0.03	0.71 (a); 0.0019 (c); 0.000144 (hc)	<0.0010	<0.0010 UJ	<0.0010	<0.0010	0.00093 J	0.00083 J
Endosulfan I	0.4	---	<0.0040	<0.0020 UJ	0.022	0.083 J	<0.0020	<0.0020 UJ
Endosulfan II	0.4	---	<0.0049	<0.0049 UJ	<0.0049	<0.0049	<0.0049	<0.0049 UJ
Endosulfan Sulfate	0.4	2.0 (h)	<0.0030	<0.0030 UJ	<0.0030	<0.0030	<0.0030	<0.0030 UJ
Endrin	2	0.037 (a); 0.0023 (c); 0.678 (h)	<0.0071	<0.0071 UJ	<0.0071	<0.0071	<0.0071	<0.0071 UJ
Endrin Aldehyde	---	0.81 (h)	<0.0048	<0.0048 UJ	<0.0048	<0.0048	<0.0048	<0.0048 UJ
Gamma BHC - Lindane	0.2	0.16 (a)	<0.0010	<0.0010 UJ	<0.0010	<0.0010	<0.0010	0.0019 UJ
Heptachlor	0.4	0.053 (a); 0.0036 (c); 0.000214 (hc)	<0.0016	<0.0016 UJ	<0.0016	<0.0016	<0.0016	<0.0016 UJ
Heptachlor Epoxide	0.2	0.053 (a); 0.0036 (c); 0.000106 (hc)	<0.0010	<0.0010 UJ	<0.0010	0.001 J	<0.0010	<0.0010 UJ
Methoxychlor	40	0.03 (c)	<0.016	0.043 J	0.027 J	<0.016	<0.016	<0.016 UJ
Toxaphene	3	0.21 (a); 0.0002 (c); 0.000747 (hc)	<0.40	<0.40 UJ	<0.40	<0.40	<0.40	<0.40 UJ

ND = not detected
< = below MDL
* = above gw criterion
shaded = above sw criterion

SW Criteria:
a = acute aquatic life protection
c = chronic aquatic life protection
h = non-carc. effect-based human health
hc = carc. effect-based human health

932170292

Table 2
DuPont Seep Sample Results (ug/l)
NJTA Piles Creek Wetland Mitigation Project Site
DuPont Grasselli Plant

Parameter	Greater of (a) GW Quality Criteria (GWQC) and PQL (Fed. Reg. 2/1/93)	New Jersey Surface Water Quality Criteria for SE3 Waters	Samples Collected by DERS 8/29/97 QWL04 Total	QWL04 Dissolved	QWL04 (Duplicate) Total	QWL04 (Duplicate) Dissolved
PRIORITY POLLUTANT METALS						
Beryllium	20		3.8 J	2.3 J	3.8 J	<2.1
Cadmium	4	---	<3.1	<3.1	<3.1	<3.1
Chromium	100	3,230 (h)	45	17 J	44	14.4 J
Copper	1,000	7.9 (a); 5.6 (c)	9.6 J	<4.5	7.9 J	<4.5
Nickel	100	3,900 (h)	73	75	73	74
Silver	20	---	<4.7	<4.7	<4.7	<4.7
Zinc	5,000	---	757	766	755	752
Antimony	20	4,300 (h)	<1.7 UJ	<1.7 UJ	<1.7 UJ	<1.7 UJ
Arsenic	8	0.136 (hc)	20 J	<2	<2	<2
Lead	10	---	24.7 J*	2 J	24.7 J*	<1.1 UJ
Mercury	2	0.146 (h)	0.116 J	<0.02	<0.02	<0.02
Selenium	50	---	11.3 J	9.7 J	<12 UJ	<6 UJ
Thallium	10	---	<12 UJ	<12 UJ	<12 UJ	<12 UJ
PRIORITY POLLUTANT PESTICIDES						
Aldrin	0.04	1.3 (a); 0.000144 (hc)	<0.0063 UJ	<0.0063 UJ	<0.0063 UJ	<0.0063 UJ
Alpha BHC	0.02	0.0131 (hc)	<0.0010 UJ	<0.0010 UJ	<0.0010 UJ	<0.0010 UJ
Beta BHC	0.2	0.460 (hc)	<0.0011 UJ	<0.0011 UJ	<0.0031 J	<0.0011 UJ
Chlordane	0.5	0.09 (a); 0.0040 (c); 0.000283 (hc)	<0.020 UJ	<0.020 UJ	<0.020 UJ	<0.020 UJ
DDD	0.1	0.000837 (hc)	0.0027 J	<0.0048 UJ	0.0098 J	<0.0048 UJ
DDE	0.1	0.000591 (hc)	0.00220 J	<0.0010 UJ	0.0010 J	<0.0010 UJ
DDT	0.1	0.13 (a); 0.0010 (c); 0.000591 (hc)	<0.0090 UJ	<0.0090 UJ	<0.0090 UJ	<0.0090 UJ
Delta BHC	---	---	<0.0030 UJ	<0.0030 UJ	<0.0030 UJ	<0.0030 UJ
Dieldrin	0.03	0.71 (a); 0.0019 (c); 0.000144 (hc)	0.00170 J	0.0027 J	0.00250 J	0.0018 J
Endosulfan I	0.4	---	<0.0020 UJ	0.0020 J	<0.0020 UJ	<0.0020 UJ
Endosulfan II	0.4	---	<0.0049 UJ	<0.0049 UJ	<0.0049 UJ	<0.0049 UJ
Endosulfan Sulfate	0.4	2.0 (h)	<0.0030 UJ	<0.0030 UJ	<0.0030 UJ	<0.0030 UJ
Endrin	2	0.037 (a); 0.0023 (c); 0.678 (h)	<0.0071 UJ	<0.0071 UJ	<0.0071 UJ	<0.0071 UJ
Endrin Aldehyde	---	0.81 (h)	<0.0048 UJ	<0.0048 UJ	<0.0048 UJ	<0.0048 UJ
Gamma BHC - Lindane	0.2	0.16 (a)	<0.0010 UJ	<0.0010 UJ	<0.0010 UJ	0.0024 UJ
Heptachlor	0.4	0.053 (a); 0.0036 (c); 0.000214 (hc)	0.00530 J	<0.0016 UJ	0.0028 J	<0.0016 UJ
Heptachlor Epoxide	0.2	0.053 (a); 0.0036 (c); 0.000106 (hc)	<0.0010 UJ	<0.0010 UJ	<0.0010 UJ	<0.0010 UJ
Methoxychlor	40	0.03 (c)	<0.016 UJ	<0.016 UJ	<0.016 UJ	<0.016 UJ
Toxaphene	3	0.21 (a); 0.0002 (c); 0.000747 (hc)	<0.40 UJ	<0.40 UJ	<0.40 UJ	<0.40 UJ

ND = not detected
< = below MDL
* = above gw criterion
shaded = above sw criterion

SW Criteria:
a = acute aquatic life protection
c = chronic aquatic life protection
h = non-carc. effect-based human health
hc = carc. effect-based human health

932170293

Organic Data Qualifier Codes

U - Compound was detected in a method, field, or trip blank associated with the project sample and at a similar level in the project sample. The compound should be considered "not detected" at or above the associated numerical value.

R - Unusable result; may or may not be present due to a quality control problem identified during the quality assurance review.

J - Quantitation is approximate due to limitations identified during the quality assurance review.

UJ - The compound was not detected, but the quantitation limit should be considered estimated due to a bias during the quality assurance review.

Inorganic Data Qualifier Codes

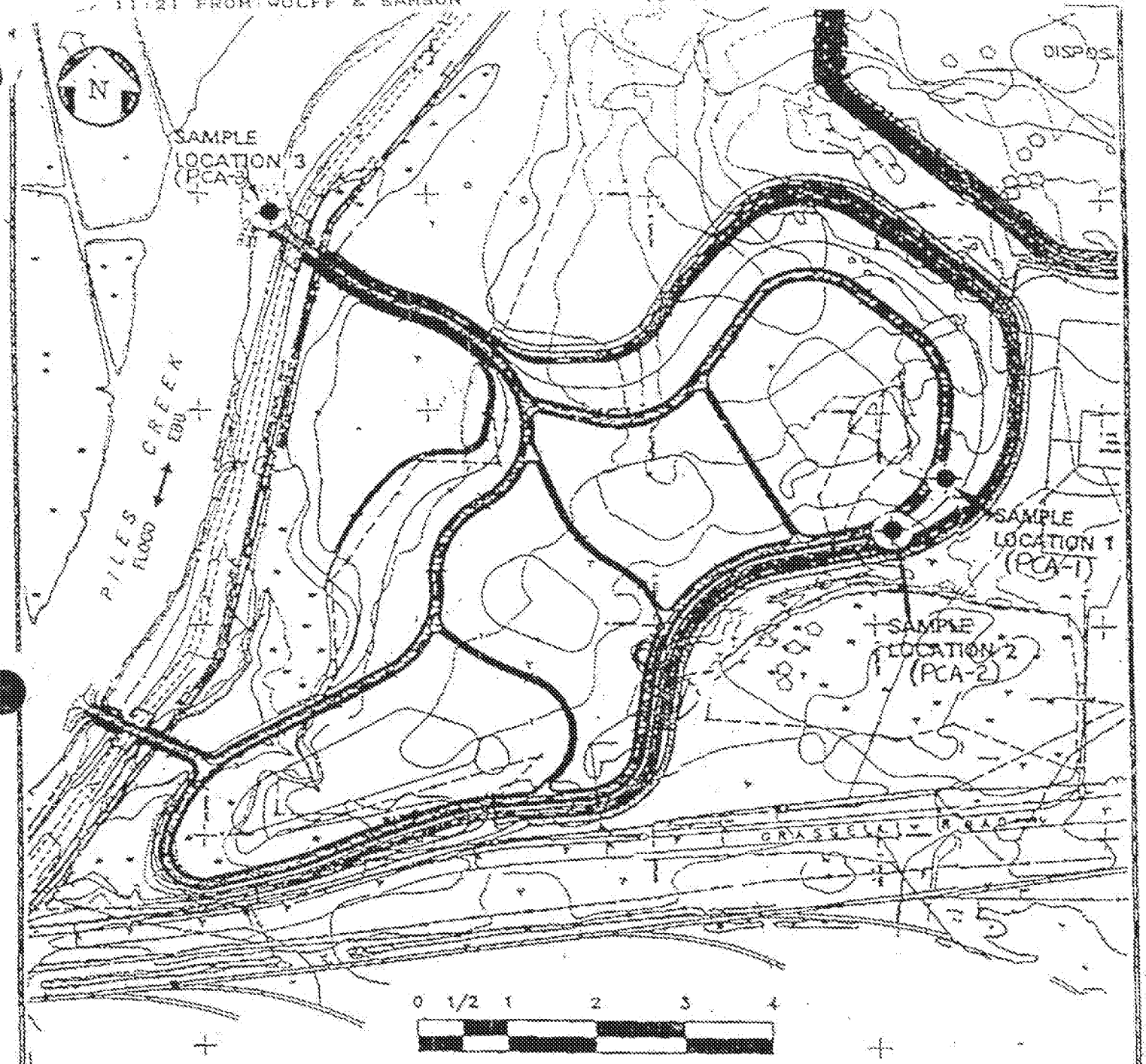
- Analyte was detected in a method, field, or trip blank associated with the project sample and at a similar level in the project sample. The analyte should be considered "not detected" at or above the associated numerical value.

- Unusable result; may or may not be present due to a quality control problem identified during the quality assurance review.

- Quantitation is approximate due to limitations identified during the quality assurance review.

J - The analyte was not detected, but the quantitation limit should be considered estimated due to a bias during the quality assurance review.

Figures



LEGEND:

◆ APPROXIMATE LOCATION OF WATER SAMPLES

SAMPLING LOCATION PLAN

NEW JERSEY TURNPIKE AUTHORITY
PILES CREEK EAST WETLANDS MITIGATION PROJECT
CITY OF LINDEN, UNION COUNTY, NEW JERSEY

PAULUS SOKOLOWSKI & SARTOR, INC.
CONSULTING ENGINEERS & ENVIRONMENTAL PLANNERS
WARREN, NEW JERSEY

Drn By: MR	Scale: AS SHOWN	Proj. No. 4704-0002-04
Ck'd By: LG	Date: OCTOBER 12, 1998	Fig. No. 1

Background

Two seeps were observed by the New Jersey Turnpike Authority's (NJTA's) consultant, Paulus, Sokolowski and Sarter, Inc. (PS&S) in July 1996, during a site visit to the Piles Creek Wetlands Mitigation Project Site. In August and September of 1996, PS&S collected samples from the two seeps (PCA-1 and PCA-2). In addition, a surface water sample (PCA-3) was collected from Piles Creek, at a downgradient location, where the mitigated wetland channel discharges to Piles Creek (see Figure 1). The samples were analyzed for priority pollutant (PP) parameters, and the results were reported in a Memorandum Report dated November 25, 1996. PS&S also reported elevated hydrogen sulfide vapors, detected by air monitoring instruments in the vicinity of the seeps. DuPont was subsequently notified about the existence of the seeps by the New Jersey Department of Environmental Protection (NJDEP). The NJTA seep and surface water sample results are summarized in Table 1 (attached).

New Jersey surface water quality criteria (SWQC) were exceeded for copper, arsenic, mercury, DDD, and DDE. However, it should be noted that, with the exception of copper, these criteria are based on human health risk, which is probably not relevant for discharges to Piles Creek, since no one swims in the stream. GW-IIa groundwater quality criteria (GWQC) were exceeded for arsenic, lead, mercury, and DDD. There were no exceedances for volatile or semivolatile constituents.

A site meeting, that included the NJTA, PS&S, GAF, DuPont, and NJDEP, was held on August 1, 1997. At that time, DuPont agreed to submit a work plan to the NJDEP for investigating the seeps, following the receipt of needed wetland investigation and construction data from the NJTA. With the exception of as-built survey data, which was requested on multiple occasions, the requested information was transmitted by PS&S in October, 1997. As-built survey data has not yet been received by DuPont at this time.

Objective

The primary objective of this document is to present the results of activities conducted since the August 1, 1997 meeting, and to compile all pertinant data that are available for use in determining an appropriate path forward for investigation and remediation of the seeps.

Investigation Activities Completed to Date

Seep Sampling and Analysis

DuPont collected both filtered and unfiltered samples from a total of four seeps observed at the Piles Creek Wetland Mitigation Project Site on August 29, 1997, while remedial investigation activities were being performed at the Grasselli plant. The samples were analyzed for PP metals, PP pesticides, and methoxychlor. Approximate sample locations, identified as QWL01, QWL02, QWL03, and QWL04, are depicted on Figure 2. Samples QWL01 and QWL02 appear to roughly correspond with PS&S samples collected from Sample Location 1 (PCA-1) and Sample Location 2 (PCA-2), shown on Figure 1.

Table 2 summarizes the analytical results, as compared with state groundwater and surface water quality criteria. It should be noted that most of the SWQC shown to have exceedances (e.g., arsenic, DDD, DDE, and heptachlor) are based on human health risk, which may not be relevant for discharges to Piles Creek. It should also be noted that the SWQCs for several of the pesticide compounds are below laboratory method detection limits (MDLs), as indicated by lighter shading in Table 2.

The results for samples QWL01 and QWL02 indicate SWQC exceedances for arsenic, DDD and methoxychlor. Copper and mercury concentrations are shown to be within acceptable SWQC limits. Only one constituent, arsenic, was detected at concentrations exceeding the established GWQC.

Results for samples collected at QWL03 and QWL04 (located approximately 100 to 200 feet southwest of QWL02; along the eastern rip-rap bank) show SWQC exceedances for copper, arsenic, DDD, DDE, dieldrin, and heptachlor. All of these results are estimated values, based on summary validation results. Arsenic is the only constituent that was detected in samples from QWL03 and QWL04 at concentrations exceeding the established GWQC.

Seep Sample Data Validation

Seep sample data collected in August, 1997 were recently subjected to summary level data validation to determine whether data qualification was warranted. The data qualifiers have been included in Table 2. Definitions for organic and inorganic data qualifiers are included following Table 2.

In general, the data quality was good. However, several results were qualified due to method blank contamination, low surrogate compound recoveries, serial dilution results,

field duplicate precision, method of standard addition recoveries, and a comparison of the total and dissolved analyte results.

Marsh Disposal Data Review

Available data from the Grasselli Plant history were reviewed to determine the composition of aqueous production wastes (commonly referred to as 'strontium muds') disposed of in the former marsh area from approximately 1928 until 1975. The aqueous wastes, which were pumped directly onto the ground, included industrial sludges composed of: phosphate plaster ($CaSO_4$, with 2-3% phosphate residual), silicate muds (sand, filter aid, and minor quantities of sodium silicate), hypo muds (diatomaceous earth, sulfur, carbon, and rust particles), salt cake (sodium sulfate), strontium sulfide, and strontium nitrate mud (coal, coal ash, and celestite [$SrSO_4$] residues).

The production wastes contain sulfates, which provide electron receptors for sulfur-reducing bacteria (if present). This may explain the presence of elevated hydrogen sulfide readings detected in the vicinity of the seeps.

Review of Site Groundwater Data

Groundwater data collected during remedial investigation activities at the Grasselli plant (September, 1997) are not yet available at this time. However, filtered and unfiltered groundwater data from upgradient wells (e.g., MW-11A, MW-13A, MW-30A, and MW-31A), collected as part of the ECRA investigation (August 1993), were reviewed to determine possible source areas for the elevated constituents detected in seep samples.

ECRA investigation sample results showed elevated levels of metals in upgradient wells at the Grasselli site. Arsenic concentrations detected in unfiltered groundwater samples from the upgradient wells at the Grasselli plant show arsenic concentrations ranging from 0.17 mg/l to 46.1 mg/l. Arsenic concentrations in filtered samples from these wells ranged from no detection (<0.005 mg/l) to 3.0 mg/l. Mercury was detected in unfiltered samples from the potential upgradient wells at concentrations ranging from no detection (<0.0002 mg/l) to 0.053 mg/l, but it was not detected in the filtered samples from these upgradient wells. Copper concentrations in unfiltered samples from the upgradient wells ranged from no detection (<0.01 mg/l) to 6.6 mg/l. Copper concentrations in filtered samples from these wells ranged from no detection (<0.01 mg/l) to 0.01 mg/l. It should be noted that elevated levels of arsenic, mercury, and copper have been detected in groundwater samples from wells on the adjacent GAF property.

ECRA investigation results showed slightly elevated levels of some pesticide compounds in upgradient wells at the Grasselli site. DDD was detected in unfiltered samples from these wells at concentrations ranging from no detection (<0.10 ug/l) to 2.8 J ug/l, but it was not detected in filtered samples. DDE was detected in unfiltered samples from potential upgradient wells at concentrations ranging from no detection (<0.10 ug/l) to 0.098 J ug/l, but it was not detected in filtered samples. Dieldrin was not previously detected in unfiltered or filtered samples from potential upgradient wells at the Grasselli plant. Methoxychlor was previously detected in unfiltered samples from potential upgradient wells at concentrations ranging from no detection (<0.5 ug/l) to 830 ug/l. Filtered sample results for these wells show methoxychlor concentrations ranging from no detection (<0.5 ug/l) to 0.7 ug/l. Pesticide compounds were not previously detected in groundwater samples from GAF site wells; however, elevated detection limits may have precluded detection.

Dames & Moore also collected groundwater samples from seven shallow monitor wells (e.g., PCMW-1, PCMW-2, PCMW-3, MW-5A, MW-6A, MW-8A, and PCMW-17) and one deep well (MW-8B) as part of the environmental investigation for the proposed Piles Creek East Wetland Mitigation Site (January, 1993). The Dames & Moore sample locations are shown on Figure 3. The groundwater samples were analyzed for TCL volatile and semi-volatile organic compounds, pesticides, PCBs, TAL metals and strontium (filtered and unfiltered), cyanide, and pH. With a few exceptions, no organic compounds were detected. Metals were detected in every sample. The sample results are included here as Attachment 1.

Seep Observation

DERS conducted a site visit on November 13, 1997, to observe the seeps at high and low tide conditions. Quantitative flow measurements were not taken; rather, flow rates were visually estimated. A strong flow was observed at seeps PCA-1 and PCA-2 (QWL01 and QWL02). During the November 1997 site visit, it was visually estimated that flow rates at these two seeps were greater than 5 gpm each. Seeps QWL03 and QWL04 flowed at lower rates. During the November 1997 site visit, the seep discharge rates were visually estimated to be 3 gpm or less at QWL03 and less than 1 gpm at QWL04. Erosion and undermining of the ground surface above the rip-rap bank were observed between PCA-1 and PCA-2.

NEW JERSEY TURNPIKE WIDENING PROJECT

ENVIRONMENTAL INVESTIGATION

FOR

PROPOSED PILES CREEK EAST WETLAND MITIGATION SITE LINDEN, NEW JERSEY

NEW JERSEY TURNPIKE AUTHORITY

APRIL 8, 1993

Prepared by:

Dames & Moore

Cranford, New Jersey

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

1.1 BACKGROUND

The New Jersey Turnpike Authority (NJTA) is widening the existing Turnpike between Interchange 11 and Interchange 15E. The widening project will require the filling of approximately 12.2 acres of existing wetlands. To mitigate the filling of these wetlands, NJTA will create, enhance and/or preserve tidal and non-tidal wetlands in Union and Middlesex Counties. As part of this mitigation program, NJTA is currently constructing non-tidal wetlands at a site located in Woodbridge, New Jersey and evaluating the feasibility of creating tidal wetlands at other sites.

On behalf of the NJTA, the consulting firm of Paulus, Sokolowski and Sartor, Inc. (PS&S), identified a parcel of land located in Linden, New Jersey, (shown on Figure 1), as a potential wetlands mitigation site. This parcel, consisting of approximately 112 acres traversed by Piles Creek, is owned by E.I. Du Pont De Nemours Company, Inc., (Du Pont). For the purposes of this study, the site has been designated the Piles Creek East Proposed Wetlands Mitigation Site.

PS&S have tentatively identified a portion of the site east of Piles Creek for the creation of new tidal wetlands. The remaining portions of the site are intended primarily for wetland enhancement or preservation. Based on preliminary designs, the creation of tidal wetlands will involve the excavation and removal of soil to lower the ground surface to an elevation of approximately 2 feet above mean sea level (MSL). The proposed wetlands will be connected to Piles Creek through one or more tidal channels. The channel invert will be at an elevation of approximately 2 feet below MSL at Piles Creek, rising to an elevation of approximately 0.5 foot above MSL inland. Sediment from Piles Creek will require removal for the construction of proposed channels. Dewatering may be required for some excavations.

1) Performance of a geophysical investigation
2) Excavation of exploratory test pits
3) Drilling of soil borings
4) Installation of monitoring wells

- Soil sampling and analysis from test pits and soil borings;

- Sediment sampling and analysis; and

- Groundwater sampling and analysis from new monitoring wells installed by Dames & Moore and existing monitoring wells installed by others.

2.0 ENVIRONMENTAL SETTING

2.1 GENERAL

The site is located in an industrialized area of Linden, New Jersey. It is bound to the north by Piles Creek and a Public Service Electric and Gas (PSE&G) Power Generating Station, to the east by Conrail railroad tracks, to the south by Grasselli Road and to the west by Conrail railroad tracks and the New Jersey Turnpike. There are several existing and former industrial/chemical facilities in the immediate vicinity of the site. These facilities (shown on Figure 2) include: a) the former Du Pont Grasselli Works Facility (east of the Conrail railroad tracks); b) the former GAF Facility (south of Grasselli Road); c) the PSE&G Power Generating Station (north of Piles Creek); and d) the American Cyanamid Facility and Linden Landfill (to the west of the New Jersey Turnpike). A small piece of property leased by Du Pont to Wade Brothers Construction is in the southeastern corner of the site.

In addition, several underground gas and oil pipelines traverse the site. Buckeye Pipeline Company, Colonial Pipeline Co., and Transcontinental Gas Pipeline Corporation have pipelines which run roughly parallel and to the east of Piles Creek. Additionally, Texas Eastern Gas Pipeline Company has a pipeline which crosses the

northern portion of the site. No indications of pump houses or maintenance facilities associated with these pipelines were observed at the site.

West of Piles Creek, the site consists entirely of wetlands. East of Piles Creek, the site consists of wetlands along Piles Creek and uplands on most of the remaining portions of the site. A small pond is located east of Piles Creek in the northeastern corner of the site. The study area is generally covered by grasses and shrubs, with several scattered stands of mature trees. Two drainage culverts were observed draining portions of the study area into Piles Creek. An unpaved access road separating the existing wetlands from Piles Creek, is located adjacent to Piles Creek along the western portion of the study area. A second unpaved elevated roadway is visible running in a northeast-southwest direction through the center of the study area. This road is now overgrown with vegetation.

West of Piles Creek, the site is relatively flat, with elevations approximately four feet above MSL. East of Piles Creek, within the study area, ground surface elevations at the site range from approximately 4 to 15 feet above MSL. Elevations are generally lower along Piles Creek and higher along the Conrail railroad tracks to the east.

2.2 REGIONAL SOILS

The surficial soils in Union County have been mapped by The U.S. Department of Agriculture, Soil Conservation Service (USDA-SCS) in cooperation with various local agencies. The USDA-SCS presented this data in a 1991 draft report which indicates that most of the soils in the general vicinity of the study area are classified as udorthents. Udorthents are defined as soils formed in cut and fill areas. In the context of the area around the study area, udorthents represent man-emplaced fill materials. Much of this fill overlies an organic substratum that represents the tidal marshes that formerly occupied most of the area. The study area is identified in the soil survey as an area containing undisturbed tidal marsh deposits.

2.3 REGIONAL GEOLOGY

A review of available geologic information, including data obtained during previous investigations performed in the surrounding properties of the study area, indicates that a tidal marsh was covered by industrial fill material. This fill has been reported to be up to 16 feet thick. The fill is generally sequentially underlain by unconsolidated deposits consisting of "recent" tidal marsh deposits and Pleistocene glacial till, and consolidated deposits consisting of the Triassic shales and siltstones of the Passaic Formation.

