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Albert Telsey, President

May 7, 1999

Investigative Consultants International
231 North Avenue
Suite 302
Westfield, NJ 07090

Attention: Mr. David P. Nolan

RE: ***IRONBOUND GROUND WATER RECLASSIFICATION PETITION***

Dear Dave:

Enclosed is the Petition with Appendix (draft) for the referenced project. This document was finalized in May 1997 and submitted to DEP. I do not have a copy of the Final document. However, this draft will probably serve your purposes. I also do not have in my possession a copy of the entire ground water data package. It is on disk. If you need it, I can get it for you.

Again, sorry for the delay.

Very truly yours,

Albert T. Telsey

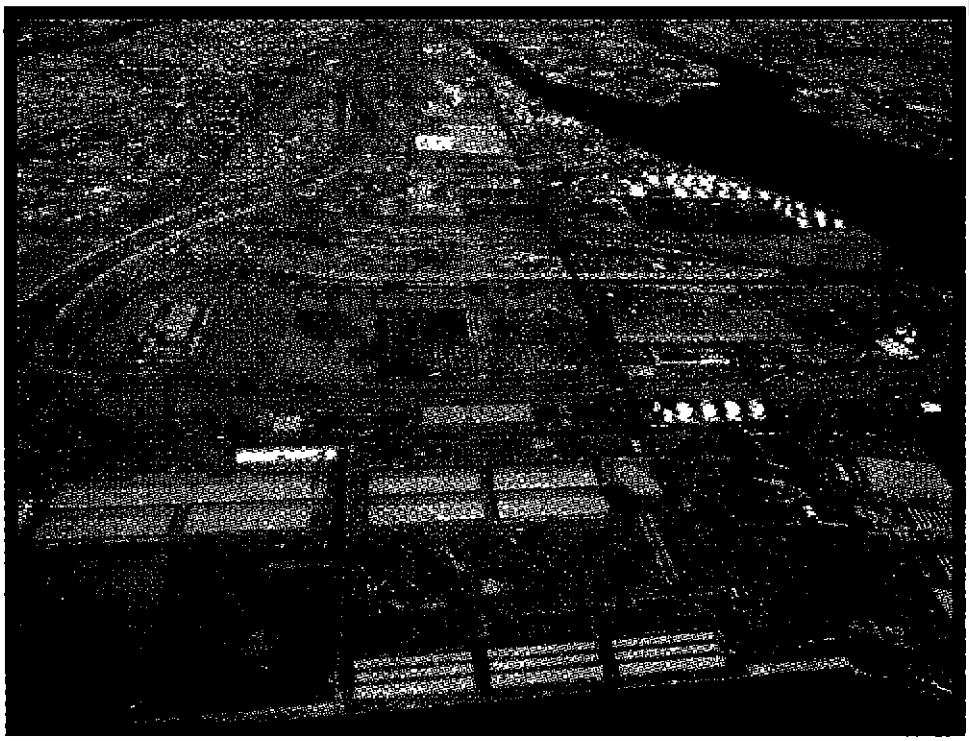
ATT\mcg
Encl. (Petition to Reclass.)

Newark Bay Study Area
NBSA-00070

Petition to Reclassify Ground Water in the Ironbound Section of Newark

Cover Page and T.O.C.

D R A F T



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Albert I. Telsey - President

March 1997

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- Richard Rast, Delta Technology Group, Inc., Littleton, Colorado.
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Representative for Petitioners
and Other Supporters

PETITION TO RECLASSIFY GROUND WATER IN THE IRONBOUND SECTION OF NEWARK

EXECUTIVE SUMMARY

The Petitioners

Alliance Chemical Co.
Crompton & Knowles Colors, Inc.
Cardolite Corp.
Elan Chemical Co.
Federated Metals
G. J. Chemical Co.
Georgia Pacific Corp.
Henry Borda
Hertz Equipment Rental
Honig Chemical & Processing Co.
Ironbound
McKesson Environmental Systems Co.
Passaic Valley Sewerage Commissioners
Quantum Chemical Co.
Reichhold Chemical Co.
Tenneco/Stratus Petroleum Corp.
The Stanley Works
Troy Corp.
Vitusa International, Inc.
Waste Management, Inc.
Welch Holme & Clark, Co.

Other Supporters

Assemblyman Richard H. Bagger
Association of Environmental Authorities
Chemical Industry Council of New Jersey (CIC/NJ)
Coalition for Environmental Liability Reform
Congressman Robert D. Franks
Congressman Donald M. Payne
Economic Development Corporation of Essex County
Ironbound
New Jersey State Chamber of Commerce
Podvey, Sachs, Meanor, Catenacci, Hildner & Cocoziello, P.C.
Senator James E. McGreevey
Senator Ronald L. Rice
Society of Industrial and Office Realtors (SIOR)

1.0 EXECUTIVE SUMMARY

INTRODUCTION

The New Jersey Department of Environmental Protection ("NJDEP" or "Department") permits parties who are interested in proposing reasonable changes to environmental regulations to submit a Petition to the Department. The Petitioners and other Supporters listed above (hereinafter, collectively "Petitioners") have submitted a Petition respectfully requesting that the Department propose and adopt certain regulations that will reclassify ground water in the Ironbound section of Newark as a non-potable Class II-B Area ("Petition Area"). [See map attached]. Presently, the Petition Area is classified as a potable Class II-A Area.

The regulations proposed by the Petitioners will permit natural processes to be the presumed cleanup remedy for ground water in the Petition Area instead of pump and treat technology or other aggressive remedies that are presently required. Petitioners have confirmed that natural processes, such as biodegradation and adsorption, are already occurring in the Petition Area and that they can be relied upon to remove contaminants over time without jeopardizing the environment. NJDEP acknowledges that natural attenuation is an effective remedy in appropriate areas and encourages Petitions such as this one.

Reclassification of the Petition Area is being sought for the following reasons:

1. ***Historic Industrial Pollution.*** The Petition Area has been one of the most heavily industrialized areas in the state for the past one hundred years. As a result, ground water in the area became contaminated long before modern environmental protection laws were adopted to prevent industrial discharges. While present-day facilities are complying with these new laws, the area has been left with an historic legacy of ground water pollution.

2. ***Not a Source of Drinking Water.*** The Petition Area is not used as a source of drinking water, has never been used as a source of drinking water and is not intended to be used as a source of drinking water in the future. In effect, ground water in the Petition Area is presently "misclassified" as a drinking water source by being classified as a potable II-A Area.

3. ***$2.5 Billion Clean-up.*** Petitioners had the Georgia Institute of Technology ("Georgia Tech") calculate how much it would cost to cleanup the Petition Area using aggressive techniques that are presently required by Department regulations for Class II-A Areas. Georgia Tech calculated that it would cost over $2.5 billion dollars to attempt a cleanup. Petitioners believe that this is a tremendous amount of money to apply to a remedy that may not be successful.

4. ***Contamination is Pervasive and Difficult to Remove.*** Ground water in the Petition Area is contaminated with 107 different compounds, including volatile and semi-volatile compounds, pesticides, and metals - 22 of these compounds are pervasively distributed throughout the area. A significant number of these contaminants sink to the bottom of the aquifer (known as DNAPLs). They are difficult and often impossible to remove using aggressive remediation technology. Consequently, even if $2.5 billion were spent, it is not expected that ground water in the area could be returned to potable water standards in the near future.

The following facts and conclusions are set forth in the Petition:

- **No Human Impact**.

  