The tidal marsh deposits below the fill consist of about 10 to 11 feet of black to brown organic peat, grading to brown and gray organic silts and clays. The surface of these deposits slopes gently to the north and east. The underlying glacial till consists of about 7 to 22.5 feet of a heterogeneous mixture of reddish brown sand, silt, clay, and gravel. The upper 8 to 15 feet of the Passaic Formation consists of residual soils comprised of reddish brown, clayey silt with medium to fine gravel, underlain by highly fractured, light to dark reddish brown, thin to medium bedded shale and silty shale.

2.4 REGIONAL HYDROLOGY AND HYDROGEOLOGY

2.4.1 Surface Water

Surface water bodies in the vicinity of the study area include the Arthur Kill (to the east), Piles Creek (to the west) and the Rahway River (to the south). Other water bodies in the area include the Winans Creek tributary of Piles Creek and Marshes Creek, a tributary of the Rahway River. These water bodies are considered tidal, with reported daily water level fluctuations of up to 5 feet.

Pursuant to the New Jersey Surface Water Quality Standards (NJAC 7:9-4.1, et seq.; NJDEP, 1985), these surface water bodies are located within the New York Harbor Complex Basin. Within this basin, the Arthur Kill, Piles Creek, and the

Rahway River are classified as "SE3" waters. Waters classified as "SE3" are saline waters of estuaries and are defined as having the following uses:

- Secondary contact recreation
- Maintenance and migration of fish populations
- Migration of diadromous fish
- Maintenance of wild life
- Other reasonable uses

Under this classification, secondary contact recreation refers to activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing. This classification does not include activities such as wading, swimming, or water skiing. Diadromous fish are those which spend most of their life in one type of water (either fresh or saline) and migrate to the other water type to spawn.

2.4.2 Groundwater

A review of available information, including the results of investigations performed at the study area by Du Pont Environmental Remediation Services (DERS) in 1991 and on some surrounding properties by Eckenfelder, Inc., in 1991, indicates that three water-bearing zones have been identified in the general vicinity of the study area, including:

- A shallow, perched water table zone within the fill material and upper portion of the tidal marsh deposits;

- A semi-confined zone beneath the fill and above the bedrock, within the unconsolidated deposits of glacial till; and

- A zone contained within the Passaic Formation.

Groundwater withdrawal data for the area indicate that no potable water supply wells exist within a two-mile radius of the study area. Due to the proximity of the Arthur Kill and other tidal waters, groundwater occurring in this region, including the Passaic Formation aquifer, is typically brackish.

3.0 PRELIMINARY INVESTIGATION AND FINDINGS

3.1 GENERAL

Dames & Moore's environmental investigation was conducted as a sequence of tasks based in part on the preliminary PS&S design for the potential construction of tidal wetlands. The investigation was subsequently modified on a task-by-task basis, based on results obtained from the previous tasks. Preliminary tasks performed by Dames & Moore prior to the initiation of field work included:

- A review of available historical information;
- A review of historical aerial photographs; and
- A site reconnaissance.

A discussion of these tasks, including findings and conclusions, is presented below.

3.2 REVIEW OF HISTORICAL INFORMATION

Dames & Moore reviewed available historical information regarding past operations and previous investigations in the study area and surrounding properties. This information included: regulatory lists indicating areas of potential environmental concern; topographic, tax, local road, and national wetlands inventory maps; county soil surveys; aerial photographs; and site-specific regulatory submittals for some of the

and metals were detected in soils at levels below the March 8, 1993, NJDEPE proposed soil cleanup criteria. Analytical data for surface water and sediment samples were not available at the time of Dames & Moore's review.

DERS concluded that shallow groundwater in the eastern portion of the facility flows west and north towards Piles Creek, and groundwater in a deeper unit below the marsh deposit flows southeast towards the Arthur Kill. Groundwater from the shallow groundwater zone did not contain volatile and semi-volatile organic compounds and pesticides at levels above method detection limits. Metals, including arsenic, antimony, barium, cadmium, copper, lead and nickel were detected in samples from the shallow groundwater. Approximately one foot of diesel oil has been reported on the water table in MW-7A.

GAF Facility

Information obtained from GAF's Draft Remedial Investigation Report, prepared by Eckenfelder, Inc., and dated May 14, 1991 indicated that GAF operated a chemical manufacturing facility from 1919 to 1991. This facility manufactured dyestuffs and surfactants, but also produced caustic chlorine, ethylene oxide, herbicides, tetrahydrofuran and other chemicals. Two landfill areas have been documented at the GAF facility: the Old Landfill and the Drum Landfill. The Old Landfill is rectangularly shaped and occupies approximately 4 to 6 acres of GAF property approximately 1,200 feet to the southwest of the study area. The area is reported to be sparsely covered and to contain demolition debris and laboratory wastes. The Drum Landfill was registered with the NJDEPE, operated from 1970 to 1973, and is located approximately 400 feet to the southwest of the study area.

Cooling water, waste water, and surface water drainage at the GAF facility was conveyed to an on-site waste water treatment plant via an unlined ditch system. Prior to the installation of the waste water treatment plant in 1977, the ditch system discharged to the Arthur Kill and Piles Creek. The Piles Creek discharge was discontinued in 1966 and a dam was constructed across the discharge ditch.

Remedial investigation activities described in the Eckenfelder report include the collection and analysis of soil/waste samples; collection and analysis of groundwater samples from 42 monitoring wells; collection and analysis of surficial soil and ditch sediment samples; collection and analysis of sediment samples from Piles Creek; and collection and analysis of sediment samples from the Arthur Kill.

Two groundwater-bearing zones were investigated during the remedial investigation: an upper zone within the fill and tidal marsh deposits, and a zone contained within the upper portion of the bedrock. Eckenfelder concluded that groundwater within the upper zone discharges to either the ditch system, Piles Creek, or the Arthur Kill, and groundwater within the lower zone discharges to the Arthur Kill.

Analysis of sediment samples collected from Piles Creek detected base/neutral-extractable organic compounds and metals, including mercury, lead, chromium and arsenic. No volatile or acid-extractable organic compounds were detected in Piles Creek sediment samples.

Eight monitoring wells on the GAF facility are located along the border of the proposed Piles Creek East Wetlands Mitigation Area, directly south of the site and across Grasselli Road. Available analytical data for these wells show the presence of the chlorobenzene, toluene, acetone, carbon disulfide, 1,2-dichlorobenzene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, 4-chloroaniline, dibenzofuran, 2-methylnaphthalene, arsenic, barium, cadmium, chromium, lead, mercury, copper and nickel in the shallow zone wells. Groundwater quality within the bedrock aquifer was also found to be impacted by these compounds. Shallow groundwater in the northern portion of the GAF facility appears to be flowing north towards Piles Creek.

1968 Photography

The buildings on the southern portion of the study area are no longer present and the area is now used for parking. In addition, filling appears to be now restricted to the west central portions. Construction of the Turnpike continues to the west, while Du Pont and GAF have added buildings to their facilities. A large pond is now evident on the GAF property, adjacent to the southwest corner of the study area. The pond appears to be connected to Piles Creek. Lastly, the PSE&G power generating station has been built to the north of Piles Creek. The mouth of Piles Creek also shifted several hundred feet to the south.

1976 Photography

Evidence of filling appears only in the center of the study area, while the majority of the area appears to be heavily vegetated. A clearing is evident parallel to a road to the east of Piles Creek. The southern portion of the study area no longer appears to be used for parking and vegetation is now visible. The Wade Brothers facility is now present on the southeast portion. Du Pont has added buildings to its facility, including several large tanks along the Arthur Kill. Industrial development surrounding the study area has continued. The pond on GAF's property is still evident, although it appears to be partially filled.

1991 Photography

The study area appears to have changed little since 1976, although in general, it appears to be re-vegetated. The only exception is the southeast portion, adjacent to the Wade Brothers building, which has been paved. Industrialization surrounding the site has slowed; in the case of the Du Pont and GAF facilities, several buildings appear to have been removed or demolished. The pond at GAF has begun to re-vegetate.

3.4 SITE RECONNAISSANCE

Several walk-throughs were conducted by Dames & Moore in December, 1992 prior to conducting the field investigation. The December 10, 1992 reconnaissance included Dames & Moore representatives and Mr. Nicholas Marton of the NJDEPE. The majority of the study area was observed to be heavily vegetated with the fill material reported in historical documents exposed at the ground surface.

Several unvegetated patches were noted, with the greatest concentration in the central portion of the study area. Several drum-shaped depressions, as well as pieces of an old pipeline, were observed in a portion of the study area.

Pieces of metal, plastic piping, wood, bricks, concrete, glass, and other miscellaneous debris were observed on the surface in several areas. Debris observed in the central unvegetated portion of the study area included what appeared to be pieces of rusted metal drums. A unpaved gravel road was noted to be running parallel to Piles Creek in the western portion of the study area. Pipeline markers were noted adjacent to Piles Creek.

4.0 PRELIMINARY FIELD EXPLORATION

4.1 GENERAL DISCUSSION

Based on the PS&S preliminary design for the creation of wetlands, Dames & Moore selected 24 environmental sampling locations, spaced roughly 250 feet apart. Twenty additional locations were also selected for the excavation of exploratory test pits and four locations were selected for the installation of shallow groundwater monitoring wells. The locations of test pits, soil borings and monitoring wells are shown on Figure 3.

Because the historical review and the site reconnaissance revealed the possibility that buried drums may be located within the study area, a geophysical

investigation was performed. The geophysical survey was limited to the suspected drum burial area.

Subsequent to the completion of the geophysical survey, the twenty exploratory test pits (TP-1 through TP-20) were excavated to characterize subsurface conditions and finalize the sampling methodology and the analytical sampling program.

4.2 GEOPHYSICAL INVESTIGATION

The limited geophysical investigation was conducted by Delta Geophysical Services using an electromagnetic (EM-31) conductivity meter and consisted of scanning an area of approximately 30-foot radius around each proposed test pit and soil boring location.

A description of the geophysical survey methods is presented in Appendix B. The geophysical investigation report prepared by Delta Geophysical Services is presented in Appendix C.

The geophysical survey revealed that the subsurface fill is fairly uniform over most of the site. Some electromagnetic anomalies were detected in the suspected former drum disposal area. These anomalies either followed a linear path, possibly representing the buried portion of a former pipeline which is exposed nearby, or were very weak, possibly representing small fragments of metal. A large anomalous zone of relatively higher conductivity than the surrounding area was identified in the eastern part of the study area. This zone appeared to represent a different type of fill material, not buried metal. Survey results indicate that buried drums do not exist at the proposed test pit and soil boring locations or within the reported former drum disposal area. With the above noted exceptions, the geophysical survey indicated uniform subsurface conditions across the study area.

4.3 EXPLORATORY TEST PITS

Twenty exploratory test pits (TP-1 through TP-20, as shown on Figure 3) were excavated in the study area to obtain information regarding the nature, thickness, and extent of the fill material. The selection of the locations for exploratory test pits was based on: a) areas proposed to be excavated during wetland construction; b) areas not targeted by the proposed environmental sampling program; and c) the location of the suspected former drum disposal area (see Figure 2 and 3).

Exploratory test pit logs are presented in Appendix D. A description of the soils encountered during the excavation of exploratory test pits is included in the discussion of site stratigraphy presented in Section 5.2.1.

The findings of the exploratory test pit program indicate that the fill material is homogeneous and extends throughout the study area. Fill material was found to range in thickness from 3 to 15 feet. Natural soils, consisting of recent tidal marsh deposits, were encountered below the fill material. Based on these findings, discrete sampling of the fill material (Zone A) and tidal marsh deposits (Zone B), was considered to be the most appropriate for evaluating the quality of materials which would be removed during wetlands construction.

5.0 ENVIRONMENTAL SAMPLING AND ANALYTICAL PROGRAM

5.1 GENERAL DISCUSSION

The environmental sampling and analytical program was finalized based on the findings of the historical review, site reconnaissance and the location of the electromagnetic anomalies detected during the geophysical survey. The objectives of the environmental sampling and analytical program were to further characterize the physical characteristics, and evaluate the quality of soil and groundwater in the study area.

ranging from 3 to 16 feet in thickness. Based on the site history, the light gray fill may possibly represent diatomaceous earth (hypomuds), silicate muds, calcium sulfate, and strontium nitrate muds, that were disposed of (pumped) into the study area during past manufacturing operations. The fill was generally stratified and interbedded with occasional thin layers of black organic clay. These layers may represent natural material deposited during past flood events between periods of sludge disposal.

Thin layers of cinders and/or coal were encountered in several test pits. These layers were generally encountered within 3 feet of the surface. A portion of an abandoned pipeline was encountered in test pit TP-11. Construction debris was encountered in test pits PC-1 (including a large quantity of broken glass) and PC-15.

Rusted drum rings and drum fragments were encountered in some sandy soil found above the gray silt near the former drum disposal area. However, no evidence of buried drums was encountered in any of the test pits and/or soil borings. Cinders, wood, brick, concrete, metal and plastic were also encountered in the study area.

Tidal Marsh Deposits

Tidal marsh deposits were encountered beneath the fill material. The tidal marsh deposits consist of brown to black peat, with abundant roots and plant material, and brown and gray organic clay. The tidal deposits were encountered at depths ranging from 3 to 16 feet below ground surface. The top of the marsh deposits is slightly higher in the center of the study area than elsewhere, and slopes gently to the north and east. The bottom of the tidal marsh deposits was not encountered during this investigation. However, a review of regional geology and information obtained from previous investigations at the site and surrounding area indicates that these deposits maintain a fairly uniform thickness of 10 to 11 feet.

5.2.2 Site Hydrogeology

Surface water at the site flows from the high area located at the center of the site toward the existing wetlands. Some of this surface water discharges through two drainage culverts into Piles Creek, which flows to the Arthur Kill. Surface water from Piles Creek may flow onto the site through the culverts during high tide or periodic floods.

The only water-bearing zone encountered during the investigation was found in the fill. This water-bearing zone appears to be perched on the underlying clays of the tidal marsh deposits, which act as a semi-confining layer, minimizing vertical migration of groundwater from the fill to the underlying material. One well (MW-8B) previously installed by DERS, is screened within the glacial till. Groundwater elevations obtained from this well and the adjacent shallow well (MW-8A) indicate that there is a downward vertical gradient through the tidal marsh deposit into the glacial till. These elevations also indicate that groundwater in the till may exist under semi-confined conditions.

Groundwater elevations obtained from the shallow zone monitoring wells ranged from 3.54 to 7.93 feet above MSL (Table 4). The highest groundwater elevations were obtained from the wells at the center of the site, with lower elevations occurring at the edges of the site. This indicates that a groundwater mound, possibly acting as a local recharge area, may exist at the central high portion of the site and discharge to surrounding lowering wetlands and drainage ditches (see Figure 4). No significant corresponding groundwater level fluctuations were observed with the tidal fluctuations observed in Piles Creek.

5.3 ANALYTICAL RESULTS

5.3.1 General

The results of the chemical analyses performed on the soil, sediment, groundwater, and surface water samples are summarized in Tables 5, 6, 7, and 8, respectively. Those analytical results exceeding the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria are presented on Figure 5. A summary of quality assurance samples (field and trip blanks) is presented in Table 9. Dames & Moore's Quality Assurance review of the analytical data is presented as Appendix E. The laboratory Data Package is included as Appendix F (Volumes I to XXI), submitted under separate cover. A discussion of the analytical results is presented below.

5.3.2 Soil Samples

Soil samples were collected from the fill material (designated Zone A) and the tidal marsh deposits (designated Zone B). A total of 45 soil samples were collected, 25 from Zone A, (including one surficial soil sample) and 20 from Zone B. All soil samples were analyzed for Target Compound List (TCL) volatile and semi-volatile organic compounds, pesticides, PCBs, Target Analyte List (TAL) metals, strontium, pH and cyanide. The soil sample results were compared with the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria.

Zone A (Fill Material):

The analytical results of the 25 soil samples collected from Zone A are summarized on Table 5. TCL volatile and semi-volatile organic compounds, pesticides, PCBs and cyanide were not detected at concentrations exceeding the NJDEPE March 8, 1993, Proposed Non-Residential Direct Contact Soil Cleanup Criteria. The pH of the soil samples ranged from 3.6 to 8.36.

Arsenic was the only metal detected (in 10 out of the 25 soil samples, as shown on Figure 5) at concentrations exceeding the NJDEPE Non-Residential Direct Contact Soil Cleanup Criterion of 2 mg/kg. Arsenic concentrations for the Zone A samples exceeding the cleanup criteria ranged from 3 mg/kg to about 26.3 mg/kg (see Table 5 and Figure 5).

Zone B:

The analytical results of the 20 soil samples collected from Zone B are summarized on Table 5. TCL volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs and cyanide were not detected at concentrations above the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria. The pH of the samples ranged from 5.12 to 7.5.

The following TAL metals were detected above NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria and are shown on Figure 5:

- Arsenic was detected at concentrations exceeding the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criterion of 2 mg/kg in all 20 Zone B soil samples. Arsenic concentrations ranged from 2.3 mg/kg to 1,440 mg/kg.

- Beryllium was detected at concentrations equal to or above the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criterion of 1 mg/kg in 4 out of 29 Zone B soil samples. Beryllium concentrations in these four samples ranged from 1 mg/kg to 1.7 mg/kg.

- Copper was detected at concentrations exceeding the NJDEPE March 8, 1993, Non-Residential Direct Soil Cleanup Criteria of 600 mg/kg in 4 out of 20 Zone B soil samples . The copper concentrations in these four samples ranged from 604 mg/kg to 854 mg/kg.

- Lead was only detected in one Zone B sample at a concentration exceeding the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria of 600 mg/kg. The lead concentration in this sample was about 759 mg/kg.

5.3.3 Sediment Samples

Two sediment samples, PCSED-14 and PCSED-20, were collected from Piles Creek. Both samples were analyzed for Target Compound List (TCL) volatile and semi-volatile organic compounds, pesticides, PCBs, Target Analyte List (TAL) metals, strontium, cyanide and pH.

The analytical results of the two sediment samples collected from Piles Creek are summarized on Table 6. TCL volatile organic compounds, semi-volatile organic compounds, pesticides and cyanide were not detected at concentrations exceeding the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria. pH values ranged from 6.98 to 7.67.

PCBs were detected in sediment sample PCSED-14 above the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria. Arsenic was detected in both sediment samples and copper was detected in sediment sample PCSED-20 at concentrations exceeding the NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria. These results are shown on Figure 5.

5.3.4 Groundwater Samples

Groundwater samples were collected from eight on-site monitoring wells. All monitoring wells, with the exception of MW-8B, are screened within the fill material. Monitoring well MW-8B is screened within the glacial till, which underlies the tidal marsh and fill deposits. All groundwater samples were analyzed for TCL volatile and semi-volatile organic compounds, pesticides, PCBs, TAL metals (filtered and unfiltered), strontium (filtered and unfiltered), cyanide and pH.

The groundwater analytical results are summarized on Table 7. With few exceptions, no organic compounds were detected. Metals were detected in all samples.

5.3.5 Surface Water Samples

Two surface water samples, PCSW-14 and PCSW-15, were collected from Piles Creek. Both surface water samples were analyzed for TCL volatile and semi-volatile organic compounds, pesticides, PCBs, TAL metals (filtered and unfiltered), strontium (filtered and unfiltered), cyanide and pH.

The surface water analytical results are summarized on Table 8. No confident concentrations of TCL volatile or semi-volatile organic compounds, pesticides, PCBs or cyanide were detected. TAL metals and Strontium were detected above the method detection limits. The pH of the surface water samples was 7.08 in sample PCSW-14 and 7.24 in sample PCSW-20.

6.0 SOIL AND GROUNDWATER MANAGEMENT PLAN

6.1 SOIL

With the exception of arsenic, beryllium and copper, contaminant levels in Zone A soils (fill material) and Zone B soils are below the March 8, 1993, NJDEPE March 8, 1993, Non-Residential Direct Contact Soil Cleanup Criteria. Because direct contact with this material following the construction of the proposed wetlands will be limited, the material can be reused on-site as surficial or subsurface fill.

6.2 SEDIMENT

Because of the potential presence of elevated levels of PCBs, any sediment that may have to be excavated from Piles Creek during the proposed

construction activities should be stockpiled separately and sampled for waste classification. Based on the results of the waste classification, proper disposal methods should be evaluated, including on-site and off-site disposal.

6.3 GROUNDWATER

Groundwater generated by wetland construction activities may be discharged within the study area provided that appropriate measures (hay bales, silt fences, etc.) are taken to minimize the introduction of sediment-laden water into the existing wetlands and Piles Creek.

Discharge to the ground surface is considered appropriate for the following reasons:

- The groundwater quality will not be impacted adversely since the water will infiltrate back into the same unit from which it was derived.

- No municipal water supply well fields or other potable water wells are known to exist in Linden.

- Based on current and potential future uses of the groundwater in this highly industrialized area, this perched water unit is not likely to be considered as, nor is it likely to transmit water to, a potentially potable water aquifer because: (1) the regional groundwater quality in the overburden materials is degraded as a result of past regional discharges; (2) the unit has low groundwater yields because it has a thin and laterally limited saturated zone; and (3) it is underlain by relatively impervious peat and silty/clayey tidal marsh deposits.

TABLE 1 (page 1 of 2)
SUMMARY OF FIELD PROGRAM
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring Sample I.D.	Date	Type	Analytical Samples Collected	Sample Matrix
TP-1	12-22-92	Exploratory Test Pit	No	NA
TP-2	12-22-92	Exploratory Test Pit	No	NA
TP-3	12-22-92	Exploratory Test Pit	No	NA
TP-4	12-22-92	Exploratory Test Pit	No	NA
TP-5	12-22-92	Exploratory Test Pit	No	NA
TP-6	12-22-92	Exploratory Test Pit	No	NA
TP-7	12-22-92	Exploratory Test Pit	No	NA
TP-8	12-22-92	Exploratory Test Pit	No	NA
TP-9	12-22-92	Exploratory Test Pit	No	NA
TP-10	12-22-92	Exploratory Test Pit	No	NA
TP-11	12-22-92	Exploratory Test Pit	No	NA
TP-12	12-22-92	Exploratory Test Pit	No	NA
TP-13	12-23-92	Exploratory Test Pit	No	NA
TP-14	12-23-92	Exploratory Test Pit	No	NA
TP-15	12-23-92	Exploratory Test Pit	No	NA
TP-16	12-23-92	Exploratory Test Pit	No	NA
TP-17	12-23-92	Exploratory Test Pit	No	NA
TP-18	12-23-92	Exploratory Test Pit	No	NA
TP-19	12-23-92	Exploratory Test Pit	No	NA
TP-20	12-23-92	Exploratory Test Pit	No	NA
PC-1	12-29-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-2	12-29-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-3	12-29-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-4	12-30-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-5	12-30-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-6*	12-29-92	Environmental Boring	Yes	Fill, Natural Soil
PC-7	12-30-92	Environmental Boring	Yes	Fill, Natural Soil
PC-8	12-29-92	Environmental Boring	Yes	Fill, Natural Soil
PC-9	12-31-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-10	12-29-92	Environmental Boring	Yes	Fill, Natural Soil

TABLE 1 (page 2 of 2)
SUMMARY OF FIELD PROGRAM
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring Sample I.D.	Date	Type	Analytical Samples Collected	Sample Matrix
PC-11*	1-4-93	Environmental Boring	Yes	Fill, Natural Soil
PC-12	12-30-92	Environmental Test Pit	Yes	Fill, Natural Soil
PC-13	1-4-93	Environmental Test Pit	Yes	Fill, Natural Soil
PC-14	1-4-93	Environmental Boring	Yes	Fill, Natural Soil
PC-15	12-31-93	Environmental Test Pit	Yes	Fill, Natural Soil
PC-16	12-31-93	Environmental Test Pit	Yes	Fill, Natural Soil
PC-17	12-30-93	Environmental Boring	Yes	Fill, Natural Soil
PC-18	1-4-93	Environmental Test Pit	Yes	Fill, Natural Soil
PC-19	1-4-93	Environmental Test Pit	Yes	Fill, Natural Soil
PC-20	1-4-93	Environmental Boring	Yes	Fill, Natural Soil
PC-21	1-6-93	Environmental Boring	Yes	Fill
PC-22	1-6-93	Environmental Boring	Yes	Fill
PC-23	1-6-93	Environmental Boring	Yes	Fill
PC-24	1-6-93	Environmental Boring	Yes	Fill
PCMW-1	1-6-93	Monitoring Well	Yes	Groundwater
PCMW-2	1-6-93	Monitoring Well	Yes	Groundwater
PCMW-3	1-6-93	Monitoring Well	Yes	Groundwater
PCMW-17*	1-6-93	Monitoring Well	Yes	Groundwater
PCSW-14	1-6-93	Grab Sample	Yes	Surface Water
PCSW-20	1-6-93	Grab Sample	Yes	Surface Water
PCSED-14	1-6-93	Grab Sample	Yes	Sediment
PCSED-20	1-6-93	Grab Sample	Yes	Sediment
PCSS-1	1-6-93	Grab Sample	Yes	Surficial Soil (Fill)

TABLE 2 (page 1 of 2)
SUMMARY OF ANALYTICAL PROGRAM
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Sample I.D.	Date Collected	Approximate Sample Elevation (ft. MSL)*	Analyses	Sample Material
PC-1A	12-29-92	8 to -2	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-1B	12-29-92	-2 to -4	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-2A	12-29-92	6.6 to -0.4	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-2B	12-29-92	-0.4 to -2.4	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-3A	12-29-92	6.3 to 1.3	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-3B	12-29-92	1.3 to -1.7	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-4A	12-30-92	5.7 to 0.7	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-4B	12-30-92	0.7 to -2.3	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-5A	12-30-92	8.9 to -2.1	TCL(VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-5B	12-30-92	-2.1 to -4.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-6A	12-30-92	8.3 to -3.7	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-6B	12-29-92	-3.7 to -5.7	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-7A	12-30-92	10.2 to -2.8	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-7B	12-30-92	-2.8 to -5.8	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-8A	12-29-92	8.1 to 0.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-8B	12-29-92	0.1 to -3.9	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-9A	12/-31-92	10.9 to -5.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-9B	12-31-92	-5.1 to -7.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-10A	12-29-92	13.0 to 1.0	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-10B	12-29-92	1.0 to -3.0	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-11A	1-4-92	13.1 to -1.9	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-11B	1-4-92	-1.9 to -4.9	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-12A	12-30-92	8.8 to -1.2	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-12B	12-30-92	-1.2 to -3.2	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-13A	1-4-93	6.5 to -1.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-13B	1-4-93	-1.5 to -4.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-14A	1-4-93	6.2 to 2.2	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-14B	1-4-93	2.2 to -1.8	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-15A	12-29-92	9.5 to -1.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-15B	12-29-92	-1.5 to -4.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil

TABLE 2 (page 2 of 2)
SUMMARY OF ANALYTICAL PROGRAM
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Sample I.D.	Date Collected	Approximate Sample Elevation (ft. MSL)*	Analyses	Sample Material
PC-16A	12-30-92	8.9 to -2.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-16B	12-30-92	-2.1 to -4.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-17A	12-30-92	7.3 to -2.2	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-17B	12-30-92	-2.2 to -4.7	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-18A	1-4-93	9.5 to -2.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-18B	1-4-93	-2.5 to -5.5	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-19A	1-4-93	10.9 to 0.9	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-19B	1-4-93	0.9 to -2.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-20A	1-4-93	4.6 to -2.4	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-20B	1-4-93	-2.4 to -6.4	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Natural Soil
PC-21A	1-6-93	5.3 to 1.8	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-22A	1-6-93	5.1 to 0.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-23A	1-6-93	5.1 to 0.1	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PC-24A	1-6-93	3.8 to 0.8	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Fill
PCSED-14	1-6-93	0-0.5 (Grab)	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Sediment
PCSED-20	1-6-93	0-0.5 (Grab)	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Sediment
PCSS-1	1-4-93	0-0.5 (Grab)	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Surficial Soil (Fill)
PCSW-14	1-4-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Surface Water
PCSW-20	1-4-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Surface Water
PCMW-1	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
PCMW-2	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
PCMW-3	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
PCMW-17	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
MW-5A	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
MW-6A	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
MW-8A	1-6-93	N/A	TCL (VOC*, BNA,Pest/PCB's) TAL Metals Strontium, pH	Groundwater
MW-8B	1-6-93	N/A	TCL (VOC*,BNA,Pest/PCB's) TAL Metals, Strontium, pH	Groundwater

VOC*: Sample from fill material collected 0-6" above saturated/unsaturated interface
ft MSL: feet Mean Sea Level)
TCL: EPA Target Compound List
VOC: Volatile Organic Compounds
BNAs: Base/Neutral Acid Extractable Semi-Volatile Organic Compounds
Pest: Pesticides
PCBs: Polychlorinated Biphenyls
TAL: EPA Target Analyte List (Metals)

All Fill Material and Natural Soil and Fill Samples are Composite Samples

932170327

TABLE 3 (page 1 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
TP-1	6.9	10	9	2	0-49.6	Soil, light gray to white silt overlying peat.	Increases odor and OVM readings with depth to maximum in peat.
TP-2	6.9	9.5	8	1.5	0-333	Soil, light gray silt, organic clay overlying peat.	Odor and OVM readings increase with depth, black organic clay at 3 feet.
TP-3	8.1	9	8	2	0-77	Light gray to white silt.	Odor and OVM readings increase with depth.
TP-4	8.9	11	10	2.5	0-77	Light gray to white silt.	Odor and OVM readings increase with depth.
TP-5	8.9	16	15	4	0-42	Light gray to white silt.	Odor and OVM readings increase with depth.
TP-6	8.5	13	12	2.5	0-146	Gray sand with rusted drum ring, light gray to white silt overlying peat.	0 ppm near drum ring, odor increasing with depth.
TP-7	9.2	14	13	3	0-179	Soil, rusted drum fragments, light gray to white silt overlying peat.	0 ppm near drum fragments. Odor and OVM readings increase with depth.
TP-8	7.5	11	10	2.5	0-120	Light gray to white silt overlying peat.	Odor and OVM readings increase with depth.
TP-9	6.9	8	7	3	0-147	Light gray to white silt overlying peat.	Odor and OVM readings increase with depth.

932170328

TIERRA-B-003750

TABLE 3 (page 2 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
TP-10	12.4	17	16	6	1-124	Light gray to white silt and fine sand, cinders, overlying peat.	0 ppm in cinders at 2 feet. Odor and OVM readings increase with depth.
TP-11	11.7	15	14	4	0-141	Light gray to white silt, steel pipes, wooden planks, overlying peat.	3.2 ppm in pipe at 5 feet. Odor and OVM readings increase with depth.
TP-12	10.3	11	10	5	0-156	Light gray to white silt with organic clay overlying peat.	Odor and OVM readings increase with depth.
TP-13	11.7	9	8	2.5	0-86	Soil, light gray to white silt overlying peat.	Odor and OVM readings increase with depth.
TP-14	11.7	14	13	4.5	0-118	Light gray to white silt overlying peat.	Increasing odor and OVM readings with depth.
TP-15	7.5	9	8	2	0-73	Light gray to white silt, cinders, overlying peat.	0 ppm in cinders at 3 feet. Odor and OVM readings increase with depth.
TP-16	7.0	8	7	2	0-56	Soil, light gray to white silt overlying peat.	Odor and OVM readings increase with depth.

932170329

TABLE 3 (page 3 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
TP-17	9.8	12	11	3.5	0-64	Soil, cobbs, cinders, light gray to white silt overlying peat.	Old elevated road. Cinders at surface. Odor and OVM readings increase with depth.
TP-18	9.5	18	17	3.5	0-178	Soil, cinders, light gray to white silt overlying peat.	Cinders noted at 2 feet - 0 ppm. Odor and OVM readings increase with depth.
TP-19	10.0	16	15	4.5	0-86	Soil, silt and clays, light gray to white silt overlying peat.	Cinders noted at 0-2.5 feet and 14 feet.
TP-20	11.7	15	14	4	0-77	Light gray to white silty with black organic clays overlying peat.	Rubber debris with organic clays at 9 feet. Odor and OVM readings increase with depth.
PC-1	8.0	12	10	3.5	3.1-92	Soil, with wood, bricks and cobbles, light gray to white silt. Cinders, wood, bricks, concrete, glass overlying peat.	Oil sheen noted at 7 feet. Glass is broken pieces of large carboys. Odor and OVM readings increase with depth to maximum in peat.
PC-2	6.6	9	7	3	0-177	Light gray to white silt overlying peat.	Odor and OVM readings increase with depth.
PC-3	6.3	8	5	2	0-116	Light gray to white silt overlying peat.	Odor and OVM readings increase with depth.

932170330

TABLE 3 (page 4 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
PC-4	5.7	8	5	1.5	0.4-122	Light gray to white silt with layers of black organic clay overlying peat.	Odor and OVM readings increase with depth.
PC-5	8.9	13	11	2	0-108	Light gray to white silt with layers of black organic clay overlying peat	Odor and OVM readings increase with depth.
PC-6	8.3	14	12	2	0-30	Soil, light gray silt and fine sand overlying peat.	Odor and OVM readings increase with depth.
PC-7	10.2	16	13	2	0	Light gray silt, fines and clay overlying peat.	OVM not functioning during boring. Increasing odor with depth.
PC-8	8.1	12	8	2	0-33	Light gray silt with fine sand overlying peat.	Odor and OVM readings increase with depth.
PC-9	10.9	18	16	3	0-78	Light gray silt, cinders overlying peat.	Cinders noted at 3 feet - 0 ppm. Odor and OVM readings increase with depth.
PC-10	13.0	16	12	6	0-87	Light gray silt and fine sand overlying peat.	Odor and OVM readings increase with depth.

TABLE 3 (page 5 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
PC-11	13.1	18	14.75	3.5	0-7.4	Light gray fine sand and silt overlying peat.	OVM not functioning. Increasing odor with depth.
PC-12	8.8	12	10	2	NW	Light gray silt with clay, cinders overlying peat.	Cinders noted at 3.5 feet. OVM not functioning. Increasing odor with depth.
PC-13	6.5	10	7	1	0-184	Light gray silt with sand and layers of black organic clay overlying peat.	Odor and OVM readings increase with depth.
PC-14	6.2	8	4	3	0-115	Sand and gravel, fill overlying organic clay.	Boring located on unpaved gravel road adjacent to to Piles Creek
PC-15	9.5	14	11	3	0-29.9	Soils, construction debris, light gray silt with wood, overlying peat.	Odor and OVM readings increase with depth.
PC-16	8.9	13	11	2	0-174	Light gray to white silt with clay overlying peat.	Odor and OVM readings increase with depth.
PC-17	7.3	12	9.5	1	0-153	Soil, light gray silt overlying peat.	Odor and OVM readings increase with depth. PCMW-17 installed in boring.
PC-18	9.5	15	12	4	0-163	Soil, light gray silt with clay cinders, overlying peat.	Perched water at 4 feet. Odor and OVM readings increase with depth.

TABLE 3 (page 6 of 6)
SUMMARY OF PHYSICAL CHARACTERISTICS OF SOIL AND FILL MATERIAL
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Test Pit/ Boring I.D.	Surface Elevation (ft. MSL)	Depth of Boring/Test Pit (ft.)	Approximate Depth to Natural Mtl. (ft.)	Approximate Depth to Groundwater (ft.)	OVM Readings (ppm)	Description	Comments
PC-19	10.9	13	10	5	NW	Brown silt and clay, cinders, light gray to white clayey silt overlying peat.	Cinders interbedded with silts and clays 0-4 feet. Odor and OVM readings increase with depth.
PC-20	4.6	12	8	2	0-9.8	Sand and gravel, miscellaneous fill overlying peat.	Boring located on unpaved gravel road adjacent to Piles Creek. Odor and OVM readings increase with depth.
PC-21	5.3	5	3.5	0	--	Soil, light gray silt and fine sand overlying peat.	Groundwater at surface.
PC-22	5.1	5	Not encountered (> 5)	0.5	--	Soil, light gray silt with fine sand.	Natural material not encountered.
PC-23	5.1	5	Not encountered (< 5)	0.7	--	Soil, light gray silt.	Natural soil not encountered.
PC-24	3.8	5	3	0	--	Light gray silt with fine sand overlying peat.	Groundwater encountered at surface.

OVM: Organic Vapor Meter, Photoionization Detector

NW: Instrument not Working

--: OVM Reading not Performed

ft. MSL: Feet Mean Sea Level

ppm: Parts Per Million

932170333

TABLE 4
SUMMARY OF GROUNDWATER ELEVATIONS
FROM MONITORING WELLS
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Monitoring Well I.D.	Reference Elevation (Top of PVC) (ft MSL)	Date	Depth to Groundwater (ft bgs)	Groundwater Elevation (ft MSL)
PCMW-1	11.19	1-6-93	5.07	6.12
		1-15-93	5.20	5.99
		1-21-93	5.86	5.33
		1-21-93	5.86	5.33
		2-1-93	6.04	5.15
		2-1-93	6.05	5.14
PCMW-2	14.17	1-6-93	9.74	4.43
		1-15-93	9.54	4.63
		1-21-92	9.72	4.45
		1-21-93	9.71	4.46
		2-1-93	9.91	4.26
		2-1-93	9.94	4.23
PWMW-3	11.47	1-6-93	6.64	4.83
		1-15-93	6.70	4.77
		1-21-93	6.90	4.57
		1-21-93	7.02	4.45
		2-1-93	7.18	4.29
		2-1-93	7.19	4.28
PCMW-17	9.75	1-6-93	2.98	6.77
		1-15-93	3.11	6.64
		1-21-93	3.54	6.21
		1-21-93	3.53	6.22
		2-1-93	3.65	6.10
		2-1-93	3.60	6.15
MW-5A	10.87	1-6-93	4.23	6.64
		1-15-93	4.39	6.48
		1-21-93	4.72	6.15
		1-21-93	4.70	6.17
		2-1-93	4.79	6.08
		2-1-93	4.79	6.08
MW-6A	8.91	1-6-93	5.36	3.55
		1-15-93	5.52	3.39
		1-21-93	5.34	3.57
		1-21-93	5.34	3.57
		2-1-93	5.57	3.34
		2-1-93	5.36	3.55
MW-8A	14.79	1-6-93	7.14	7.65
		1-15-93	6.86	7.93
		1-21-93	7.20	7.59
		1-21-93	7.22	7.57
		2-1-93	7.47	7.32
			7.47	7.32
MW-8B	15.13	1-6-93	10.50	4.63
		1-15-93	10.09	5.04
		1-21-93	10.18	4.95
		1-21-93	10.16	4.97
		2-1-93	10.06	5.07
		2-1-93	10.09	5.04

ft MSL: Feet Mean Sea Level
All groundwater readings were measured from top of PVC casing

TABLE 5 (page 1 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED FILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-1A	PC-1B	PC-2A	DUP-2A	PC-2B	PC-3A	PC-3B	PC-4A	PC-4B	NJDEPE
Laboratory Sample Number	22935-01	22935-02	22935-09	22935-13	22935-10	22935-11	22935-12	22960001	22960002	NPDCSCC
Sampling Date	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/30/92	12/30/92	
Sampling Depth (ft)	0'-10'	10'-12'	0'-7'	0'-7'	7'-9'	0'-5'	5'-8'	0-5'	5-8'	
Dilution Factor	1.6	2.9	2.0	1.9	3.1	1.9	3.7	2.3	2.6	
VOLATILES										
Methylene Chloride	34 BJ	29 U	20 U	6 JB	31 U	7 JB	86 B	26 B	26 U	210000
Acetone	16 U	29 U	14 J	19 U	210	19 U	120	23 U	28 B	1000000
Carbon Disulfide	16 U	29 U	20 U	19 U	40	19 U	24 J	23 U	18 JB	NP
2-Butanone	16 U	29 U	13 JB	19 U	90 B	19 U	37 U	23 U	26 U	1000000
Chloroform	16 U	29 U	20 U	19 U	31 U	19 U	37 U	23 U	26 U	28000
Total Estimated Conc of VOA TICs (a)	10	24	--	--	152	--	69	26	17	NA
SEMIVOLATILES										
1,4-Dichlorobenzene	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	93 J	10000000
Hexachlorobenzene	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	2000
N-Nitroso-di-n-propylamine	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	100 J	660
1,2,4-Trichlorobenzene	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	100 J	1200000
4-Chloro-3-methylphenol	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	130 J	10000000
Phenanthrene	150 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	NP
Di-n-butylphthalate	530 U	950 U	650 U	640 U	180 J	640 U	1200 U	760 U	86 JB	10000000
Fluoranthene	170 J	230 J	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	10000000
Pyrene	130 J	170 J	650 U	640 U	1000 U	640 U	1200 U	760 U	95 J	10000000
Benzo(a)anthracene	68 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	4000
Chrysene	74 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	40000
bis(2-Ethylhexyl)phthalate	530 U	200 J	74 J	79 J	150 J	150 J	320 J	760 U	850 U	210000
Benzo(b)fluoranthene	67 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	4000
Benzo(k)fluoranthene	67 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	4000
Benzo(a)pyrene	53 J	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	660
Indeno(1,2,3-cd)pyrene	530 U	950 U	650 U	640 U	1000 U	640 U	1200 U	760 U	850 U	4000
Total Confident Conc of BNAs (a)	--	--	--	--	--	--	--	U	--	NA
Total Estimated Conc of BNA TICs (a)	1100	14000	330	360	12600	1290	17930	2240	5490	NA
PESTICIDES/PCBs										
alpha-BHC	2.7 U	4.9 U	3.3 U	3.3 U	5.3 U	3.3 U	6.1 U	3.8 U	4.4 U	NP
Beta-BHC	2.7 U	4.9 U	3.3 U	3.3 U	5.3 U	3.3 U	6.1 U	3.8 U	4.4 U	NP
gamma-BHC (Lindane)	2.7 U	4.9 U	3.3 U	3.3 U	5.3 U	3.3 U	6.6 J	3.8 U	4.4 U	2200
4,4'-DDE	82	9.4 U	6.5 U	6.3 U	10 U	6.3 U	12 U	7.5 U	8.4 U	9000
4,4'-DDD	160 J	9.4 U	6.5 U	6.3 U	10 U	6.3 U	12 U	7.5 U	8.4 U	12000
4,4'-DDT	440 J	9.4 U	6.5 U	6.3 U	10 U	6.3 U	12 U	6.8 J	8.4 U	9000
Methoxychlor	27 U	49 U	33 U	33 U	53 U	33 U	61 U	38 U	44 U	5200000
alpha-Chlordane	2.7 U	4.9 U	3.3 U	3.3 U	5.3 U	3.3 U	6.1 U	3.8 U	4.4 U	NP
gamma-Chlordane	2.7 U	4.9 U	3.3 U	3.3 U	5.3 U	3.3 U	6.1 U	3.8 U	4.4 U	NP

continued next page (see notes on last page of table)

932170335

TABLE 5 (page 2 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-1A	PC-1B	PC-2A	DUP-2A	PC-2B	PC-3A	PC-3B	PC-4A	PC-4B	NJDEPE
Laboratory Sample Number	22935-01	22935-02	22935-09	22935-13	22935-10	22935-11	22935-12	22960001	22960002	NRDCSCC
Sampling Date	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/29/92	12/30/92	12/30/92	
Sampling Depth (ft)	0'-10'	10'-12'	0'-7'	0'-7'	7'-9'	0'-5'	5'-8'	0-5'	5-8'	
Dilution Factor	1.6	2.9	2.0	1.9	3.1	1.9	3.7	2.3	2.6	
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/kg
METALS										
Aluminum	809	12000	546	614	15000	625	26800	1200	8400	NP
Antimony	11.4 U	35.5	14 U	13.7 U	31	13.7 U	26.7 U	16.1 U	18.4 U	340
Arsenic	1.9 U	122	1.2 U	1.2 U	412	1.2	17.3	6.3 J	14.4	2
Barium	385	339	105	90.7	3980	78.7	319	600 J	352	47000
Beryllium	0.15	0.67	0.15	0.18	1.7	0.18	1.6	0.33	0.54	1
Cadmium	1.3 U	2.3 U	1.8	1.6 U	6.9	1.6 U	3 U	2.2	2.1 U	100
Calcium	220000	7390	281000	289000	39600	260000	9090	161000	9010	NP
Chromium	3	27.9	3	3.2	127	3.5	73.5	13.3 J	20.7	NP
Cobalt	1.7 U	10.4	2 U	2 U	17.7	2 U	17	4.1	8.4	NP
Copper	2	46.3	3.6	2	560	2	168	28.2	49.2	600
Iron	1280	29200	177	172	31200	186	46500	1530	14900	NP
Lead	39.3 J	91.4 J	40 J	46.4 J	759 J	55.1 J	165 J	49.8	19.9	600
Magnesium	68.2	6470	62.7	51.3	4990	162	12300	85.7	3090	NP
Manganese	19.9	259	2.6	2.9	901	3.1	474	20	144	NP
Mercury	0.3	0.47	0.2 U	0.19 U	0.31 U	0.19 U	1.2	0.42	0.39	270
Nickel	3.1	29.1	3.3 U	3.2 U	39.4	3.8	48.1	7.1	14.4	2400
Potassium	148 U	2970	182 U	230	1850	527	6210	341	1690	NP
Selenium	0.36 U	0.98	2.2 U	2.2 U	15.7	2.2 U	2.3	0.51 U	0.86	3100
Sodium	325	9100	213	239	6790	1100	9280	588	3030	NP
Strontium	347	33.3	182	177	27.9	174	117	330 J	29.7	NP
Thallium	0.32 U	0.58 U	0.4 U	0.42	0.93	0.39 U	0.93	0.49	1.3	2
Vanadium	6.7	38.6	2.9	3.3	71.1	4.8	73.1	27.1	24	7100
Zinc	25.2	167	18.7	18.8	417	32.6	167	49.2	75.2	1500
MISCELLANEOUS										
pH (s.u.)	6.73	7.17	5.79	5.88	7.45	6.22	7.16	5.37	7.01	NP
Cyanide	1.6 U	4.0	2.3 U	2.0 U	3.4 U	2.1 U	4 U	2.1 U	2.7 U	21000

continued next page (see notes on last page of table)

TABLE 5 (page 3 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-5A	PC-5B	PC-6A	PC-6B	PC-7A	PC-7B	PC-8A	PC-8B	PC-9A	PC-9B	NJDEPE
Laboratory Sample Number	22960003	22960004	22935-03	22935-04	22960007	22960008	22935-05	22935-06	22960019	22960020	NRDCSCC
Sampling Date	12/30/92	12/30/92	12/29/92	12/29/92	12/30/92	12/30/92	12/29/92	12/29/92	12/31/92	12/31/92	
Sampling Depth (ft)	0-11'	11-13'	0'-12'	12-14"	0-13'	13-16'	0'-8'	8-12"	0-16'	16-18'	
Dilution Factor	1.8	4.8	1.8	4.2	1.8	1.8	1.8	3.8	1.7	3.5	
VOLATILES											
Methylene Chloride	57 B	130 B	8 JB	42 U	29 B	14 JB	16 U	56 B	14 JB	110 B	210000
Acetone	11 JB	86 JB	18 U	35 J	18 U	18 UJ	10 J	38 U	17 UJ	73 JB	1000000
Carbon Disulfide	18 U	48 U	18 U	42 U	18 U	18 U	18 U	11 J	17 U	9 JB	NP
2-Butanone	18 U	29 J	18 U	30 JB	18 U	18 U	18 U	38 U	17 U	35 U	1000000
Chloroform	18 U	48 U	18 U	42 U	18 U	18 U	18 U	38 U	17 U	35 U	28000
Total Estimated Conc of VOA TICs (a)	U	31	U	--	--	14	--	U	15	20	NA
SEMIVOLATILES											
1,4-Dichlorobenzene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	10000000
Hexachlorobenzene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	2000
N-Nitroso-di-n-propylamine	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	660
1,2,4-Trichlorobenzene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	1200000
4-Chloro-3-methylphenol	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	10000000
Phenanthrene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	NP
Di-n-butylphthalate	45 JB	1700 U	600 U	1400 U	630 U	130 JB	600 U	1300 U	910 B	120 JB	10000000
Fluoranthene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	10000000
Pyrene	6 J	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	10000000
Benzo(a)anthracene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	4000
Chrysene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	40000
bis(2-Ethylhexyl)phthalate	23 JB	1700 U	600 U	160 J	630 U	950 U	600 U	1300 U	80 JB	180 JB	210000
Benzo(b)fluoranthene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	4000
Benzo(k)fluoranthene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	4000
Benzo(a)pyrene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	660
Indeno(1,2,3-cd)pyrene	580 U	1700 U	600 U	1400 U	630 U	950 U	600 U	1300 U	560 U	1100 U	4000
Total Confident Conc of BNAs (a)	--	U	U	--	U	--	U	U	--	--	NA
Total Estimated Conc of BNA TICs (a)	530	24100	34	14520	670	7780	140	31740	470	16620	NA
PESTICIDES/PCBs											
alpha-BHC	3 U	8.5 U	3 U	7.1 U	3.2 U	4.9 U	3.1 U	6.5 U	2.8 U	5.9 U	NP
Beta-BHC	3 U	8.5 U	3 U	7.1 U	3.2 U	4.9 U	3.1 U	6.5 U	2.8 U	5.9 U	NP
gamma-BHC (Lindane)	3 U	8.5 U	3 U	4.5 J	3.2 U	4.9 U	3.1 U	3.2 J	2.8 U	5.9 U	2200
4,4'-DDE	5.8 U	16 U	5.9 U	14 U	6.2 U	9.4 U	6 U	13 U	2.8 J	11 U	9000
4,4'-DDD	5.8 U	16 U	3.4 J	14 U	6.2 U	9.4 U	6 U	13 U	3.7 J	11 U	12000
4,4'-DDT	5.8 U	18 U	6.7 J	14 U	6.2 U	9.4 U	6 U	13 U	34 J	11 U	9000
Methoxychlor	30 U	85 U	30 U	71 U	32 U	49 U	31 U	65 U	28 U	59 U	5200000
alpha-Chlordane	3 U	8.5 U	3 U	7.1 U	3.2 U	4.9 U	3.1 U	6.5 U	2.8 U	5.9 U	NP
gamma-Chlordane	3 U	8.5 U	3 U	7.1 U	3.2 U	4.9 U	3.1 U	6.5 U	2.8 U	5.9 U	NP

continued next page (see notes on last page of table)

TABLE 5 (page 4 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-5A	PC-5B	PC-6A	PC-6B	PC-7A	PC-7B	PC-8A	PC-8B	PC-9A	PC-9B	NJDEPE
Laboratory Sample Number	22960003	22960004	22935-03	22935-04	22960007	22960008	22935-05	22935-06	22960019	22960020	NPDOSCC
Sampling Date	12/30/92	12/30/92	12/29/92	12/29/92	12/30/92	12/30/92	12/29/92	12/29/92	12/31/92	12/31/92	
Sampling Depth (ft)	0-11'	11-13'	0'-12'	12-14"	0-13'	13-16'	0'-8'	8-12"	0-16'	16-18'	
Dilution Factor	1.8	4.8	1.8	4.2	1.8	1.8	1.8	3.8	1.7	3.5	
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METALS											
Aluminum	576	4980	4740	12900	415	4110	829	7940	1160	7550	NP
Antimony	12.6 U	34.8 U	12.8 U	29.8 U	13.5 U	20.2 U	12.9 U	27.1 U	11.9 U	24.7 U	340
Arsenic	0.81 U	32.6	26.3 J	96.1 J	1.2	15.2	3.2	13.7	0.77 U	72.5	2
Barium	674	289	560 J	70.7	421	28.6	296	2560	494	593	47000
Beryllium	0.12	0.21	0.77	0.67	0.13	0.38	0.22	0.59	0.17	0.52	1
Cadmium	1.4 U	4 U	3.4	3.4 U	1.5 U	2.3 U	1.5 U	3.1 U	1.4 U	5.4	100
Calcium	147000	13800	168000	21500	154000	4270	288000	71900	135000	12900	NP
Chromium	1.1 U	12	13	20	1.3	10.6	3.5	24.4	5.6	29.5	NP
Cobalt	1.8 U	5.1 U	4.9	20.9	2 U	5.4	1.9 U	7.4	1.7 U	7.5	NP
Copper	1.3 U	190	14.4	22.3	1.4 U	5.2	1.3 U	43.6	6	354	600
Iron	452	6230	7890	35700	552	7950	487	13200	2460	8150	NP
Lead	16	66	43.6 J	57 J	22.7 J	4.4 J	47.2 J	1.6 UJ	30.4	331	600
Magnesium	37.2 U	1820	355	2460	40.1 U	1550	75.3	2680	79.6	2360	NP
Manganese	22.3	56.7	116	139	3.3	36.5	12.2	100	94	79.2	NP
Mercury	0.18 U	0.49 U	0.18 U	0.42 U	0.19 U	0.28 U	0.18 U	0.38 U	0.17 U	1.5	270
Nickel	2.9 U	82.9	25.3	83.1	3.2 U	14.7	3 U	22.6	2.8 U	29.2	2400
Potassium	163 U	863	324	1840	176 U	996	228	1150	155 U	1690	NP
Selenium	0.4 U	5	0.8 J	1.9	0.43 U	0.64 U	0.41 U	0.86 U	0.45	3.5	3100
Sodium	251 B	3150	572	6500	226 B	2490	262	6740	329 B	2590	NP
Strontium	249	190	167	94.4	235	54.3	200	39.5	239	87.5	NP
Thallium	0.35 U	0.98	0.36 U	0.84 U	0.61	0.97	0.37 U	0.77 U	0.34 U	0.7 U	2
Vanadium	1.5	14.3	13.2	35.6	6.2	15.4	3.3	36	4.3	29.8	7100
Zinc	8.6 B	73.7	129	446	9.7 B	65.4	22.2	87.1	16.5 B	392	1500
MISCELLANEOUS											
pH (s.u.)	5.94	6.26	5.29	6.84	4.87	6.69	6.51	7.41	6.06	6.95	NP
Cyanide	1.7 U	4.7 U	2.1 U	3.9 U	2.2 U	2.9 U	1.9 U	3.8 U	2.0 U	4.3 U	21000

continued next page (see notes on last page of table)

TABLE 5 (page 5 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-10A	PC-10B	PC-11A	PC-11B	PC-12A	PC-12B	PC-13A	PC-13B	PC-14A	PC-14B	NJDEPE
Laboratory Sample Number	22935-07	22935-08	30016001	30016002	22960009	22960010	30016003	30016004	30016005	30016006	NRDCSCC
Sampling Date	12/29/92	12/29/92	01/04/93	01/04/93	12/30/92	12/30/92	01/04/93	01/04/93	01/04/93	01/04/93	
Sampling Depth (ft)	0'-12'	12'-16'	0-14'	14-18'	0-10'	10-12'	0-8'	8-11'	0-4'	4-8'	
Dilution Factor	1.8	1.8	1.5	3.8	2.0	3.6	2.0	4.4	1.1	2.6	
VOLATILES											
Methylene Chloride	18 U	18 U	21 BJ	150 BJ	18 JB	36 B	21 BJ	160 BJ	57 BJ	26 UJ	210000
Acetone	18 U	18 U	15 U	41	20 UJ	170 JB	20 U	44 U	11 U	26 U	1000000
Carbon Disulfide	18 U	18 U	15 U	24 J	20 U	14 JB	20 U	26 J	11 U	7 J	NP
2-Butanone	18 U	18 U	15 U	38 U	20 U	36 U	20 U	17 J	11 U	26 U	1000000
Chloroform	18 U	18 U	15 U	38 U	20 U	36 U	20 U	44 U	11 U	26 U	28000
Total Estimated Conc of VOA TICs (e)	–	–	U	U	–	113	U	U	U	14	NA
SEMIVOLATILES											
1,4-Dichlorobenzene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	10000000
Hexachlorobenzene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	2000
N-Nitroso-di-n-propylamine	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	660
1,2,4-Trichlorobenzene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	1200000
4-Chloro-3-methylphenol	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	10000000
Phenanthrene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	NP
Di-n-butylphthalate	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	220 JB	380 U	880 U	10000000
Fluoranthene	580 U	600 U	500 U	1300 U	640 U	140 J	650 U	1400 U	380 U	880 U	10000000
Pyrene	580 U	600 U	500 U	1300 U	640 U	140 J	650 U	1400 U	380 U	880 U	10000000
Benzo(a)anthracene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	4000
Chrysene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	40000
bis(2-Ethylhexyl)phthalate	71 J	61 J	500 U	1300 U	640 U	120 JB	650 U	1400 U	380 U	880 U	210000
Benzo(b)fluoranthene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	4000
Benzo(k)fluoranthene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	4000
Benzo(a)pyrene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	660
Indeno(1,2,3-cd)pyrene	580 U	600 U	500 U	1300 U	640 U	1200 U	650 U	1400 U	380 U	880 U	4000
Total Confident Conc of BNAs (e)	–	–	U	U	U	–	U	–	U	U	NA
Total Estimated Conc of BNA TICs (e)	290	3850	U	46240	–		1090	9640	1064	12020	NA
PESTICIDES/PCBs											
alpha-BHC	3 U	3.1 U	2.5 U	6.5 U	3.3 U	6.1 U	3.3 U	7.4 U	1.9 U	4.5 U	NP
Beta-BHC	3 U	3.1 U	2.5 U	6.5 U	3.3 U	6.1 U	3.3 U	7.4 U	1.9 U	4.5 U	NP
gamma-BHC (Lindane)	3 U	3.1 U	2.5 U	6.5 U	3.3 U	6.1 U	3.3 U	7.4 U	1.9 U	4.5 U	2200
4,4'-DDE	5.8 U	6 U	4.9 U	13 U	6.3 U	12 U	6.5 U	14 U	3.8 U	8.7 U	9000
4,4'-DDD	5.8 U	6 U	4.9 U	13 U	6.3 U	12 U	3.7 J	14 U	3.8 U	4.4 J	12000
4,4'-DDT	5.8 U	6 U	4.9 U	13 U	6.3 U	12 U	3.3 J	14 U	3.8 U	8.7 U	9000
Methoxychlor	30 U	31 U	25 U	65 U	33 U	61 U	33 U	74 U	19 U	45 U	5200000
alpha-Chlordane	3 U	3.1 U	2.5 U	6.5 U	3.3 U	6.1 U	3.3 U	7.4 U	1.9 U	4.5 U	NP
gamma-Chlordane	3 U	3.1 U	2.5 U	6.5 U	3.3 U	6.1 U	3.3 U	7.4 U	1.9 U	4.5 U	NP

continued next page (see notes on last page of table)

TABLE 5 (page 6 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-10A	PC-10B	PC-11A	PC-11B	PC-12A	PC-12B	PC-13A	PC-13B	PC-14A	PC-14B	NJDEPE
Laboratory Sample Number	22935-07	22935-08	30016001	30016002	22960009	22960010	30016003	30016004	30016005	30016006	NRDCSCC
Sampling Date	12/29/92	12/29/92	01/04/93	01/04/93	12/30/92	12/30/92	01/04/93	01/04/93	01/04/93	01/04/93	
Sampling Depth (ft)	0'-12'	12'-16'	0-14'	14-18'	0-10'	10-12'	0-8'	8-11'	0-4'	4-8'	
Dilution Factor	1.8	1.8	1.5	3.8	2.0	3.6	2.0	4.4	1.1	2.6	
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/kg
METALS											
Aluminum	697	18300	225	8080	262	19900	4500	11000	3020	6940	NP
Antimony	12.5 U	13 U	10.6 U	27.1 U	13.7 U	25.7 U	14 U	31.1 U	8.1 U	19 U	340
Arsenic	1.1 U	11.6	0.89 U	2.3	4.2	1440	1.2 J	7	3.2	5.3	2
Barium	229	35.6	49.6	89.6	36.3	652	456 J	195	17.5	1300	47000
Beryllium	0.2	1	0.06	0.38	0.07 U	1.4	0.34	0.53	0.3	0.56	1
Cadmium	1.4 U	1.5 U	1.2 U	3.1 U	1.6 U	25.5	1.7	3.5 U	0.92 U	2.2 U	100
Calcium	259000	3090	111000	56500	161000	11600	126000	6840	709	163000	NP
Chromium	3.3	38.9	0.95 U	13.7	1.2 U	57.5	10.3	19.4	12.4	14.5	NP
Cobalt	1.8 U	12.7	1.5 U	3.9 U	2 U	17.5	2 U	4.5 U	1.2 U	3.4	NP
Copper	1.3 U	15.3	1.1 U	7.8	1.4 U	74	10.2	18.4	11.2	37.9	600
Iron	326	41400	62.4	10400	289	46700	4140	13600	7170	9030	NP
Lead	43.7 J	13.6 J	13	4.4	28.3	268	81.3 J	50.7	25.1	42.8	600
Magnesium	43	8450	31.5 U	2620	40.6 U	7270	1710	2260	155	1560	NP
Manganese	4	411	1.2	44.3	2	459	76.8	64.2	52	72	NP
Mercury	0.18 U	0.18 U	0.15 U	0.38 U	0.19 U	1.1	0.2 U	4.9	0.11 U	0.27 U	270
Nickel	2.9 U	31	2.5 U	6.5	3.2 U	38.1	10.7	8.9	3.5	10.1	2400
Potassium	163 U	4230	343 B	2120	178 U	3350	470 B	3030	324 B	1640	NP
Selenium	0.4 UJ	0.55	0.3 U	0.77 U	0.43 U	4.3	0.39 UJ	1.5	0.38 J	0.54 U	3100
Sodium	196	6320	57.9	6020	268	5570	3320	4030	39.6	2020	NP
Strontium	195	25.2	163	37.1	199	403	191	170	17.8	118	NP
Thallium	0.35 UJ	0.44 J	0.3 U	0.77 U	0.39 U	0.72 U	0.39 U	0.88 U	0.52 U	0.54 U	2
Vanadium	4.9	40.8	1.6	29.7	1.5 U	55.9	5.5	33.8	10.6	16.7	7100
Zinc	15.2	95.4	6.0 B	31.9	11.6 B	275	17.9	60.4	12.8	109	1500
MISCELLANEOUS											
pH (s.u.)	6.14	7.50	6.12	6.85	5.35	5.96	8.36	7.16	7.4	6.96	NP
Cyanide	2.0 U	2.0 U	1.7 U	4.8 U	2.2 U	3.5 U	2.7 U	4.5 U	1.1 U	2.8 U	21000

continued next page (see notes on last page of table)

932170340

TABLE 5 (page 7 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-15A	PC-15B	PC-16A	PC-16B	PC-17A	PC-17B	PC-18A	DUP-18A	PC-18B	NJDEPE
Laboratory Sample Number	22960013	22960014	22960015	22960016	22960005	22960006	30016007	30016012	30016008	NRDCSCC
Sampling Date	12/31/92	12/31/92	12/31/92	12/31/92	12/30/92	12/30/92	01/04/93	01/04/93	01/04/93	
Sampling Depth (ft)	0-11'	11-14'	0-11'	11-13'	0-9.5	9.5-12'	0-12'	0-12'	12-15'	
Dilution Factor	1.7	3.0	1.9	3.1	1.6	2.7	1.8	1.8	2.2	
VOLATILES										
Methylene Chloride	58 B	17 JB	20 B	130 B	16 JB	120 B	26 BJ	53 BJ	16 JB	210000
Acetone	36 BJ	88 JB	19 UJ	31 UJ	16 U	27 U	18 UJ	18 U	150 J	1000000
Carbon Disulfide	17 U	11 JB	19 U	6 JB	16 U	18 JB	18 U	18 U	6 J	NP
2-Butanone	17 U	28 J	19 U	31 U	16 U	27 U	18 UJ	18 UJ	22 U	1000000
Chloroform	17 U	30 U	19 U	31 U	16 U	27 U	18 U	18 U	22 U	28000
Total Estimated Conc of VOA TICs (e)	U	31	U	43	U	--	13	13	U	NA
SEMIVOLATILES										
1,4-Dichlorobenzene	560 U	1000 U	630 U	1000 U	540 U	900 U	620 U	600 U	760 U	10000000
Hexachlorobenzene	560 U	1000 U	630 U	1000 U	540 U	900 U	620 U	600 U	760 U	2000
N-Nitroso-di-n-propylamine	560 U	1000 U	630 U	1000 U	540 U	900 U	620 U	600 U	760 U	660
1,2,4-Trichlorobenzene	560 U	1000 U	630 U	1000 U	540 U	900 U	620 U	600 U	760 U	1200000
4-Chloro-3-methylphenol	560 U	1000 U	630 U	1000 U	540 U	900 U	620 U	600 U	760 U	10000000
Phenanthrene	560 U	1000 U	630 U	1000 U	540 U	92 J	620 U	600 U	760 U	NP
Di-n-butylphthalate	560 U	1000 U	66 JB	120 JB	540 U	900 U	620 U	600 U	760 U	10000000
Fluoranthene	560 U	160 J	630 U	1000 U	540 U	190 J	620 U	600 U	760 U	10000000
Pyrene	560 U	160 J	630 U	1000 U	540 U	190 J	620 U	600 U	760 U	10000000
Benzo(a)anthracene	560 U	1000 U	630 U	1000 U	540 U	130 J	620 U	600 U	760 U	4000
Chrysene	560 U	130 J	630 U	1000 U	540 U	170 J	620 U	600 U	760 U	40000
bis(2-Ethylhexyl)phthalate	140 JB	240 JB	630 U	100 JB	540 U	900 U	200 JB	600 U	760 U	210000
Benzo(b)fluoranthene	560 U	110 J	630 U	1000 U	540 U	130 J	620 U	600 U	760 U	4000
Benzo(k)fluoranthene	560 U	1000 U	630 U	1000 U	540 U	120 J	620 U	600 U	760 U	4000
Benzo(a)pyrene	560 U	110 J	630 U	1000 U	540 U	150 J	620 U	600 U	760 U	660
Indeno(1,2,3-cd)pyrene	560 U	1000 U	630 U	1000 U	540 U	120 J	620 U	600 U	760 U	4000
Total Confident Conc of BNAs (e)	--	--	--	--	U	--	--	U	U	NA
Total Estimated Conc of BNA TICs (e)	590	15280	960	7790	--	8630	1500	1520	9220	NA
PESTICIDES/PCBs										
alpha-BHC	2.9 U	5.2 U	3.2 U	5.3 U	2.7 U	4.6 U	3.1 U	3.1 U	3.8 U	NP
Beta-BHC	2.9 U	5.2 U	3.2 U	5.3 U	2.7 U	4.6 U	3.1 U	3.1 U	3.8 U	NP
gamma-BHC (Lindane)	2.9 U	5.2 U	3.2 U	5.3 U	2.7 U	4.6 U	3.1 U	3.1 U	3.8 U	2200
4,4'-DDE	5.6 U	10 U	6.2 U	10 U	5.3 U	8.9 U	6.1 U	6 U	7.5 U	9000
4,4'-DDD	5.6 U	10 U	6.2 U	10 U	5.3 U	8.9 U	6.1 U	6 U	7.5 U	12000
4,4'-DDT	5.6 U	10 U	6.2 U	10 U	5.3 U	8.9 U	6.1 U	6 U	7.5 U	9000
Methoxychlor	29 U	52 U	32 U	53 U	27 U	46 U	31 U	31 U	38 U	5200000
alpha-Chlordane	2.9 U	5.2 U	3.2 U	5.3 U	2.7 U	4.6 U	3.1 U	3.1 U	3.8 U	NP
gamma-Chlordane	2.9 U	5.2 U	3.2 U	5.3 U	2.7 U	4.6 U	3.1 U	3.1 U	3.8 U	NP

continued next page (see notes on last page of table)

TABLE 5 (page 8 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-15A	PC-15B	PC-16A	PC-16B	PC-17A	PC-17B	PC-18A	DUP-18A	PC-18B	NJDEPE
Laboratory Sample Number	22960013	22960014	22960015	22960016	22960005	22960006	30016007	30016012	30016008	NRDCSCC
Sampling Date	12/31/92	12/31/92	12/31/92	12/31/92	12/30/92	12/30/92	01/04/93	01/04/93	01/04/93	
Sampling Depth (ft)	0-11'	11-14'	0-11'	11-13'	0-9.5	9.5-12'	0-12'	0-12'	12-15'	
Dilution Factor	1.7	3.0	1.9	3.1	1.6	2.7	1.8	1.8	2.2	
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METALS										
Aluminum	670	9540	209	12800	929	6520	4520	3070	13200	NP
Antimony	12.1 U	21.9 U	13.5 U	22.4 U	11.5 U	19.5 U	13.4 U	13 U	16.1 U	340
Arsenic	1.8	15.6	0.87 U	70.5	0.94	17.9	2.9	2.2	7.5	2
Barium	41.4	1460	364	4280	358	3630	582	661	3210	47000
Beryllium	0.11	0.67	0.09	0.94	0.12	0.51	0.28	0.23	0.71	1
Cadmium	1.4 U	2.5 U	1.5 U	2.5 U	1.3 U	2.2 U	1.5 U	1.5 U	1.8 U	100
Calcium	139000	8580	162000	6750	134000	19700	123000	114000	2160	NP
Chromium	1.3	26.9	1.2 U	125	4.3	91.2	12.6	9.7	24	NP
Cobalt	3.5	8.2	2.5	15.9	1.7 U	9.7	2.2	2.2	9.9	NP
Copper	1.7	80.9	1.4 U	285	1.2 U	604	22.1	9.5	18.3	600
Iron	595	16700	242	19600	1500	6740	6730	4450	21800	NP
Lead	17.3	225	13.3	379	25.4	225	18.2	21.8	38.6	600
Magnesium	163	4020	40 U	4480	119	2670	584	417	5450	NP
Manganese	11.1	129	1.9	263	7.4	176	169	102	364	NP
Mercury	0.17 U	2.8	0.19 U	0.53	0.16 U	1.4	0.2	0.18 U	0.24	270
Nickel	2.8 U	15.4	3.2 U	46.8	2.7 U	26.6	3.1 U	3 U	19.3	2400
Potassium	157 U	1880	175 U	2520	150 U	1490	604 B	481 B	3170	NP
Selenium	0.38 U	5	0.43 U	6.8	0.36 U	3.4	1.2	0.38 U	1.3	3100
Sodium	198 B	5000	213 B	4920	1380	8910	800	590	5100	NP
Strontium	173	129	186	56.1	1800	63.5	13100	11400	222	NP
Thallium	0.61	0.62 U	0.38 U	0.63 U	0.33 U	0.75	0.38 U	0.37 U	0.45 U	2
Vanadium	2.8	33.4	1.7	44.3	5.9	24.1	19.5	11.4	32.7	7100
Zinc	9.2 B	144	6.8 B	270	8.4 B	169	56.2	11.7	78.3	1500
MISCELLANEOUS										
pH (s.u.)	5.8	6.71	5.11	5.12	4.56	6.52	6.42	6.26	7.5	NP
Cyanide	1.9 U	3.2 U	2.1 U	3.1 U	1.6 U	2.8 U	2.0 U	1.7 U	2.2 U	21000

continued next page (see notes on last page of table)

932170342

TABLE 5 (page 9 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-19A	PC-19B	PC-20A	PC-20B	PC-21A	PC-22A	PC-23A	PC-24A	PCSS-1	NJDEPE
Laboratory Sample Number	30016009	30016010	30016013	30016014	30047001	30047002	30047003	30047004	30016011	NRDCSCC
Sampling Date	01/04/93	01/04/93	01/04/93	01/04/93	1/06/93	1/06/93	1/06/93	1/06/93	01/04/93	
Sampling Depth (ft)	0-10'	10-12'	0-8'	8-12'	0-3.5'	0-5'	0-5'	0-3'	0-1'	
Dilution Factor	1.8	2.3	1.1	1.8	2.2	1.9	2.4	2.0	1.7	
VOLATILES										
Methylene Chloride	18 UJ	23 UJ	9 JB	13 JB	60 BJ	19 UJ	18 JB	11 JB	47 BJ	210000
Acetone	18 U	23 U	11 U	36 J	41 BJ	23 BJ	24 UJ	20 UJ	31 J	1000000
Carbon Disulfide	18 U	9 J	11 U	18 U	22 U	19 UJ	24 U	20 U	17 U	NP
2-Butanone	18 U	23 U	11 U	18 UJ	22 UJ	19 UJ	24 UJ	20 UJ	17 U	1000000
Chloroform	25	23 U	11 U	18 U	22 U	19 U	24 U	20 U	17 U	28000
Total Estimated Conc of VOA TICs (a)	87	U	U	U	U	12	U	U	U	NA
SEMIVOLATILES										
1,4-Dichlorobenzene	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	10000000
Hexachlorobenzene	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	2000
N-Nitroso-di-n-propylamine	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	660
1,2,4-Trichlorobenzene	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	1200000
4-Chloro-3-methylphenol	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	10000000
Phenanthrene	580 U	100 J	240 J	580 U	720 U	630 U	790 U	670 U	560 U	NP
Di-n-butylphthalate	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	560 U	10000000
Fluoranthene	580 U	200 J	55 J	580 U	720 U	630 U	790 U	670 U	560 U	10000000
Pyrene	580 U	210 J	50 J	580 U	720 U	630 U	790 U	670 U	560 U	10000000
Benzo(a)anthracene	580 U	140 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	4000
Chrysene	580 U	180 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	40000
bis(2-Ethylhexyl)phthalate	580 U	760 U	370 U	580 U	720 U	630 U	790 U	670 U	99 JB	210000
Benzo(b)fluoranthene	580 U	150 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	4000
Benzo(k)fluoranthene	580 U	130 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	4000
Benzo(a)pyrene	580 U	170 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	660
Indeno(1,2,3-cd)pyrene	580 U	84 J	370 U	580 U	720 U	630 U	790 U	670 U	560 U	4000
Total Confident Conc of BNAs (a)	U	--	--	U	U	U	--	U	U	NA
Total Estimated Conc of BNA TICs (a)	1510	11830	16053	6530	180	1310	240	659	2200	NA
PESTICIDES/PCBs										
alpha-BHC	5.5	3.8 UJ	1.1 J	3 U	3.7 U	3.2 U	4 U	3.4 U	3.4	NP
Beta-BHC	2.3 J	3.8 UJ	1.9 U	3 U	3.7 U	3.2 U	4 U	3.4 U	2.8 U	NP
gamma-BHC (Lindane)	3 U	3.8 UJ	1.9 U	3 U	3.7 UJ	3.2 UJ	4 U	3.4 U	2.3 J	2200
4,4'-DDE	7	7.5 UJ	34	5.8 U	7.2 U	6.2 U	6 J	6.6 U	4.2 J	9000
4,4'-DDD	5.8 U	7.5 UJ	27 J	5.8 U	7.2 U	6.2 U	7.8 U	6.6 U	5.5 U	12000
4,4'-DDT	5.8 U	7.5 UJ	70 J	5.8 U	7.2 U	6.2 U	7.8 U	6.6 U	5.7 J	9000
Methoxychlor	30 U	38 UJ	19 U	30 U	37 U	32 U	40 U	34 U	210	5200000
alpha-Chlordane	3 U	3.8 UJ	1.9 U	3 U	3.7 U	3.2 U	4 U	3.4 U	4.0	NP
gamma-Chlordane	3 U	3.8 UJ	1.9 U	3 U	3.7 U	3.2 U	4 U	3.4 U	2.4 J	NP

continued next page (see notes on last page of table)

TABLE 5 (page 10 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PC-19A	PC-19B	PC-20A	PC-20B	PC-21A	PC-22A	PC-23A	PC-24A	POSS-1	NJDEPE
Laboratory Sample Number	30016009	30016010	30016013	30016014	30047001	30047002	30047003	30047004	30016011	NRDCSCC
Sampling Date	01/04/93	01/04/93	01/04/93	01/04/93	1/06/93	1/06/93	1/06/93	1/06/93	01/04/93	
Sampling Depth (ft)	0-10'	10-13'	0-8'	8-12'	0-3.5'	0-5'	0-5'	0-3'	0-1'	
Dilution Factor	1.8	2.3	1.1	1.8	2.2	1.9	2.4	2.0	1.7	
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/kg
METALS										
Aluminum	5300	6530	5820	10800	3080	143	9520	278	13600	NP
Antimony	12.6 U	16.3 U	8 U	12.6 U	18.7 U	16.3 U	20.8 U	17.4 U	26.2	340
Arsenic	3	63.7	0.82	5.1	4.5 J	1.3 U	16.2	1.4 U	9.4	2
Barium	444	376	184	33.9	779 J	56.4	2320	69.2	3700	47000
Beryllium	0.2	0.31	0.34	0.66	0.38	0.08	0.53	0.09	0.36	1
Cadmium	1.4 U	4.2	0.91 U	1.4 U	1.8 U	1.6 U	2 U	1.7 U	1.4 U	100
Calcium	81900	2420	662	1570	178000	172000	40100	153000	140	NP
Chromium	9	33.4	6.1	20.6	7.4 J	2.3 UJ	19 J	2.4 UJ	108	NP
Cobalt	1.8 U	5.5	9.1	6.4	2.9	1.9 U	14.8	2.1 U	6.1	NP
Copper	13.9	710	17.6	9.4	28.7 J	2.1 U	51.5	2.2 U	26.4	600
Iron	5890	12000	14700	24200	4520	116	18500	107	33000	NP
Lead	20	277	6.9	9.4	21.9	18.3 J	40.8	18.5	43.4	600
Magnesium	78.5	2460	3050	4840	485	217	564 B	293	136	NP
Manganese	29.6	112	412	456	164	2.6	758	3.2	0.49 U	NP
Mercury	0.18 U	1.5	0.35	0.18 U	0.22 U	0.19 U	0.24 U	0.2 U	0.18	270
Nickel	3.6	36.6	5.9	13.1	7.5	4.2 U	21.4	4.5 U	5.8	2400
Potassium	656 B	1620	382 B	2980	471	342 U	740	364 U	845	NP
Selenium	0.35 J	2.1	0.23 U	0.36 U	0.44 U	0.38 U	1.8	0.41 U	2.4	3100
Sodium	177	3200	1370	3650	1090	1640	1240	2420	117	NP
Strontium	5560	173	3.2	46.7	350	702	257	735	26000	NP
Thallium	0.35 UJ	0.46 U	0.23 U	0.36 U	0.99 U	0.86 U	1.1 U	0.92 U	0.34 U	2
Vanadium	13.2	25.2	25.7	26.2	8.2	1.9 U	27.2	2.1 U	129	7100
Zinc	8.6	551	29.4	66.7	34.6 J	13.8	84.7	61.8	12.5	1500
MISCELLANEOUS										
pH (s.u.)	4.59	7.38	7.18	7.04	6.53	6.50	6.63	6.78	3.60	NP
Cyanide	1.8 U	2.5 U	1.3 U	1.9 U	4.3 U	3.6 U	5.3 U	4.2 U	1.6 U	21000

continued next page (see notes on last page of table)

932170344

TIERRA-B-003766

TABLE 5 (page 11 of 11)
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

NOTES

(a)	: Total concentration provided does not include concentrations of individual compounds attributable to laboratory and/or field contamination (i.e., "B") or estimated concentrations below the method detection limits.
--	: No confident concentration available
U	: Compound was not detected at concentrations exceeding the method detection limit
J	: Quantitation is approximate due to limitations identified during the quality assurance review (data validation).
B	: This result is qualitatively suspect since this compound was detected in a field and/or laboratory blank at a similar concentration.
UJ	: This analyte was not detected, but the quantitation limit is estimated due to limitations identified during the QA review.
s.u.	: Standard Unit
NP	: No Cleanup Criteria available
NA	: Not Applicable/Not Analyzed
VOC TICs	: Volatile Organic Tentatively Identified Compounds
BN TICs	: Base/Neutral Extractable Organic Tentatively Identified Compounds
NRDCSCC	: NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria, dated March 8, 1993.
OUTLINE	: Result Exceeds The NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria, dated March 8, 1993.

TABLE 6 (page 1 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PCSED-14	PCSED-20	NJDEPE
Laboratory Sample Number	30047005	30047006	NRDCSCC
Sampling Date	1/06/93	1/06/93	
Sampling Depth (ft)	0-6"	0-6"	
Dilution Factor	2.8/14.4	2.2/13.3	
Units	ug/Kg	ug/Kg	ug/Kg
VOLATILES			
Acetone	270 BJ	110 BJ	1000000
Carbon Disulfide	18 J	130 U	NP
2-Butanone	46 J	130 U	1000000
Chlorobenzene	28 U	340	680000
Total Confident Conc of VOCs (a)	--	340	NA
Total Estimated Conc of VOA TICs (a)	3863	6880	NA
SEMIVOLATILES			
1,3-Dichlorobenzene	920 U	1400 J	10000000
1,4-Dichlorobenzene	920 U	7300	10000000
1,2-Dichlorobenzene	920 U	4700	10000000
Isophorone	140 J	510 J	10000000
1,2,4-Trichlorobenzene	920 U	6000	1200000
Naphthalene	920 U	1200 J	4200000
Acenaphthylene	94 J	4400 U	NP
Acenaphthene	920 U	460 J	10000000
3-Nitroaniline	2300 UJ	11000 UJ	NP
4,6-Dinitro-2-methylphenol	220 J	11000 U	NP
N-Nitrosodiphenylamine (1)	920 U	3600 J	NP
Phenanthrene	140 J	4400 U	NP
Anthracene	240 J	49000	10000000
Fluoranthene	920 J	2200 J	10000000
Pyrene	1200 J	4800	10000000
Butylbenzylphthalate	110 J	4400 U	10000000
3-3'-Dichlorobenzidine	920 U	2100 J	NP
Benzo(a)anthracene	460 J	1100 J	4000
Chrysene	450 J	1800 J	4000
bis(2-Ethylhexyl)phthalate	6800 B	730 JB	210000
Di-n-octylphthalate	200 J	4400 UJ	10000000
Benzo(b)fluoranthene	420 J	590 J	4000
Benzo(k)fluoranthene	450 J	470 J	4000
Benzo(a)pyrene	430 J	600 J	660
Indeno(1,2,3-cd)pyrene	210 J	4400 UJ	4000
Benzo(g,h,i)Perylene	170 J	4400 UJ	NP
Total Confident Conc of BNAs (a)	920	27700	NA
Total Estimated Conc of BNA TICs (a)	36410	156500	NA
PESTICIDES/PCBs			
Heptachlor	4.7 U	2.9 J	650
4,4'-DDE	180	390	9000
4,4'-DDD	100	45	12000
Endrin Aldehyde	6.6 J	8.7 U	NP
Aroclor-1248	2500	87 U	NP
Aroclor-1260	830	87 U	NP
Total PCB (Aroclor) Concentration	3330	U	2000**

continued next page (see notes on last page of table)

932170346

TABLE 6 (page 2 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PCSED-14	PCSED-20	NJDEPE
Laboratory Sample Number	30047005	30047006	NRDCSCC
Sampling Date	1/06/93	1/06/93	
Sampling Depth (ft)	0-6"	0-6"	
Dilution Factor	2.8	2.2	
Units	mg/Kg	mg/Kg	mg/Kg
METALS			
Aluminum	10300	2340	NP
Antimony	24.2 U	22.8 U	340
Arsenic	19.6	23.6	2
Barium	3180	10700	47000
Beryllium	0.91	0.11	1
Cadmium	9.9	2.2 U	100
Calcium	4670	1680	NP
Chromium	316 J	236 J	NP
Cobalt	12.2	12.9	NP
Copper	515	616	600
Iron	21100	22300	NP
Lead	294	432	600
Magnesium	4460	1920	NP
Manganese	191	46.3	NP
Mercury	6.6	43.6	270
Nickel	53.8	11.5	2400
Potassium	1700	1260	NP
Selenium	3.6	6.8	3100
Sodium	6970	6560	NP
Strontium	735	74.9	NP
Thallium	1.3 U	1.2 U	2
Vanadium	131	16.9	7100
Zinc	563	123	1500
MISCELLANEOUS			
pH (s.u.)	6.98	7.67	NP
Cyanide	8.6	192	NP

continued next page (see notes on last page of table)

TABLE 6 (page 3 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

NOTES

(a)	: Total concentration provided does not include concentrations of individual compounds attributable to laboratory and/or field contamination (i.e.,"B") or estimated (J) concentration below the method detection limits.
**	: Total PCB (Aroclor) concentration, not for individual PCB compounds.
--	: No confident concentration available
U	: Compound was not detected at concentrations exceeding the method detection limit.
J	: Quantitation is approximate due to limitations identified during the quality assurance review (data validation).
B	: This result is qualitatively suspect since this compound was detected in a field and/or laboratory blank at a similar concentration.
UJ	: This analyte was not detecetd but the quantitation limit is estimated due to limitations identified during the QA review.
s.u.	: Standard Unit
NP	: No Proposed Cleanup level available
NA	: Not Applicable/Not Analyzed
VOC TICs	: Volatile Organic Tentatively Identified Compounds
BNA TICs	: Base/Neutral/Acid Extractable Organic Tentatively Identified Compounds
NRDCSCC	: NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria, dated March 8, 1993.
Outline	: Results exceed the NJDEPE Non-Residential Direct Contact Soil Cleanup Criteria, dated March 8, 1993

932170348

TABLE 7 (page 1 of 4)
SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames & Moore Sample Number	PCMW-1	PCMW-2	PCMW-3	MW-5A	MW-6A	MW-6ADUP	MW-8A	MW-8B	PCMW-17
Laboratory Sample Number	30047009	30047010	30047011	30047014	30047013	30047017	30047015	30047016	30047012
Sampling Date	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES									
Methylene Chloride	10 U	5 JB	5 JB	5 JB	10 U	10 U	10 U	11 B	8 JB
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	91 B	16 B
Carbon Disulfide	10 U	10 U	10 U	6 J	23	14	10 U	52	10 U
Total Confident Conc. VOAs (a)	U	–	–	–	23	14	U	62	–
Total Estimated Conc. VOA TICs (a)	6	–	–	8	U	U	U	34	–
SEMI-VOLATILES									
Phenol	11 U	10 U	11 U	11 U	14 U	11 U	10 U	260	12 U
bis(2-Ethylhexyl)phthalate	3 JB	2 JB	1 JB	1 JB	1 JB	4 JB	1 J	7 JB	2 JB
Total Confident Conc. BNAs (a)	–	–	–	–	–	–	U	–	–
Total Estimated Conc. BNA TICs (a)	1960	139	72	30076	3906	4048	432	1697	826
PESTICIDE/PCBs									
Alpha-BHC	0.05 U	0.05 U	0.05 U	0.03 J	R	R	0.05 U	0.05 U	R

continued next page (see notes on last page of table)

TABLE 7 (page 2 of 4)
SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames & Moore Sample Number	PCMW-1	PCMW-1Diss	PCMW-2	PCMW-2Diss	PCMW-3	PCMW-3Diss	MW-5A	MW-5ADiss
Laboratory Sample Number	30047009	30047019	30047010	30047020	30047011	30047021	30047014	30047024
Sampling Date	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS								
Aluminum	5500	247	23500	146	46600	20200	2850	2410
Arsenic	15.4	6.6 J	106	7.5 J	14.1	3.4 U	3.4 U	3.4 U
Barium	617	132	721	149	1190	15.4	139	15.5
Beryllium	0.61	0.13 U	2.4	0.13 U	4	3	0.37	0.27
Cadmium	4.2 U	4.2 U	25.3	4.2 U	4.2 U	4.7	4.2 U	4.2 U
Calcium	1230000	656000	432000	429000	470000	512000	593000	582000
Chromium	16.7 J	6.1 UJ	52.3 J	6.1 UJ	41.5 J	6.1 UJ	6.1 UJ	6.1 UJ
Cobalt	6.3	5.1 U	36.2	5.1 U	29.1	13.6	5.1 U	5.1 U
Copper	22.6	5.5 U	203	5.5 U	238	127	5.5 U	5.5 U
Iron	7390	789	37800	354	18100	98	1550	949
Lead	46.2	0.8 U	217	1	26.6	0.8 U	22.4	0.8 U
Magnesium	30800	34000	14000	13100	21100	21600	7730	8470
Manganese	806	811	667	123	1400	756	96.5	103
Nickel	15.3	11.2 U	79.4	11.2 U	111	86.2	11.2 U	11.2 U
Potassium	3000	3120	5180	4230	7700	7940	4020	4240
Selenium	1 UJ	1 UJ	6.4 J	3.1	2.6 J	1.5	1 UJ	1 U
Sodium	72100	84700	490000	524000	163000	178000	64800	73200
Strontium	6340	NA	52100	NA	22500	NA	1750	NA
Vanadium	25.6	5.1 U	57.4	5.1 U	27.8	5.1 U	10.6	8.9
Zinc	147	23.5 B	565	42.2 B	178	142	64.4	20.6 B
MISCELLANEOUS								
pH (s.u.)	6.91	NA	7.51	NA	4.68	NA	5.97	NA
Cyanide	10 U	NA	10 U	NA	10 U	NA	20 U	NA

continued next page (see notes on last page of table)

TABLE 7 (page 3 of 4)
SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames & Moore Sample Number	MW-6A	MW-6ADUP	MW-6ADiss	DUPMW6ADiss	MW-8A	MW-8ADiss	MW-8B	MW-8BDiss	PCMW-17	PCMW-17Diss
Laboratory Sample Number	30047013	30047017	30047023	30047027	30047015	30047025	30047016	30047026	30047012	30047012
Sampling Date	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93	1/06/93
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS										
Aluminum	812	902	152	41.7	4420	4830	166	115	174000	179000
Arsenic	2660	2650	2890	2620	9.8	7.5	16.8 U	16.8 U	6.4	10.5
Barium	656	757	161	130	77.1	16	802	947	96.6	16.1
Beryllium	0.19	0.13 U	0.15	0.13 U	0.62	0.61	0.13	0.13 U	11.4	11
Cadmium	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Calcium	404000	402000	480000	474000	556000	563000	518000	569000	672000	599000
Chromium	6.1 UJ	6.1 UJ	6.1 UJ	6.1 UJ	6.1 UJ	6.1 UJ	6.1 UJ	6.1 UJ	19.7 J	12.5 J
Cobalt	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	92.8	106
Copper	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	14.9	5.5 U
Iron	3750	3750	1040	478	667	507	790	73	47300	42700
Lead	46.3	60.2	1.4	1.3 U	21	1.3 U	13	1.3 U	24.2	3.8 U
Magnesium	85200	81200	97100	98300	1320	1380	45900	1360	175000	174000
Manganese	490	480	487	464	61.6	65.9	138	1.7	8070	7690
Nickel	11.2 U	11.2 U	11.2 U	11.2 U	12.8	14.1	19.1	17.1	484	544
Potassium	23600	23400	25600	25600	1640	1560	195000	218000	47400	45700
Selenium	1 U	1 UJ	3.1 U	6.2 UJ	1 UJ	1 UJ	6.2 UJ	6.2 U	3.1 U	3.1 U
Sodium	696000	656000	885000	1010000	18900	20200	460000	2490000	2440000	2370000
Strontium	1560	1470	NA	NA	2440	NA	47500	NA	9670	NA
Vanadium	8.4	10.5	5.1	5.1 U	18.5	20.4	5.1 U	5.1 U	11.8	8.3
Zinc	61.9	55.4	65 B	16.2 B	79.3	83.9	32 B	16.1 B	456	514
MISCELLANEOUS										
pH (s.u.)	6.46	7.00	NA	7	5.15	NA	10.84	NA	4.27	NA
Cyanide	16.3	23	NA	NA	10 U	NA	10 U	NA	10 U	NA

continued next page (see notes on last page of table)

TABLE 7 (page 4 of 4)
SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

NOTES:

(a)	:	Total concentration provided does not include concentrations of individual compounds attributable to laboratory and/or field contamination (i.e., "B") or estimated concentrations below the method detection limits.
--	:	No confident concentration available
U	:	Compound was not detected at concentrations exceeding the method detection limit.
J	:	Quantitation is approximate due to limitations identified during the quality assurance review (data validation).
B	:	This result is qualitatively suspect since this compound was detected in a field and/or laboratory blank at a similar concentration.
R	:	Unreliable result. Compound may or may not be present.
UJ	:	This analyte was not detected, but the method detection limit is estimated due to limitations identified during the QA review.
s.u.	:	Standard Unit
NP	:	No Groundwater Cleanup Standard available
NA	:	Not Applicable/Not Analyzed
VOC TICs	:	Volatile Organic Tentatively Identified Compounds
BNA TICs	:	Base/Neutral/Acid Extractable Organic Tentatively Identified Compounds

932170352

TABLE 8 (page 1 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SURFACEWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PCSW-14	PCSW-20
Laboratory Sample Number	30016015	30016016
Sampling Date	1/04/93	1/04/93
Dilution Factor	1.0	1.0
Units	ug/L	ug/L
VOLATILES		
Methylene Chloride	12 B	11 B
Total Confident Conc. VOAs (a)	--	--
Total Estimated Conc. VOA TICs (a)	--	--
SEMI-VOLATILES		
Di-n-butylphthalate	3 JB	10 U
bis(2-Ethylhexyl)phthalate	7 JB	4 JB
Total Confident Conc. BNA (a)	--	--
Total Estimated Conc. BNA TICs (a)	5	U
PESTICIDES/PCBs	U	U

continued next page (see notes on last page)

TABLE 8 (page 2 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SURFACEWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	PCSW-14	PCSW-14-Diss	PCSW-20	PCSW-20-Diss
Laboratory Sample Number	30016015	30016019	30016016	30016020
Sampling Date	1/04/93	1/04/93	1/04/93	1/04/93
Dilution Factor	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L
METALS				
Aluminum	416	39.3 U	61.1 U	39.3 U
Arsenic	11.5	30 U	11.5 U	30 U
Barium	51.6 J	25.3	25.3	23.2
Beryllium	0.2	0.13 U	0.2	0.13 U
Calcium	244000	231000	253000	244000
Copper	12.1	5.5 U	7.4	5.5 U
Iron	857	167	167	149
Magnesium	624000	651000	608000	642000
Manganese	72.6	55.9	65	80
Mercury	0.55	0.2 U	1.2	0.2 U
Nickel	8.4 U	11.2 U	11.2	11.2 U
Potassium	165000	170000	162000	169000
Sodium	4560000	4380000	4330000	4350000
Strontium	2880	NA	2810	NA
Thallium	5.4	11.4 U	5 U	11.4 U
Vanadium	4.2	5.1 U	6	5.1 U
Zinc	28.8	2.4 U	28.3	2.4 U
MISCELLANEOUS				
pH (s.u.)	7.08	NA	7.24	NA
Cyanide	10 U	NA	10 U	NA

continued next page (see notes on last page)

TABLE 8 (page 3 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR SURFACEWATER SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

NOTES

(a)	: Total concentration provided does not include concentrations of individual compounds attributable to laboratory and/or field contamination (i.e., "B") or estimated concentrations below the method detection limits.
--	: No confident concentration available
U	: Compound was not detected at concentrations exceeding the method detection limit.
J	: Quantitation is approximate due to limitations identified during the quality assurance review (data validation).
B	: This result is qualitatively suspect since this compound was detected in a field and/or laboratory blank at a similar concentration.
UJ	: This analyte was not detected, but the quantitation limit is estimated due to limitations identified during the quality assurance review.
s.u.	: Standard Unit
NP	: No Proposed Cleanup level available
NA	: Not Applicable/Not Analyzed
VOC TICs	: Volatile Organic Tentatively Identified Compounds
BNA TICs	: Base/Neutral/Acid Extractable Organic Tentatively Identified Compounds

932170355

TABLE 9 (page 1 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR FIELD AND TRIP BLANK SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	FB-123092	TB-123092	FB-123192	TB-123192	FB010493	TB010493	FB-010693	TB-010693
Laboratory Sample Number	22960011	22960012	22960017	22960018	30016017	30016018	30047007	30047008
Sampling Date	12/30/92	12/30/92	12/31/92	12/31/92	1/04/93	1/04/93	1/06/93	1/06/93
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES								
Methylene Chloride	8 J	6 J	11	4 J	8 J	13	7 J	10 J
Acetone	25	22	10 U	10 U	10 U	10 U	28 B	10 U
Carbon Disulfide	10 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U
Total Confident Conc of VOCs (a)	25	22	11	--	--	13	--	--
Total Estimated Conc of VOC TICs (a)	33	38	25	17	U	6	27	18
SEMI-VOLATILES								
Di-n-butylphthalate	2 JB	NA	2 JB	NA	11 U	NA	10 U	NA
bis(2-Ethylhexyl)phthalate	3 JB	NA	1 JB	NA	3 JB	NA	22 B	NA
Total Confident Conc of BNAs (a)	--	NA	--	NA	--	NA	--	NA
Total Estimated Conc of BNA TICs (a)	2	NA	34	NA	U	NA	8	NA
PESTICIDES/PCBs	U	NA	U	NA	U	NA	U	NA

continued next page (see last page of table for notes)

TABLE 9 (page 2 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR FIELD AND TRIP BLANK SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

Dames and Moore Sample Number	FB-123092	TB-123092	FB-123192	TB-123192	FB-010493	TB-010493	FB-010693	TB-010693	FB-010693Diss
Laboratory Sample Number	22960011	22960012	22960017	22960018	30016017	30016018	30047007	30047008	30047018
Sampling Date	12/30/92	12/30/92	12/31/92	12/31/92	1/04/93	1/04/93	1/06/93	1/06/93	1/06/93
Dilution Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS									
Antimony	44.5	NA	35.8 U	NA	35.8 U	NA	43.3 U	NA	43.3 U
Barium	1.1 U	NA	1.1 U	NA	1.1 U	NA	1.6 U	NA	1.9
Calcium	94.4 U	NA	94.4 U	NA	94.4 U	NA	103	NA	295
Iron	84.4 U	NA	84.4 U	NA	84.4 U	NA	21.8	NA	31.4
Manganese	1.5 U	NA	1.5 U	NA	1.5 U	NA	1.1	NA	1.1 U
Sodium	96.5	NA	116	NA	204	NA	308 B	NA	700 B
Strontium	2	NA	7.9	NA	7.2	NA	1 U	NA	NA
Zinc	2.6 U	NA	2.6 U	NA	2.6 U	NA	18.3 B	NA	20.1 B

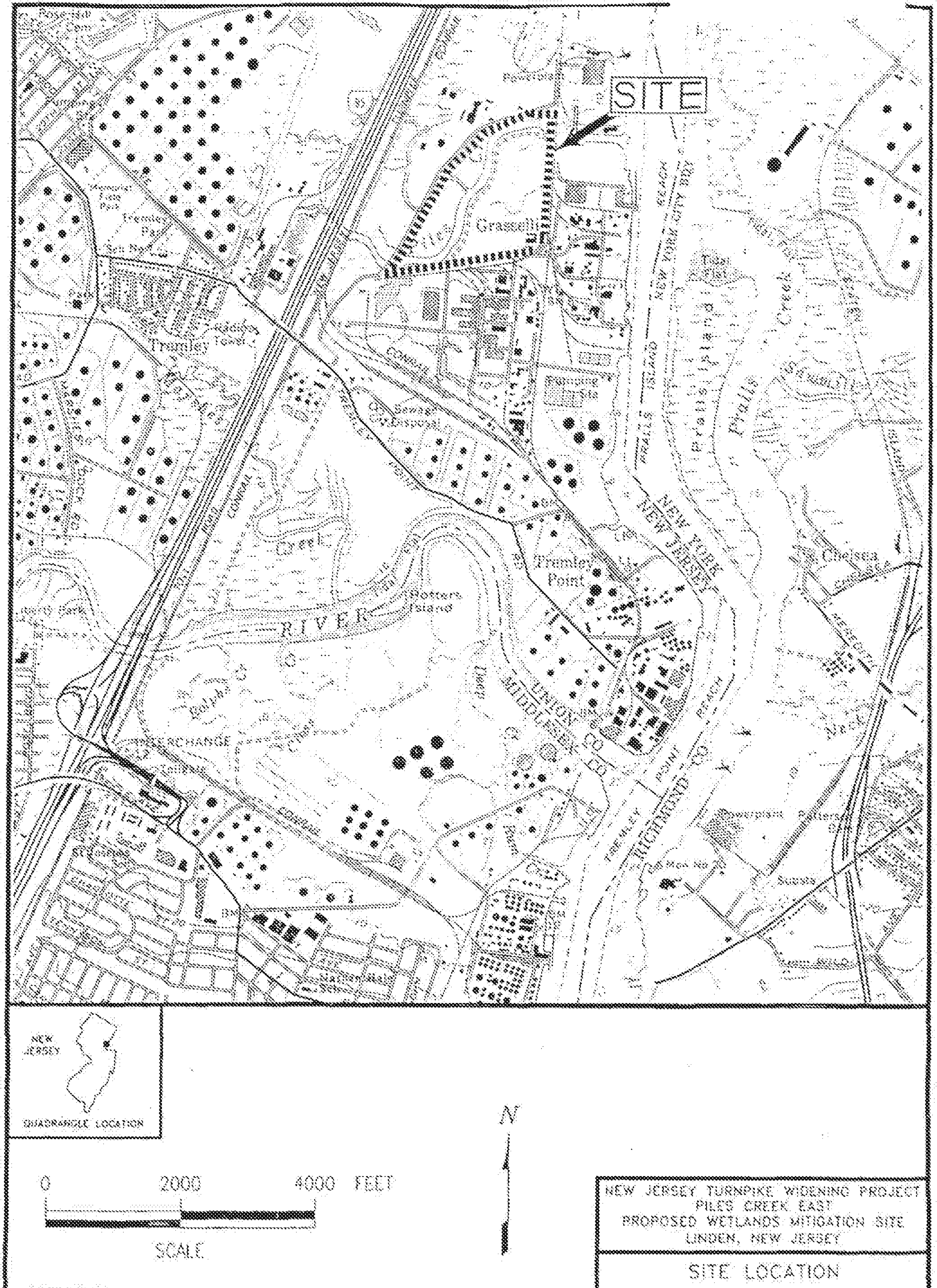
continued next page (see last page of table for notes)

932170357

TABLE 9 (page 3 of 3)
SUMMARY OF ANALYTICAL RESULTS FOR FIELD AND TRIP BLANK SAMPLES
NEW JERSEY TURNPIKE WIDENING PROJECT
PROPOSED PILES CREEK EAST WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

NOTES

(a)	: Total concentration provided does not include concentrations of individual compounds attributable to laboratory and/or field contamination (i.e., "B") or estimated concentrations below the method detection limits.
–	: No confident concentration available
s.u.	: Standard Unit
U	: Compound was not detected at concentrations exceeding the method detection limit.
J	: Quantitation is approximate due to limitations identified during the quality assurance review (data validation).
B	: This result is qualitatively suspect since this compound was detected in a field and/or laboratory blank at a similar concentration.
UJ	: This analyte was not detected, but the quantitation limit is estimated due to limitations identified during the QA review.
NA	: Not Applicable/Not Analyzed
VOC TICs	: Volatile Organic Tentatively Identified Compounds
BNA TICs	: Base/Neutral/Acid Extractable Organic Tentatively Identified Compounds



REFERENCE:
U.S.G.S. 7.5' QUADRANGLE;
ARTHUR KILL, N.J.-N.Y., 1966
PHOTOREVISED: 1981

NEW JERSEY TURNPIKE WIDENING PROJECT
PILES CREEK EAST
PROPOSED WETLANDS MITIGATION SITE
LINDEN, NEW JERSEY

SITE LOCATION
MAP

Dames & Moore, Inc.
CRANFORD, NEW JERSEY

FIGURE
1

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ 0026240 NO. OF DISCHARGES 004, 005, 008, 009 CLASS Maj Ind

DISCHARGER E.I. du Pont de Nemours and Company

OWNER E.I. du Pont de Nemours and Company

MUNICIPALITY Linden COUNTY Union WATERSHED CODE Metro

LOCATION Foot of South Wood Avenue

RECEIVING WATERS Arthur Kill STREAM CLASS TW3

LICENSED OPERATOR & PLANT CLASS Mr Carl Walling

TRAINEE/ASSISTANT _____ OTHER INFO. 474-1772.

DEFICIENCIES OR COMMENTS Analysis of samples dated 3/31/87 reveal that Total Organic Carbon (TOC) exceeded permit limitations for discharge 005

BAA000030

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☑ Unacceptable

EVALUATOR Steven Cimkowski TITLE Envtl Compliance Invest.

INFORMATION FURNISHED BY (Name) Mr Carl Walling

(Title) Safety Health Envtl and Projects Manager (Organization) E.I. dupont

DATE OF INSPECTION March 31, 1987

4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ002640
Date: 3/31/87

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 004	---	
	WASTEWATER SOURCE(S)	---	NCCW - Condensers (out of Service)
	CONTINUITY OF OPERATION	---	24 hrs day
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN		
	ALARM SYSTEMS	NA	
	ALTERNATE POWER SUPPLY	NA	
TREATMENT PROCESSES			
SLUDGE HANDLING			EPA ID NJC002185965
	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	
	RECORDS	S	
	SAMPLING PROCEDURES	S	Company personnel
	ANALYSES PERFORMED BY	S	du Pont (Linden) Cert #04459 NY Testing Cert # 73159 oil & grease bioassay
OTHER	Manufacture chemicals - mineral acids, aluminum salts, ammonium thiosulfate, dimethyl sulfate, formaldehyde, methylamine solutions, sulfamic acid.		
	FINAL EFFLUENT APPEARENCE	NI	
	REC. WATERS APPEARENCE	NI	

Form DWR-053-A
-/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0026640
Date: 3/31/87

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 005	---	
	WASTEWATER SOURCE(S)	---	NCCW (Condensers + Scrubbers) Process
	CONTINUITY OF OPERATION	---	24 hrs/day (Di Methyl Sulfate)
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	S	
	ALTERNATE POWER SUPPLY	S	
TREATMENT PROCESSES		NA	
SLUDGE HANDLING	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	
	RECORDS	S	
	SAMPLING PROCEDURES	S	Company Personnel
	ANALYSES PERFORMED BY	S	Dupont Linden NY Testing
OTHER	FINAL EFFLUENT APPEARENCE	NI	
	REC. WATERS APPEARENCE	NI	

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: 3/31/87

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 008	---	
	WASTEWATER SOURCE(S)	---	Washdown water, Scrubber water - Process -
	CONTINUITY OF OPERATION	---	24hrs/day Sulfur Dioxide Ammonium
	BYPASSES/OVERFLOWS	NA	Thiosulfate Chloro-Sulfonic
	S.P.C.C. PLAN	S	Acid, Sulfur Trioxide,
	ALARM SYSTEMS	S	Sodium Bi Sulfate
	ALTERNATE POWER SUPPLY	S	
TREATMENT PROCESSES	Neutralization (NaOH)		
	pH adjustment		
	high pH indicator on Panel Board	S	
	1st or 2nd Stage Alarm		
SLUDGE HANDLING	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Parshall flume
	RECORDS	S	
	SAMPLING PROCEDURES	S	Company personnel
	ANALYSES PERFORMED BY	S	E.I. Dupont NY testing
OTHER	FINAL EFFLUENT APPEARENCE	NI	
	REC. WATERS APPEARENCE	NI	

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: 3/31/87

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 009	---	
	WASTEWATER SOURCE(S)	---	NCCW (Hydro Unit) Process water in
	CONTINUITY OF OPERATION	---	Emergency Only.
	BYPASSES/OVERFLOWS	NA	Process Formaldehyde
	S.P.C.C. PLAN	S	Sulfonic Acid
	ALARM SYSTEMS	S	
	ALTERNATE POWER SUPPLY	NA	
TREATMENT PROCESSES	Automatic Neutralization (NaOH)	S	
	High pH indicator on panel Board		
SLUDGE HANDLING	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Parshall flume
	RECORDS	S	
	SAMPLING PROCEDURES	S	company personnel
	ANALYSES PERFORMED BY	S	NJ testing
OTHER	FINAL EFFLUENT APPEARENCE	S	
	REC. WATERS APPEARENCE	NI	

Form DWR-053
3/81

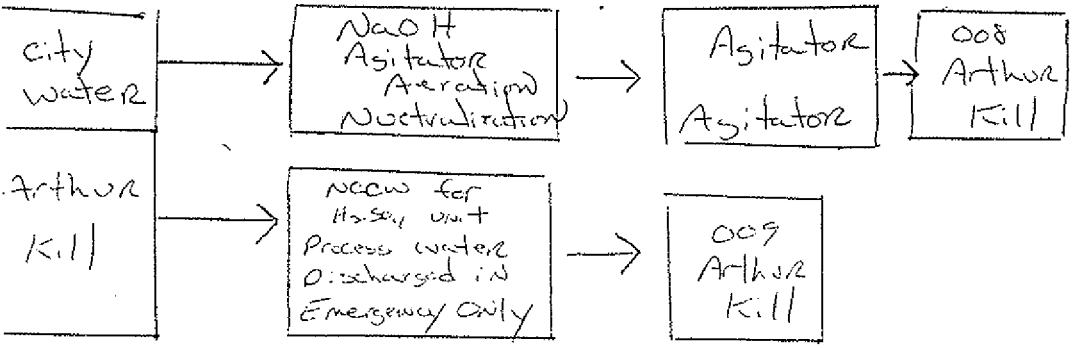
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

Permit # NJ0002640

Date 3/31/87

DISCHARGE SURVEILLANCE REPORT

PLANT DIAGRAM AND FLOW SEQUENCE:



DISCHARGE DATA

SOURCE: _____ PERIOD: _____

DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA	DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA
005	TOC	Grab	88 kg/day	95 kg/day	008	NH_3	Grab	800 kg/day	700 kg/day
"	TSS	"	70 kg/day	-14 kg/day	"	TOC	"	273 kg/day	31 kg/day
"	Sulfate	"	1000 kg/day	NO	"	TSS	"	400 kg/day	NO
"	Petro Hydro	"	—	NO	"	Pet Hydro	"	—	NO
	Temp		37.7°C	16°C				37.8°C	16°C

DISCHARGE DATA

SOURCE: from sampler PERIOD: 3/31/87

DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA	DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA
009	TOC	Grab	350 kg/day	.88 kg/day					
"	TSS	"	285 kg/day	77 kg/day					
	Temp	"	37.7°C	18°C					
"	Petro Hydro	"	NO	NO					

MONITORING DEFICIENCIES: None

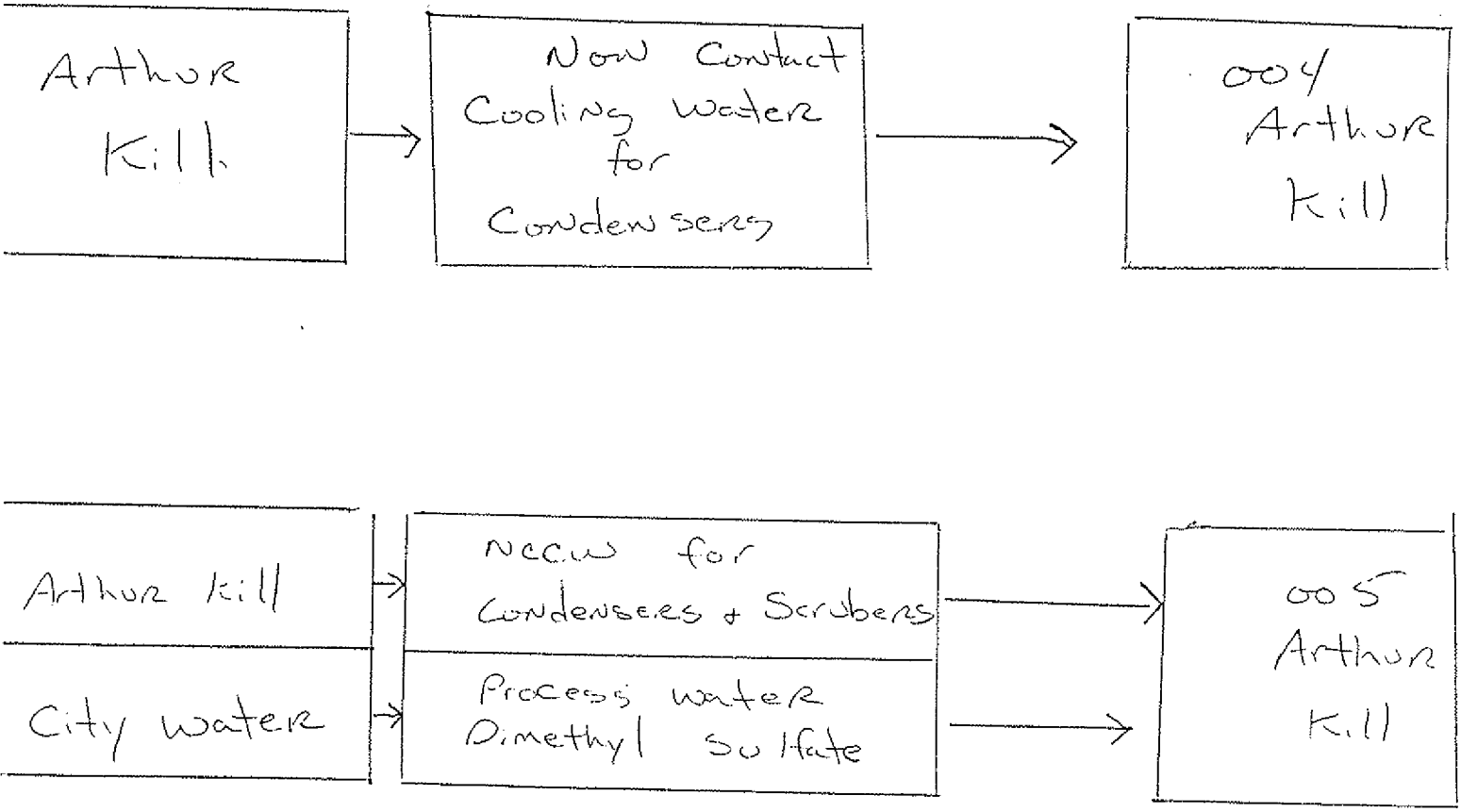
Form DWR-053
3/81

NEW JE .Y DEPARTMENT OF ENVIRONMENTAL PROTE N
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

Permit # NJ0002640
Date 3/31/87

DISCHARGE SURVEILLANCE REPORT

PLANT DIAGRAM AND FLOW SEQUENCE:



DISCHARGE DATA

SOURCE: _____ PERIOD: _____

DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA	DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA

MONITORING DEFICIENCIES: _____

Let's protect our earth

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WATER RESOURCES
METRO BUREAU OF REGIONAL ENFORCEMENT

2 BABCOCK PLACE
WEST ORANGE, NEW JERSEY 07052

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E
DEPUTY DIRECTOR

IN THE MATTER OF	:	
E.I. DUPONT DE NEMOURS	:	ADMINISTRATIVE ORDER AND NOTICE OF CIVIL ADMINISTRATIVE PENALTY ASSESSMENT
AND COMPANY	:	

This Administrative Order and Notice of Civil Administrative Penalty Assessment is issued pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection (hereinafter "NJDEP" or "Department") by N.J.S.A. 13:1D-1 et seq. and the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and duly delegated to the Assistant Director or Bureau Chief of the Division of Water Resources, Enforcement Element pursuant to N.J.S.A. 13:1B-4.

FINDINGS BAA000034

1. E.I. duPont deNemours and Company (hereinafter "duPont") operates a facility located at Block 586, Lots 8,9, & 11, South Wood Ave., Linden, Bergen County, New Jersey.

2. NJDEP issued a New Jersey Pollutant Discharge Elimination System ("NJPDES") Permit No. NJ0002640 (hereinafter "the Permit") to duPont on September 28, 1984. The effective date of the Permit was November 1, 1984 and the expiration date is October 31, 1989.

3. Pursuant to the Permit, duPont discharges pollutants, as defined by N.J.A.C. 7:14A-1.9, into the waters of the State.

4. No person shall discharge any pollutant except in conformity with a valid NJPDES Permit issued pursuant to the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq.

5. Part IV of the Permit sets forth specific parameters to be reported on Discharge Monitoring Reports (hereinafter "DMRs") and identifies discharge limitations for each parameter for each permitted outfall.

6. duPont has submitted DMRs to NJDEP as required by Part IV of the Permit. The DMRs demonstrate that duPont has violated the discharge limits of the Permit. Listed below are the dates and parameters which were violated.

Monitoring Period	Outfall #	Discharge Parameter	Permit Limits	Reported Results
1/1/88-1/31/88	009	TSS	365kg/day (max)	563kg/day
8/1/88-8/31/88	009	TSS	365kg/day (max)	1235kg/day
9/1/88-9/31/88	008	pH	6-9	9.5
10/1/88-10/31/88 10/1/88-10/31/88	008	NH3	500kg/day (avg) 800kg/day (max)	555kg/day 1105kg/day
11/1/88-11/30/88	009	TSS	365kg/day (max)	712kg/day
12/1/88-12/31/88	009	TSS	365kg/day (max)	695kg/day
2/1/89-2/28/89 2/1/89-2/28/89	009 009	TSS TSS	365kg/day (max) 285kg/day (avg)	6200kg/day 2044kg/day

TSS = Total Suspended Solids
NH3 = Ammonia Nitrogen
max = maximum discharge limitation
avg = average discharge limitation
kg/day = kilograms per day

7. Based on the facts set forth in these FINDINGS, the Department has determined that duPont has violated the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., specifically N.J.S.A. 58:10A-6, and the regulations promulgated pursuant thereto, N.J.A.C. 7:14A-1 et seq., specifically N.J.A.C. 7:14A-1.2.

ORDER

NOW, THEREFORE, IT IS HEREBY ORDERED THAT:

8. duPont shall discharge pollutants only in conformity with NJPDES Permit No. 0002640, the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and the regulations promulgated pursuant thereto, N.J.A.C. 7:14A-1.1 et seq.

9. No obligations imposed by this Administrative Order are intended to constitute a debt, damage claim, penalty or other civil action which should be limited or discharged in a bankruptcy proceeding. All obligations imposed by this Administrative Order shall constitute continuing regulatory obligations imposed pursuant to the police powers of the State of New Jersey, intended to protect the public health, safety, welfare and environment.

10. This Administrative Order shall be effective upon receipt.

NOTICE OF CIVIL ADMINISTRATIVE PENALTY ASSESSMENT

11. Pursuant to N.J.S.A. 58:10A-10d and N.J.A.C. 7:14-8.1 et seq., and based upon the above FINDINGS, NJDEP has determined that a civil administrative penalty should be assessed against duPont in the amount of $78,750. NJDEP's rationale for this Civil Administrative Penalty is set forth in Appendix A which is attached hereto and incorporated herein.

12. Payment of the penalty is due when a final order is issued by the Commissioner subsequent to a hearing if any, or when this Notice of Civil Administrative Penalty Assessment becomes a final order (see following paragraph). Payment shall be made by certified or cashier's check payable to "Treasurer, State of New Jersey" and shall be submitted to:

Peter T. Lynch, Chief
Metro Bureau of Regional Enforcement
Division of Water Resources
2 Babcock Place
West Orange, NJ

13. If no request for a hearing is received within twenty (20) calendar days from receipt of this Notice of Civil Administrative Penalty Assessment, it shall become a final order upon the twenty-first calendar day following its receipt by duPont, and the penalty shall be due and payable.

NOTICE OF RIGHT TO A HEARING

14. duPont is entitled to an administrative hearing. Any hearing request shall be delivered to the address referenced in paragraph 12 above within twenty (20) calendar days after receipt by duPont of this Administrative Order and Notice of Civil Administrative Penalty Assessment.

15. duPont shall, pursuant to N.J.A.C. 7:14-8.4(a) in its request for a hearing furnish NJDEP with the following:

a. The name, address and telephone number of duPont and its authorized representative;

b. duPont's defenses to each of the findings of fact stated in short and plain terms;

c. an admission or denial of each of the findings of fact. If duPont is without knowledge or information sufficient to form a belief as to the truth of a finding, duPont shall so state and this shall have the effect of a denial. A denial shall fairly meet the substance of the findings denied. When duPont intends in good faith to deny only a part or a qualification of a finding, duPont shall specify so much of it as is true and material and deny only the remainder. duPont may not generally deny all of the findings but shall make all denials as specific denials of designated findings. For each finding duPont denies, duPont shall allege the fact or facts as duPont believes it or them to be;

d. information supporting the request and specific reference to/or copies of other written documents relied upon to support the request;

e. an estimate of the time required for the hearing (in days and/or hours); and,

f. a request, if necessary, for a barrier-free hearing location for physically disabled persons;

GENERAL PROVISIONS

16. This Administrative Order and Notice of Civil Administrative Penalty Assessment is binding on duPont, its principals, directors, officers, agents, successors, assigns, any trustee in bankruptcy or other trustee, and any receiver appointed pursuant to a proceeding in law or equity.

17. duPont shall submit all documents required by this Administrative Order and Notice of Civil Administrative Penalty Assessment by certified mail, return receipt requested or by hand delivery to the address in paragraph 12 above.

18. Notice is given that pursuant to N.J.S.A. 58:10A-10d, NJDEP is authorized to assess a civil administrative penalty of not more than $50,000 for each violation, and each day during which the violation continues shall constitute an additional, separate and distinct offense.

19. Notice is given that this Administrative Order and Notice of Civil Administrative Penalty Assessment is issued only for the violations identified in the Findings hereinabove and that violations of any statutes,

rules or permits other than those herein cited may be cause for additional enforcement actions, either administrative or judicial, being instituted without further notice. By issuing this Administrative Order and Notice of Civil Administrative Penalty Assessment the Department does not waive its rights to initiate additional enforcement actions.

20. Notice is further given that pursuant to N.J.S.A. 58:10A-10e, any person who violates N.J.S.A. 58:10A-1 et seq., or an administrative order issued pursuant to N.J.S.A. 58:10A-10b, or who fails to pay the civil administrative penalty in full after it is due shall be subject to a civil penalty not to exceed $50,000 per day of such violation, and each day's continuance of the violation shall constitute an additional, separate and distinct violation.

21. Notice is further given that pursuant to N.J.S.A. 58:10A-10f, any person who willfully or negligently violates this act shall, upon conviction, be guilty of a crime of the fourth degree and shall be punished by fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than one year or by both. Punishment for a second offense under this subsection shall be a fine of not less than $10,000 nor more than $100,000 per day of violation, or by imprisonment for not more than two years, or both. Any person who knowingly makes a false statement, representation, or certification in any application, record, or other document filed or required to be maintained under this act or who falsifies, tampers with or knowingly renders inaccurate, any monitoring device or method required to be maintained pursuant to this action shall, upon conviction, be subject to a fine of not more than $20,000.00 or by imprisonment for not more than six months, or by both.

BY THE AUTHORITY OF
JORGE H. BERKOWITZ, PH.D.
ACTING DIRECTOR
DIVISION OF WATER RESOURCES
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE: March 31, 1989

Peter T. Lynch
Chief, Metro Bureau
of Regional Enforcement

Appendix A

PENALTY RATIONALE

E.I. duPont deNemours
South Wood Avenue
Linden/Union County
NJPDES # NJ0002640

NJAC: 7:14-8:10 Basic Penalty for Discharge Violations

1) DMR January 1, 1988 - January 31, 1988.
DSN 009
TSS Violation. Permit limitation is 365 kg/day (max) and the reported value is 563 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)2.ii(2)
Moderate: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by 51 to 100 percent for a non-hazardous pollutant.

Range for minor conduct and moderate seriousness:
$3,000-$6,000
Penalty Assessed $4,500

2) DMR August 1, 1988 - August 31, 1988.
DSN 009
TSS Violation. Permit limitation is 365 kg/day (max) and the reported value is 1235 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)1.ii(2)
Major: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by more than 100 percent for a non-hazardous pollutant.

Range for minor conduct and major seriousness:
$15,000-$25,000
Penalty Assessed: $20,000

3) DMR September 1, 1988 - September 30, 1988.
DSN 008
pH Violation. Permit limitation range 6-9 and the reported value is 9.5.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: the seriousness factor is considered to be minor when a violation has occurred which is not considered major or moderate, and is not measured by concentration or mass.

Range for minor conduct and minor seriousness:
$1,000-$2,500
Penalty Assessed: $1,750

4) DMR October 1, 1988 - October 31, 1988.
NH3 Violation. Permit limitation is 500 kg/day (avg) and the reported value is 555 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)3.ii(1)
Minor: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by up to 50 percent for a non-hazardous pollutant.

Range for minor conduct and minor seriousness:
$1,000-$2,500
Penalty Assessed: $1,750

5) DMR October 1, 1988 - October 31, 1988.
NH3 Violation. Permit limitation is 800 kg/day (max) and the reported value is 1105 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)3.ii(1)
Minor: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by up to 50 percent for a non-hazardous pollutant.

Range for minor conduct and minor seriousness:
$1,000-$2,500
Penalty Assessed: $1,750

6) DMR November 1, 1988 - November 30, 1988
DSN 009
TSS Violation. Permit limitation is 365 kg/day (max) and the reported value is 712 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)2.ii(2)
Moderate: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by 51 to 100 percent for a non-hazardous pollutant.

Range for minor conduct and moderate seriousness:
$3,000-$6,000
Penalty Assessed $4,500

7) DMR December 1, 1988 - December 31, 1988
DSN 009
TSS Violation. Permit limitation is 365 kg/day (max) and the reported value is 695 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)2.ii(2)
Moderate: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by 51 to 100 percent for a non-hazardous pollutant.

Range for minor conduct and moderate seriousness:
$3,000-$6,000
Penalty Assessed $4,500

8) DMR February 1, 1989 - February 28, 1989
DSN 009
TSS Violation. Permit limitation is 365 kg/day (max) and the violation is 6200 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)1.ii(2)
Major: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by more than 100 percent for a non-hazardous pollutant.

Range for minor conduct and major seriousness:
$15,000-$25,000
Penalty Assessed: $20,000

9) DMR Feruary 1, 1989 - February 28, 1989
DSN 009
TSS Violation. Permit limitation is 285 kg/day (avg) and the reported value is 2044 kg/day.

Conduct: Pursuant to N.J.A.C. 7:14-8.5(e)3, the conduct factor is considered minor when actions taken by the violator are not considered intentional nor unintentional but foreseeable.

Seriousness: Pursuant to N.J.A.C. 7:14-8.5(d)1.ii(2)
Major: shall include any discharge exceeding the effluent limitation set forth in a permit or administrative order by more than 100 percent for a non-hazardous pollutant.

Range for minor conduct and major seriousness:
$15,000-$25,000
Penalty Assessed: $20,000

Discharge Violation:	$ 4,500
	$20,000
	$ 1,750
	$ 1,750
	$ 1,750
	$ 4,500
	$ 4,500
	$20,000
	$20,000

Total Penalty Assessed: $78,750

DuPC's comments in pencil

State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 028
Trenton, NJ 08625-0028
Tel. # 609-633-1408
Fax. # 609-633-1454

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

BAA000051

PREPARED BY: David W. Paddock
David Paddock

DATE: January 16, 1992

IN THE MATTER OF	:	
THE DUPONT - LINDEN SITE	:	ADMINISTRATIVE
AND	:	CONSENT
E.I. DU PONT DE NEMOURS & COMPANY, INC.,	:	ORDER
Respondent	:	

This Administrative Consent Order is issued pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection and Energy (hereinafter "NJDEPE" or "Department") by N.J.S.A. 13:1D-1 et seq. and the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq. and the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq. and duly delegated to the Assistant Director for the Responsible Party Cleanup Element of the Division of Responsible Party Site Remediation pursuant to N.J.S.A. 13:1B-4.

FINDINGS

1. E.I. Du Pont De Nemours & Company, Inc. (hereinafter "Du Pont"), a Delaware corporation with its principal offices located at 1007 Market Street, Wilmington, Delaware, is the owner and operator of a chemical manufacturing facility located at Block 586, Lots 8, 9 and 11 on the tax maps of the City of Linden, Union County, NJ (hereinafter the "Site"). The Site consists of 182.94 acres and is bounded generally by General Aniline an711777lld Film Corporation and wetlands to the south and west, Public Service Electric and Gas to the north and the Arthur Kill to the east. Office and industrial buildings, rail lines, above ground storage tanks and surface impoundments exist at the Site and are utilized by Du Pont in the chemical manufacturing processes. A map of the Site is attached hereto and incorporated herein as Attachment I.

932170249

Shutdown of the entire site in 1992 is contemplated by DuPont.

2. Du Pont has owned and operated the Site since 1928. Du Pont's current Site activities involve the production of inorganic chemicals, namely an ~~ammonium thiosulfate solution, a sodium bisulfite solution~~ and various ~~non-reagent~~ grade sulfuric acids. Du Pont's former operations at the Site involved the manufacturing of inorganic and organic chemicals for use in various industries. In the past organic chemicals accounted for approximately 12% of total chemical production, while inorganic chemicals accounted for the remaining 88% of production. Du Pont has classified its past chemical production according to the following industrial activities: dimethyl sulfate, reagent acids (sulfuric, nitric and hydrochloric), chlorosulfonic acids, sulfur trioxide, ammonium thiosulfate, sodium bisulfate, non-reagent sulfuric acids, formaldehyde and dimethyl hydroxylamine. The Standard Industrial Code which Du Pont utilizes to categorize its current operations at the Site is 2819 (Industrial Inorganic Chemicals).

3. Du Pont discharges process wastewater to the Arthur Kill under a New Jersey Pollutant Discharge Elimination System - Discharge to Surface Water (hereinafter "NJPDES-DSW") permit (#NJ00002640). Currently, Du Pont utilizes ~~three~~ two discharge outfalls numbered ~~005,~~ 008 and 009 for the release of process effluent, with a ~~fourth~~ two outfall numbered 004 and 005 ~~being recently~~ deactivated. The effective date for this permit ~~was November 1, 1984~~ is February 1, 1992. ~~An application for renewal of this NJPDES-DSW permit is undergoing review by the Department~~. Du Pont has appealed this permit principally on the grounds that it requires excessive sampling.

sub

non-contact cooling water and storm water

4. ~~Five~~ Two surface impoundments exist at the Site as part of Du Pont's current or former operations. The discharges to groundwater which have occurred as a result of Du Pont's use of these surface impoundments are regulated by a NJPDES-Discharge to Groundwater (hereinafter "NJPDES-DGW) permit (#NJ0079413). The NJPDES-DGW permit requires Du Pont to install five groundwater wells to monitor the groundwater condition associated with Du Pont's use of three lined dimethylhydroxylamine (hereinafter "DMHA") surface impoundments, which have recently been deactivated, and two unlined equalization surface impoundments, ~~which are used in the production of ammonium thiosulfate and sodium bisulfite~~. The NJPDES-DGW permit also regulates the closure of the three deactivated DMHA surface impoundments. The effective date for the NJPDES-DGW permit was September 1, 1991.

5. Du Pont is regulated as a hazardous waste generator, pursuant to the Resource Conservation and Recovery Act (hereinafter "RCRA"), 42 U.S.C. 6901 et seq. As such, Du Pont must comply with all regulations which apply to generator facilities as stipulated in the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., specifically N.J.A.C. 7:26-1 et seq. Du Pont is not regulated as a treatment, storage or disposal facility as defined under RCRA. The United States Environmental Protection Agency (hereinafter "USEPA") identification number for the Site is NJ002185965.

6. On May 11, 1978 the Department completed an industrial waste survey at the Site to define what chemical compounds Du Pont produced and the wastes generated from the chemical processing. The survey disclosed that Du Pont generated approximately 15,000,000 gallons of treated "process waste" daily, 34,000,000 gallons of untreated "process waste" annually and 1,000 gallons of a sodium bisulfite/formaldehyde effluent annually. The waste summary indicated that these wastes were treated by a neutralization/settling process and either discharged into the Arthur Kill under a National Pollutant Discharge Elimination

System permit or ~~dumped~~ disposed via barge into the Atlantic Ocean under a USEPA disposal permit. Barging was terminated permanently in 1978.

7. On November 9, 1984 Du Pont spilled approximately ten gallons of sulfur trioxide on the ground at the Site while transferring the sulfur trioxide from one above-ground storage tank to another. DuPont reported this spill. The Department assessed a penalty of $2,500 for this ~~illegal~~ discharge, ~~but the penalty was never paid by Du Pont~~ which amount was paid by DuPont.

8. On November 27, 1984 Du Pont spilled approximately three gallons of oleum, a fuming sulfuric acid, onto the ground at the Site. DuPont reported this spill. As a result of this spill, on December 4, 1984 the Department issued Du Pont a Notice of Violation and Offer of Settlement for the discharge of a hazardous substance in violation of N.J.S.A. 58:10-23.11c and for failure to notify the Department of the discharge in violation of N.J.S.A. 58:10-23.11e. The Department assessed a penalty of $15,550 ~~against Du Pont~~, which ~~penalty~~ amount was paid by Du Pont ~~subsequently paid~~.

9. On January 9, 1985 USEPA conducted an environmental investigation at the Site in response to a congressional study, namely the Eckhardt Report, which stated that Du Pont disposed of approximately 7,950 tons of chemical waste at the Site between 1928 and 1979. As part of this investigation USEPA collected fourteen soil samples, two surface water samples and one sediment sample from various locations at the Site. ~~The resulting sample analysis disclosed:~~ DuPont has yet to be provided a copy of the report and reserves, therefore, its rights to comment upon its contents.

Soil

Contaminant	Concentration (ppm)
aluminum	12,900
antimony	47
arsenic	188
barium	10,300
beryllium	5.1
cadmium	88
chromium	221
cobalt	45
copper	402
lead	1,710
magnesium	115,000
manganese	398
nickel	143
silver	7.4
selenium	7.2
tin	94
vanadium	147
zinc	2,460
fluoranthene	6.0
pyrene	6.3
phenanthrene	5.2

either delete or put all the data here. It is meaningless to take the highest reading from different samples. This should be a factual document. Also: metals may be background in some cases.

Surface Water

Contaminant	Concentration (ppb)

lead	14
magnesium	672,000
acetone	14
toluene	14

Sediment

delete

Contaminant	Concentration (ppm)
aluminum	12,800
barium	775
copper	170
lead	330
nitkel	105
zinc	710

10. On February 18, 1986 Du Pont spilled approximately twenty (20) gallons of chlorosulfonic acid onto the ground at the Site. Du Pont reported this spill. This spill occurred when a Du Pont employee punctured a 55-gallon drum of chlorosulfonic acid with a forklift while moving the drum for shipment.

11. On June 17, 1986, the Department conducted an inspection at the Site in response to an incident report from USEPA resulting from a report from Du Pont. The Department's inspection confirmed ~~disclosed~~ that Du Pont had spilled approximately twenty-five gallons of chlorosulfonic acid onto the ground at the Site while transferring this material from an above-ground storage tank to a tank car.

12. On May 19, 1987 the Department conducted an inspection at the Site in response to an incident report from Du Pont regarding a spill. The Department's inspection confirmed ~~disclosed~~ that Du Pont had spilled approximately fifty gallons of an oleum/nitric acid mixture onto the ground at the Site during transfer of this material from an above-ground storage tank to a storage trailer.

13. On March 31, 1989 the Department issued an Administrative Order and Notice of Civil Administrative Penalty Assessment to Du Pont for numerous violations of NJPDES-DSW permit limitations. The Department assessed a penalty of $78,750 for these violations, which order was subsequently settled for $30,750 and paid by Du Pont.

14. On July 13, 1989 the Department conducted an inspection at the Site in response to an incident report from Du Pont regarding a spill. The Department's inspection confirmed ~~disclosed~~ that Du Pont had spilled approximately five gallons chlorosulfonic acid onto the ground at the Site during product transfer to a tank car.

15. On November 27, 1989 Du Pont submitted a report to the Department entitled "Sampling and Analysis Plan - E.I. Du Pont Site." This report detailed the methods and procedures which Du Pont would utilize to define the extent of petroleum contamination in the northwest corner of the Site, commonly referred to as the "Wade Brothers Property." The Wade Brothers Property is a 1.75 acre parcel which is leased by Du Pont to the Wade Brothers Construction Company for

material that material with characteristics similar to diesel fuel

the operation of a construction and excavation business. The preliminary results of the aforementioned report indicated that ~~oil~~ appeared to be seeping from the Wade Brothers Property into a drainage ditch at the Site, which eventually flows into Piles Creek to the north and the Arthur Kill.

16. On January 10, 1990 the Department conducted an inspection at the Site in response to the aforementioned report. The Department's inspection disclosed an unknown amount of ~~oil which~~ was continually seeping from the Wade Brothers Property into a drainage ditch at the Site. At this point the Department became involved to monitor Du Pont's mitigation of this continuing threat to human health and the environment.

17. On January 31, 1990 Du Pont submitted a letter to the Department detailing the extent of oil contamination at the Site. This correspondence stated that Du Pont observed oil seeping into the drainage ditch adjacent to the Wade Brothers Property and visibly oil-stained soil on the embankment of test pits which it had excavated in this area. Du Pont also observed visible oil contamination on the water table in two of the three test pits on the Wade Brothers Property.

material material

18. On February 16, 1990 the Department conducted another inspection at the Site to investigate the continuing discharge of ~~oil~~ into the above-referenced drainage ditch. The Department's inspection disclosed that oil was continually seeping into the drainage ditch at the site. The Department's inspection also disclosed that Du Pont had initiated interim action by placing booms in the ditch to absorb the ~~oil~~ and was preparing to install a product recovery unit in a test pit on the Wade Brothers Property. At this time, Du Pont surmised that the source of the ~~oil~~ spill was from an under-ground ~~storage tank~~ transfer lines on the Wade Brothers Property.

package outlines

19. On March 30, 1990 Du Pont submitted ~~a summary report~~ an information package to the Department entitled "Grasselli Plant Voluntary Environmental Investigation." This ~~report details~~ the proposed voluntary environmental investigation which Du Pont is willing to undertake at the Site to remove any potential threat to human health or the environment. This ~~report~~ package included a Request for Bids package for the Grasselli Plant Operational History, historical Site landfill information and a number of plot plans for the facility. The Department has not reviewed or approved any of the information contained in this report.

20. On April 24, 1990 the Department conducted a RCRA generator inspection at the Site to determine Du Pont's compliance with N.J.A.C. 7:26-1 et seq. As a result of this inspection on May 24, 1990 the Department issued a Notice of Violation to Du Pont for the following violations: failure to securely close all hazardous waste containers in violation of N.J.A.C. 7:26-9.4(d)4i; failure to overpack a leaking drum of a hazardous waste in violation of N.J.A.C. 7:26-9.4(d)2; and failure to mark drums with the words "Hazardous Waste" in violation of N.J.A.C. 7:26-9.3(d)A.

21. By correspondence dated June 1, 1990 Du Pont advised the Department that the violations outlined in the May 24, 1990 Notice of Violation had been abated.

22. In October, 1990 Du Pont completed a report which detailed the results of soil and groundwater investigations conducted to delineate oil contamination at the Wade Brothers Property. ~~The resulting sample analysis disclosed~~ The highest petroleum hydrocarbon reading in soil was 34,000 ppm. Groundwater samples were collected from open borings, not properly constructed monitoring wells, so are not indicative of groundwater quality.

Soil

Contaminant	Concentration (ppm)
petroleum hydrocarbons	34,000

Groundwater

Contaminant	Concentration (ppb)
petroleum hydrocarbons	2,200,000
benzene	250
toluene	550
ethylbenzene	130
xylene(s)	790
naphthalene	4,320
fluorene	960
phenanthrene	6,230
pyrene	14,700
acenaphthene	730
anthracene	1,480
fluoranthene	7,410
benzo(a)anthracene	5,440
chrysene	6,100
benzo(b)fluoranthene	7,840
benzo(a)pyrene	4,980
ideno(1,2,3-cd)pyrene	2,990
dibenzo(a,n)anthracene	640
benzo(g,h,i)perylene	3,060

delete as meaningless and highly misleading these appear to be peak readings from different wells

Du Pont's report concluded that the ~~distribution~~ areal extent of petroleum contaminants at the Wade Brothers Property was larger than originally anticipated.

23. By correspondence dated January 29, 1991 Du Pont notified the Department that the nature and extent of the petroleum contamination at the Site had been delineated. In this correspondence Du Pont suggests that any corrective action at the Wade Brothers Property should be conducted in accordance with a voluntary site-wide investigation, which is currently underway. The Department has not reviewed ~~the~~ this information ~~upon which Du Pont's conclusions are based and, therefore, cannot agree with Du Pont's assertion that the nature and extent of the contamination has been delineated.~~

24. On June 19, 1991 the Department conducted an inspection at the Site in response to an incident report from Du Pont regarding a spill. The Department's inspection ~~disclosed~~ confirmed that Du Pont had spilled approximately 100 gallons of sulfuric acid onto the ground at the Site during a tank transfer of product.

Wade Brothers property

possible

what appeared to be (but was not sampled)

25. On August 14, 1991 the Department conducted an inspection at the ~~Site~~ to determine site conditions prior to the issuance of this Administrative Consent Order. The Department observed that oil was still seeping into the drainage ditch at the Site and that this same ditch contained black and white liquids of unknown origins. Du Pont had installed a boom to collect this material.

26. The substances referenced in these FINDINGS are hazardous substances pursuant to the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11b(k), and pollutants pursuant to the Water Pollution Control Act, N.J.S.A. 58:10A-3n.

27. The hazardous substances and pollutants referenced above were discharged ~~and continue to discharge~~ into the waters and onto the lands of the State of New Jersey in violation of the Spill Compensation and Control Act, specifically N.J.S.A. 58:10-23.11c, and the Water Pollution Control Act, specifically N.J.S.A. 58:10A-6

28. Du Pont ~~is responsible~~ does not contest responsibility for the discharges referenced in these FINDINGS.

29. Based on these FINDINGS, the Department has determined that Du Pont ~~has~~ may have violated the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq. and regulations promulgated pursuant thereto, N.J.A.C. 7:14A-1.2(c), the Spill Compensation and Control Act, 58:10-23.11 et seq. and regulations promulgated pursuant thereto, N.J.A.C. 7:1E-1.1 et seq., and the Solid Waste Management Act N.J.S.A. 13:1E-1 et seq. and regulations promulgated pursuant thereto, N.J.A.C. 7:26-1.1 et seq.

30. To determine the nature and extent of the problem presented by the discharge of pollutants and hazardous substances at the Site and to develop environmentally sound remedial actions, it is necessary to conduct a remedial investigation and feasibility study of remedial action alternatives (hereinafter "RI/FS") for the Site. ~~To correct the problems presented by the discharge, it is necessary to implement a remedial action plan.~~ This study and a site specific risk assessment may indicate that certain remedial actions are necessary at the Site.

31. To resolve this matter without the necessity for litigation, Du Pont has agreed to conduct an RI/FS and to design and implement a remedial action alternative ~~to remedy all pollution at the Site, emanating from the Site, or which has emanated from the Site.~~ if necessary, based on the site specific risk assessment.

I. AGREEMENT

32. By executing this Administrative Consent Order, Du Pont agrees to complete a Remedial Investigation/Feasibility Study (hereinafter "RI/FS") and to design and implement a remedial action alternative ~~to remedy all pollution at the Site, emanating from the Site or which has emanated from the Site.~~ if necessary based on the site specific risk assessment.

33. By executing this Administrative Consent Order the Department agrees to review and oversee the activities required herein.

II. PROJECT COORDINATION

34. Unless otherwise directed by the Department, Du Pont shall submit four (4) copies of all documents required by this Administrative Consent Order

to the individual identified below, who shall be the Department's contact for Du Pont for all matters concerning this Administrative Consent Order.

New Jersey Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
Bureau of State Case Management
401 East State Street-CN 028
Trenton, NJ 08625
Attn: Section Chief, Cleanup Section

35. Within thirty (30) calendar days after the Department's receipt of any submission pursuant to this Administrative Consent Order, the Department will inform Du Pont in writing of any administrative deficiencies in the submission that would prevent the Department from conducting its review.

36. If the submission is not administratively complete, the Department will notify Du Pont in writing of the deficiencies and Du Pont's timeframe in which to submit the missing information to the Department.

37. When the Department determines that the submission is administratively complete, the Department will commit in writing to a timeframe for the Department to complete its' technical review of the submittal.

III. REMEDIAL PHASES

A. Interim Remedial Measures

38. Within ~~thirty (30)~~ sixty (60) calendar days after the effective date of this Administrative Consent Order, Du Pont shall submit to the Department a detailed draft Interim Remedial Measures Work Plan (hereinafter "IRM Work Plan") to address those interim remedial measures in accordance with the scope of work addressed in Appendix A, which is attached hereto and made a part hereof.

39. Within ~~twenty-one (21)~~ forty-five (45) calendar days after receipt of the Department's written comments on the draft IRM Work Plan, Du Pont shall modify the draft IRM Work Plan to conform to the Department's comments and shall submit the modified IRM Work Plan to the Department. The determination as to whether or not the modified IRM Work Plan, as resubmitted, conforms to the Department's comments and is otherwise acceptable to the Department shall be made solely by the Department in writing.

40. Upon receipt of the Department's final written approval of the IRM Work Plan, Du Pont shall implement the approved IRM Work Plan in accordance with the approved schedule therein.

41. In accordance with the IRM Work Plan schedule, Du Pont shall submit to the Department a draft Interim Remedial Measures Report (hereinafter "IRM Report").

42. If upon review of the draft IRM Report the Department determines that additional interim remedial measures are required, Du Pont shall conduct the additional interim remedial measures as directed by the Department and submit a second draft IRM Report.

forty-five 45

43. Within ~~twenty-one (21)~~ calendar days after receipt of the Department's written comments on the draft or second draft (if applicable pursuant to the preceding paragraph) IRM Report Du Pont shall modify the draft or second draft IRM Report to conform to the Department's comments and shall submit the modified IRM Report to the Department. The determination as to whether or not the modified IRM Report, as resubmitted, conforms with the Department's comments and is otherwise acceptable by the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

B. Remedial Investigation

ninety (90)

44. Within ~~forty-five (45)~~ calendar days after the effective date of this Administrative Consent Order, Du Pont shall submit to the Department a detailed draft Remedial Investigation Work Plan (hereinafter the "RI Work Plan") in accordance with the scope of work set forth in Appendices B, C and D, which are attached hereto and made a part hereof.

forty-five (45)

45. Within ~~thirty (30)~~ calendar days after receipt of the Department's written comments on the draft RI Work Plan, Du Pont shall modify the draft RI Work Plan to conform to the Department's comments and shall submit the modified RI Work Plan to the Department. The determination as to whether or not the modified RI Work Plan, as resubmitted, conforms to the Department's comments and is otherwise acceptable to the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

46. Upon receipt of the Department's written final approval of the RI Work Plan, Du Pont shall conduct the remedial investigation in accordance with the approved RI Work Plan and the schedule therein.

47. In accordance with the RI Work Plan schedule, Du Pont shall submit to the Department a draft Remedial Investigation Report (hereinafter "RI Report").

48. If upon review of the draft RI Report the Department determines that additional remedial investigation is required, Du Pont shall conduct, this additional remedial investigation as directed by the Department and submit a second draft RI Report.

forty-five (45)

49. Within ~~twenty-one (21)~~ calendar days after receipt of the Department's written comments on the draft or second draft (if applicable pursuant to the preceding paragraph) RI Report, Du Pont shall modify the draft or second draft RI Report to conform to the Department's comments and shall submit the modified RI Report to the Department. The determination as to whether or not the modified RI Report, as resubmitted, conforms with the Department's comments and is otherwise acceptable by the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

C. Feasibility Study

ninety (90)

50. Within ~~forty-five (45)~~ calendar days after receipt of the Department's written final approval of the RI Report, or as otherwise directed

by the Department, Du Pont shall submit to the Department a detailed draft Feasibility Study Work Plan (hereinafter, "FS Work Plan") in accordance with the scope of work set forth in Appendix E, which is attached hereto and made a part hereof.

51. Within ~~thirty (30)~~ forty-five (45) calendar days after receipt of the Department's written comments on the draft FS Work Plan, Du Pont shall modify the draft FS Work Plan to conform to the Department's comments and shall submit the modified FS Work Plan to the Department. The determination as to whether or not the modified FS Work Plan, as resubmitted, conforms to the Department's comments and is otherwise acceptable to the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

52. Upon receipt of the Department's written final approval of the FS Work Plan, Du Pont shall conduct the feasibility study in accordance with the approved FS Work Plan and the schedule therein.

53. In accordance with the FS Work Plan schedule, Du Pont shall submit to the Department a draft Feasibility Study Report (hereinafter "FS Report").

54. Within ~~twenty (20)~~ forty-five (45) calendar days after receipt of the Department's written comments on the draft FS Report, Du Pont shall modify the draft FS Report to conform to the Department's comments and shall submit the modified FS Report to the Department. The determination as to whether or not the modified FS Report, as resubmitted, conforms to the Department's comments and is otherwise acceptable to the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

D. Remedial Action

55. The Department will make the selection of the remedial action alternative based on the criteria set forth in Appendix E, Section I.D.

56. Within ~~forty-five (45)~~ ninety (90) calendar days after receipt of the Department's written notification of selection of a remedial action alternative Du Pont shall submit to the Department a detailed draft Remedial Action Plan in accordance with the scope of work set forth in Appendix F, which is attached hereto and made a part hereof.

57. Within ~~thirty (30)~~ forty-five (45) calendar days after receipt of the Department's written comments on the draft Remedial Action Plan, Du Pont shall modify the draft Remedial Action Plan to conform to the Department's comments and shall submit the modified Remedial Action Plan to the Department. The determination as to whether or not the modified Remedial Action Plan, as resubmitted, conforms to the Department's comments and is otherwise acceptable to the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

58. Upon receipt of the Department's written final approval of the Remedial Action Plan, Du Pont shall implement the approved Remedial Action Plan in accordance with the schedule therein.

59. In accordance with the Remedial Action Plan schedule, Du Pont shall submit to the Department a draft Remedial Action Report (hereinafter "RA Report").

60. If upon review of the draft RA Report the Department determines that additional remedial action is required, Du Pont shall conduct this additional remedial action as directed by the Department and submit a second draft RA Report.

forty-five (45)

61. Within ~~twenty-one (21)~~ calendar days after receipt of the Department's written comments on the draft or second draft (if applicable pursuant to the preceding paragraph) RA Report, Du Pont shall modify the draft or second draft RA Report to conform to the Department's comments and shall submit the modified RA Report to the Department. The determination as to whether or not the modified RA Report, as resubmitted, conforms with the Department's comments and is otherwise acceptable by the Department shall be made solely by the Department in writing in accordance with the timeframe committed to by the Department.

E. Additional Remedial Investigation and Remedial Action

62. If at any time prior to Du Pont receipt of written notice from the Department pursuant to paragraph 91, the Department determines that the criteria set forth in Appendix E (Section I.D.) are not being achieved or that additional remedial investigation and/or remedial action is required to protect human health or the environment, Du Pont shall conduct such additional activities as directed by the Department and in accordance with this Administrative Consent Order.

(same words as applicable to Du Pont in para 65)

IV. OVERSIGHT COST REIMBURSEMENT

63. Upon receipt from the Department of a ~~summary~~ detailed summary of the Department's costs incurred in connection with its oversight functions of this Administrative Consent Order, and for all prior costs associated with the Site not previously collected by the Department, Du Pont shall submit to the Department a cashier's or certified check payable to the "Treasurer, State of New Jersey" with NJDEPE Form 062A for the full amount of the Department's oversight costs for which such details are provided.

V. PENALTY

64. Within fourteen (14) calendar days after the effective date of this Administrative Consent Order, Du Pont shall pay a penalty of $amount zero dollars to the Department, by a cashier's or certified check payable to the "Treasurer, State of New Jersey", for the violations referenced in the FINDINGS hereinabove.

VI. PROJECT COST REVIEW

65. Beginning three hundred sixty-five (365) calendar days after the effective date of this Administrative Consent Order and annually thereafter on that same calendar day, Du Pont shall submit to the Department a detailed review of all costs incurred by Du Pont in conjunction with this Administrative Consent Order. This cost review shall also include a detailed summary of all monies spent to date pursuant to this Administrative Consent Order, the estimated cost

of all future expenditures required to comply with this Administrative Consent Order (including any operation and maintenance costs), and the reason for any changes from the previous cost review submitted by Du Pont.

VII. STIPULATED PENALTIES

66. Within thirty (30) calendar days after Du Pont's receipt of a written demand made by the Department, Du Pont shall pay stipulated penalties to the Department for Du Pont's failure to comply with any of the deadlines or schedules required by this Administrative Consent Order including those established and approved by the Department in writing pursuant to this Administrative Consent Order. Each deadline or schedule not complied with shall be considered a separate violation and stipulated penalties shall begin to accrue on the day that performance is due, or when noncompliance occurs, and shall continue to accrue through the final day of correction of the noncompliance. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Administrative Consent Order. In addition, failure to pay a stipulated penalty on time shall be an additional violation of this Administrative Consent Order subject to stipulated penalties.

~~1-17~~ 67. Du Pont's payment of stipulated penalties for Du Pont's failure to comply with the deadlines and schedules associated with the major deliverables and tasks required by this Administrative Consent Order, as identified below, shall be made according to the following schedule:

Major Deliverables and Tasks

- all draft and final workplans
- all draft and final reports
- performance of remedial activities including interim remedial measures
- implementation of all approved workplans
- compliance with financial assurance requirements
- payments of penalty settlements and reimbursement of prior costs
- payment of oversight costs

Calendar Days After Due Date	Stipulated Penalties
1 - 7	$1,000 per calendar day
8 - 14	$2,000 per calendar day
15 - 21	$3,000 per calendar day
22 - 28	$5,000 per calendar day
29 - over	$10,000 per calendar day

68. Payment of stipulated penalties for Du Pont's failure to comply with the deadlines and schedules associated with all remaining deliverables and tasks, other than those listed in the preceding paragraph, shall be made according to the following schedule:

Calendar Days After Due Date	Stipulated Penalties
1 - 7	$100 per calendar day
8 - 14	$200 per calendar day

15 - 21	$1,000 per calendar day
22 - 28	$2,500 per calendar day
29 - over	$5,000 per calendar day

69. Any such penalty shall be due and payable thirty (30) calendar days following receipt of a written demand by the Department. Payment of stipulated penalties shall be made by a cashier's or certified check payable to the "Treasurer, State of New Jersey".

70. All penalties paid pursuant to this Administrative Consent Order shall be considered civil and/or civil administrative penalties.

71. Payment of stipulated penalties does not alter Du Pont's responsibility to complete any requirement of this Administrative Consent Order.

VI. Force Majeure

72. If any event as specified in the following paragraph occurs which Du Pont believes or should believe may cause delay in the compliance or non-compliance with any provision of this Administrative Consent Order, Du Pont shall notify the Department in writing no later than seven (7) calendar days after the delay or the date the anticipated delay became known to Du Pont. The notification referenced in this paragraph shall describe the anticipated length of the delay, the precise cause or causes of the delay, any measures taken or to be taken to minimize the delay, and the time required to take any such measures to minimize the delay. Du Pont shall take all necessary action to prevent or minimize any such delay.

73. If the Department finds that: (a) Du Pont has complied with the notice requirements of the preceding paragraph (b) that any delay or anticipated delay has been or will be caused by fire, flood, riot, strike or other circumstances beyond the control of Du Pont; and (c) Du Pont has taken all necessary action to prevent or minimize any such delay the Department shall extend the time for performance hereunder for a period no longer than the delay resulting from such circumstances. If the Department determines that, (i) Du Pont has not complied with the notice requirements of the preceding paragraph, (ii) the event causing the delay is not beyond the control of Du Pont, or (iii) Du Pont has not taken all necessary actions to prevent or minimize the delay, this paragraph shall not be applicable and failure to comply with the provisions of this Administrative Consent Order shall constitute a breach of the requirements of this Administrative Consent Order. The burden of proving that any delay is caused by circumstances beyond the control of Du Pont and the length of any such delay attributable to those circumstances shall rest with Du Pont. Increases in the cost or expenses incurred by Du Pont in fulfilling the requirements of this Administrative Consent Order shall not constitute a force majeure. Delay in an interim requirement shall not automatically justify or excuse delay in the attainment of subsequent requirements. Force majeure shall not include nonattainment of the goals, standards, guidelines and requirements set forth in the appendicies attached hereto. Force majeure shall not include contractor's breach unless such breach falls under (a), (b) and (c) of this paragraph.

VIII. RESERVATION OF RIGHTS

74. The Department reserves the right to unilaterally terminate this Administrative Consent Order in the event that Du Pont violates any terms or fails to meet the obligations of this Administrative Consent Order.

75. Nothing herein, including any document the Department issues as agreed to above, shall be interpreted to constitute a release or waiver of liability for any of the conditions which existed before, during or after the Department's execution of this Administrative Consent Order.

76. Nothing in this Administrative Consent Order shall preclude the Department from seeking civil or civil administrative penalties or any other legal or equitable relief against Du Pont.

IX. GENERAL PROVISIONS

77. Du Pont shall, in addition to any other obligation required by law, notify the Department contact immediately upon knowledge of any condition posing an immediate threat to human health and/or the environment.

78. Du Pont shall perform all work conducted pursuant to this Administrative Consent Order with prevailing professional standards.

79. Du Pont shall conform all actions required by this Administrative Consent Order with all applicable federal, State and local laws and regulations.

80. Nothing in this Administrative Consent Order shall relieve Du Pont from complying with all other applicable laws and regulations.

81. Du Pont shall preserve all potential evidentiary documentation found at the Site until written approval is received from the Department to do otherwise, including, without limitation, documents, labels, drums, bottles, boxes or other containers, and/or other physical materials that could lead to the establishment of the identity of any person which generated, treated, transported, stored or disposed of contaminants at the Site.

82. Upon receipt of a written request from the Department, Du Pont shall submit to the Department all data and information, including technical records and contractual documents, concerning contamination at the Site, including raw sampling and monitoring data, whether or not such data and information, including technical records and contractual documents, was developed pursuant to this Administrative Consent Order. Du Pont reserves whatever rights it may have, if any, to assert any privilege or a privilege regarding such data or information, however, Du Pont agrees not to assert confidentiality claims with respect to any data related to Site conditions, sampling or monitoring.

83. In addition to the Department's statutory and regulatory rights to enter and inspect, Du Pont shall allow the Department and its authorized representatives access to the Site at all times for the purpose of monitoring Du Pont's compliance with this Administrative Consent Order.

84. Du Pont shall not construe any informal advice, guidance, suggestions or comments by the Department, or by anyone acting on behalf of the

Department, as relieving Du Pont of its obligations to obtain written approvals as required herein.

85. No modifications or waiver of this Administrative Consent Order shall be valid except by written amendment to this Administrative Consent Order duly executed by Du Pont and the Department.

86. In the event that the Department determines that a meeting concerning the remediation of the Site is necessary at any time, Du Pont shall ensure that Du Pont's appropriate representative is prepared and available for, and participates in such a meeting upon written notification from the Department of the date, time and place of such meeting.

87. This Administrative Consent Order shall be governed and interpreted under the laws of the State of New Jersey.

88. Du Pont shall notify in writing each contractor and subcontractor, retained to perform any work at the Site, that the Site is the subject of this Administrative Consent Order for the purpose of remediating contaminants identified at the Site.

89. Within thirty (30) calendar days after the effective date of this Administrative Consent Order, Du Pont shall record a copy of this Administrative Consent Order with the County Clerk, ~~Middlesex~~ Union County, State of New Jersey and shall provide the Department with written verification of compliance with this paragraph which shall include a copy of this Administrative Consent Order stamped "Filed" by the ~~Middlesex~~ Union County Clerk.

90. Du Pont shall preserve, during the pendency of this Administrative Consent Order and for a minimum of ten (10) years after its termination, all data and information, including technical records, potential evidentiary documentation and contractual documents, in its possession or in the possession of their divisions, employees, agents, accountants, contractors, or attorneys which relate in any way to the contamination at the Site, despite any document retention policy to the contrary. After this ten year period, Du Pont may make a written request to the Department to discard any such documents. Such a request shall be accompanied by a description of the documents involved, including the name of each document, date, name and title of the sender and receiver and a statement of contents. Upon receipt of written approval by the Department, Du Pont may discard only those documents that the Department does not require to be preserved for a longer period.

91. Except as otherwise provided, the requirements of this Administrative Consent Order shall be deemed satisfied upon receipt by Du Pont of written notice from the Department that Du Pont has completed the substantive and financial obligations imposed by this Administrative Consent Order to the satisfaction of the Department.

93. This Administrative Consent Order shall become effective upon execution hereof by all parties.

DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY

Date: _____ By: _____

Ronald T. Corcory, Assistant Director
Responsible Party Cleanup Element
Responsible Party Site Remediation

E.I. DU PONT DE NEMOURS & COMPANY, INC.

Date: _____ By: _____

Name: _____

Title: _____

12. NJDEP agrees to provide an opportunity for DuPont to meet with the Director, Division of Hazardous Waste Management of NJDEP concerning NJDEP's decision on any selection of a remedial/corrective action alternative and NJDEP's actions or determinations on RI/FS reports, if DuPont objects in writing to any NJDEP's actions or determinations made pursuant to this Administrative Consent Order, within ten (10) calendar days after receipt of such decision from NJDEP. NJDEP and DuPont shall have seven (7) calendar days thereafter to meet with the Director to resolve the objection. After the meeting, NJDEP will provide to DuPont a written statement of the reasons for its final decision.

from DuPont Pompton Lakes ACO

Let's protect our earth

State of New Jersey

RECEIVED
JUL 12 1989
BOARD OF HEALTH

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
METRO BUREAU OF REGIONAL ENFORCEMENT
2 BABCOCK PLACE
WEST ORANGE, NEW JERSEY 07052

Jorge H. Berkowitz, Ph.D
Acting Director

June 30, 1989

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

Mr. Harry McDowell, Senior Consultant
E.I du Pont de Nemours & Company, Incorporated
Grasselli Plant
South Wood Avenue
Linden, NJ 07036

Re: Compliance Evaluation Inspection
E.I. du Pont de Nemours & Company, Incorporated
Discharge Activity Code: C,J
NJPDES No. NJ0002640
Linden/Union County

BAA000036

Dear Mr. McDowell:

A Compliance Evaluation Inspection of your facility was conducted by a representative of this Division on June 5, 1989. A copy of the completed inspection report form is enclosed for your information.

Your facility received a rating of "UNACCEPTABLE" due to the following deficiency:

> The effluent limitation for total suspended solids (TSS) was exceeded at DSN 009 for the monitoring period March 1, 1989 - March 31, 1989.

The deficiency noted above is a significant violation of the terms and conditions of your NJPDES permit and/or the Water Pollution Control Act Regulations (N.J.A.C. 7:14A-1 et seq.). You are therefore DIRECTED to institute corrective measures. A written report concerning specific details of remedial measures to be instituted, as well as an implementation timetable, must be submitted to this Department and USEPA, Permits Administration Branch within thirty (30) calendar days of the date of this correspondence.

You are advised that the New Jersey Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) provides for substantial monetary and criminal penalties in cases of permit violations.

Please direct all correspondence and inquiries to John M. Brennan, the Environmental Specialist responsible for this case, who can be reached at (201) 669-3900, or by letter through this Division.

Failure to fully comply with the above will result in the initiation of enforcement action by this Department. This shall in no way be construed, however, to indicate any exemption on your part from possible penalties for violations indicated by the Compliance Evaluation Inspection, as stated above.

Very truly yours,

Gloria T. Grant

Gloria T. Grant
Supervisor, Ground Water Unit
Metro Bureau of
Regional Enforcement

E15:G26

C: Dr. Richard A. Baker, USEPA
Mr. Patrick M. Durack, USEPA
Mr. Henry Gavan, HO.
Mr. Stan Larmee, duPont
Mr. Tom Jerrell, duPont

Form DWR-053
3/81

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0002640 NO. OF DISCHARGES 4 CLASS Maj - Ind

DISCHARGER E.I. duPont de Nemours & Co., Inc.

OWNER E.I. duPont de Nemours & Co., Inc.

MUNICIPALITY Linden COUNTY Union WATERSHED CODE –

LOCATION South Wood Ave - Grasselli Plant

RECEIVING WATERS Arthur Kill STREAM CLASS TW-3

LICENSED OPERATOR & PLANT CLASS NA

TRAINEE/ASSISTANT NA OTHER INFO. 474-1745

DEFICIENCIES OR COMMENTS

Re effluent limits for TSS was exceeded at DSN 009 in March 1989

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☑ Unacceptable

EVALUATOR John M. Brennan TITLE Environmental Specialist

INFORMATION FURNISHED BY (Name) Messrs. Harry McDowell, Stan Larmee, Tom Jerrell

(Title) Sr. Consultant, Op. Mgrs (Organization) E.I. duPont de Nemours Co, Inc

DATE OF INSPECTION June 5, 1989

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: 6/5/89

INDUSTRIAL TREATMENT PROCESS EVALUATION NI = Not Inspected

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 004	---	
	WASTEWATER SOURCE(S)	---	NCCW for condensers - process shutdown
	CONTINUITY OF OPERATION	---	No discharge
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	revised 5/1988
	ALARM SYSTEMS	NA	
	ALTERNATE POWER SUPPLY	NA	
	DPCC/DCR	S	revised January 1989
TREATMENT PROCESSES	BMP	S	Approved 8/29/86
		NA	
SLUDGE HANDLING		NA	
	DISPOSAL SITE		
OTHER INFORMATION	FLOW METER & RECORDER	S	metered
	RECORDS	S	Permit, DMR's
	SAMPLING PROCEDURES	-	Co. Personnel + Composite sampler
	ANALYSES PERFORMED BY	S	Garden State Labs
	Manufacture Sulfuric Acids + Acid Salts		Physical Connection Permit #528
	FINAL EFFLUENT APPEARENCE	-	No discharge
	REC. WATERS APPEARENCE	NI	

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: 6/5/89

INDUSTRIAL TREATMENT PROCESS EVALUATION — NI = Not Inspected

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 005	---	
	WASTEWATER SOURCE(S)	---	NCCW for condensers & scrubbers - Process closed
	CONTINUITY OF OPERATION	---	intermittent discharge from Dimethyl Sulfate
	BYPASSES/OVERFLOWS		(DMS) drum washing operation
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	NA	
	ALTERNATE POWER SUPPLY	NA	
	NPCC/DCR; BMP	S	
TREATMENT PROCESSES		NA	
SLUDGE HANDLING		NA	
	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	metered
	RECORDS	S	Permit DMR's.
	SAMPLING PROCEDURES	-	Co. Personnel
	ANALYSES PERFORMED BY	S	Garden State Labs
OTHER	FINAL EFFLUENT APPEARENCE	NA	No discharge
	REC. WATERS APPEARENCE	-	Arthur Kill

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0002640
Date: 6/5/89

INDUSTRIAL TREATMENT PROCESS EVALUATION NI = Not Inspected

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

		RATING	COMMENTS
GENERAL	DISCHARGE # 008	---	
	WASTEWATER SOURCE(S)	---	NCCW + Scrubber water
	CONTINUITY OF OPERATION	---	continuous
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	S	pH alarm
	ALTERNATE POWER SUPPLY	NA	
TREATMENT PROCESSES	Neutralization +	S	NaOH neutralization
	Clarification	S	1 - mixing pond - unlined 1 - settling pond - unlined to be addressed in DGW permit
SLUDGE HANDLING		NA	
	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Parshall Flume
	RECORDS	S	
	SAMPLING PROCEDURES	NI	
	ANALYSES PERFORMED BY	S	Garden State Labs
OTHER	FINAL EFFLUENT APPEARENCE	S	
	REC. WATERS APPEARENCE	NI	Arthur Kill

Form DWR-053-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ 0002640
Date: 6/5/89

INDUSTRIAL TREATMENT PROCESS EVALUATION NI = Not Inspected

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

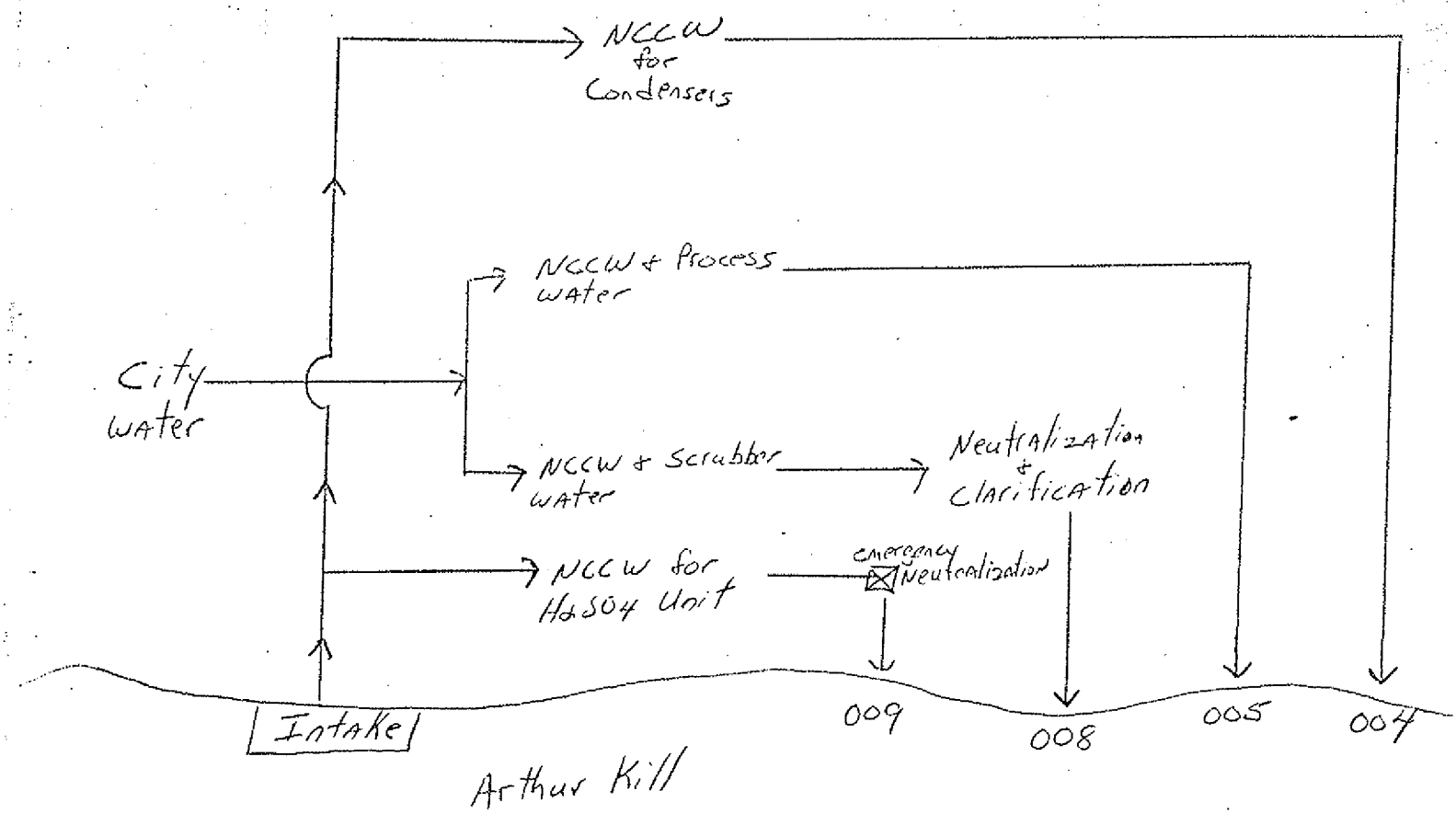
		RATING	COMMENTS
GENERAL	DISCHARGE # 009	---	
	WASTEWATER SOURCE(S)	---	NCCW from H_2SO_4 unit
	CONTINUITY OF OPERATION	---	continuous
	BYPASSES/OVERFLOWS	NA	
	S.P.C.C. PLAN	S	
	ALARM SYSTEMS	S	pH (high/low)
	ALTERNATE POWER SUPPLY	NA	
TREATMENT PROCESSES	Automatic Neutralization	S	(for emergency purposes)
SLUDGE HANDLING		NA	
	DISPOSAL SITE		
INFORMATION	FLOW METER & RECORDER	S	Parshall Flume
	RECORDS	S	
	SAMPLING PROCEDURES	NI	
	ANALYSES PERFORMED BY	S	Garden State Labs
OTHER	FINAL EFFLUENT APPEARENCE	S	
	REC. WATERS APPEARENCE	NI	Arthur Kill

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

Permit # NJ0002640
Date 6/5/89

PLANT DIAGRAM AND FLOW SEQUENCE:



No Samples Taken

DISCHARGE DATA

SOURCE: DMA

PERIOD: March 1, 1989 - March 31, 1989

DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA	DIS	PARA	SAMPLE TYPE	PERMIT LIMITS	DATA
009	TSS	Comp.	365 Kgs/day (mm)	684 Kg/day					

MONITORING DEFICIENCIES: One TSS violation as listed above. DMA's for March & April 1989 were reviewed. All DMA's previous to this date have been reviewed & any violations of effluent limitations were included in the AONCAPA. [illegible]

Form DWR-053
3/81

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0002640 NO. OF DISCHARGES J CLASS Maj/Ind/

DISCHARGER E. I. duPont de Nemours and Company, Inc.

OWNER E. I. duPont de Nemours and Co, Inc.

MUNICIPALITY Linden COUNTY Union WATERSHED CODE NA

LOCATION South Wood Avenue - Grasselli Plant

RECEIVING WATERS Ground Water STREAM CLASS NA

Main Gate (201) 474-1745

DEFICIENCIES OR COMMENTS

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☐ Unacceptable ☑ Not Rated

EVALUATOR John M. Brennan TITLE Environmental Specialist

INFORMATION FURNISHED BY (Name) Messers. Harry McDowell, Stan Larmee, Tom Jerrell

(Title) Sr. Consultant, Op. Mngrs (Organization) E.I. duPont deNemours & Co. Inc.

DATE OF INSPECTION June 5, 1989

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

Permit # NJ 0002640

DISCHARGE SURVEILLANCE REPORT

Date 6/5/89

GROUND WATER DISCHARGE EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable NI = Not Inspected

		RATING	COMMENTS
GENERAL	TYPE DGW	–	(5) Surface Impoundments
	RCRA FACILITY	S	NJD002188965
	DISCHARGE NUMBER	NA	
	WASTEWATER SOURCE/FREQ.		(Basin C, D, E - Dimethyl hydroxy/ Amine (DMHA) ponds
	PUMPS AND PIPING	NI	(Basin A & B - 2 wastewater ponds → DSN008
	ALTERNATE POWER/ALARM	NA	
	BYPASS	NA	
MONITORING SYSTEM	WATER SUPPLY/MONITORING	NA	
	AQUIFERS MONITORED		8 monitoring wells proposed.
	UPGRADIENT WELLS		A final permit has not been
	DOWNGRADIENT WELLS		issued to date.
	SAMPLING PLAN		
	SAMPLING PROCEDURES		
	LAB CERTIFICATION		
	RECORDS		
	REPORTING		
LYSIMETER/ MONITORED WELLS	DRILLING PERMIT NUMBERS	NA	wells not yet installed
	WELLS NUMBERED/IDENTIFIED		
	LOCKS/INTEGRITY		
	ABANDONMENT PLAN		
	ELEVATION INFORMATION		
	WATER LEVEL MEASUREMENT		
	TURBIDITY FREE		
	SUFFICIENT YIELD		
UIC	CLASSIFICATION	NA	
	PERC./LEACHING PROBLEMS		
	SOLVENTS/REPAIRS MADE		
	MAX. PRESSURE & VOLUME		
	CLOSEST USDW/SUPPLY WELLS		
	MOUND INTEGRITY/COVER		
IMPOUNDMENT	LINING INTEGRITY	S	Basins A+B unlined, Basins C, D, E hypalon line
	EMBANKMENT INTEGRITY	S	
	LEACHATE COLLECTION SYS.	NA	
	SOLIDS BUILDUP/REMOVAL	NA	
	HEIGHT TO FREEBOARD	–	3 feet
	APPEARANCE	S	
LAND APPLICATION/ SPRAY SYSTEM	EVEN DISTRIBUTION	NA	
	PONDING/RUNOFF/EROSION		
	SPRAY HEADS		
	DISCING		
	COVER CROP		
	APPEARANCE		
	BUFFER ZONE		
	SLUDGE STOCKPILED		
OTHER	SEEPAGE/LEACHING	NA	NONE observed
	ODOR/AEROSOLS		NONE
	FLOW MONITORING/RECORDING		

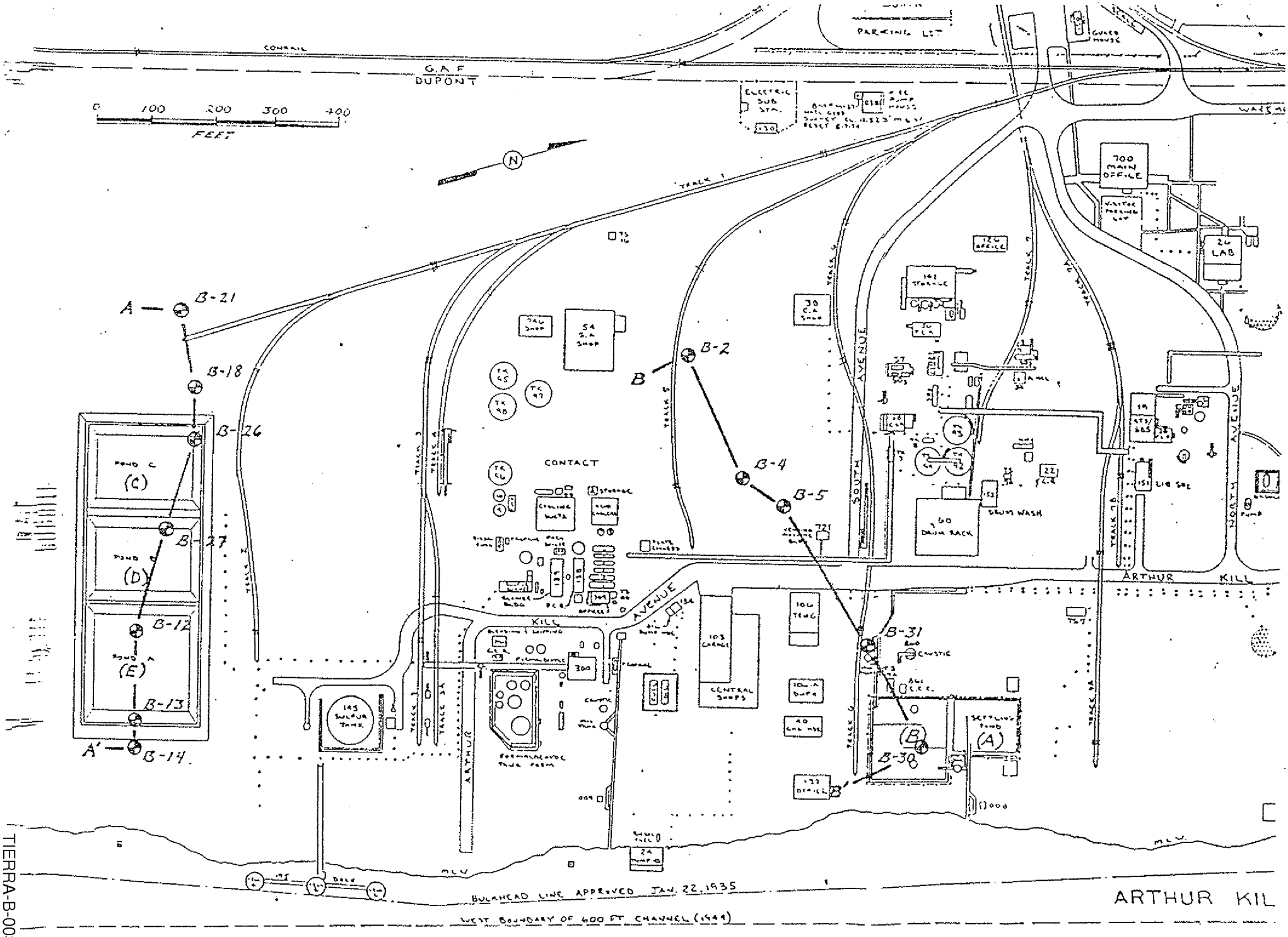


FIGURE 1: SITE MAP SHOWING LOCATIONS OF PONDS, BORINGS, AND CROSS SECTIONS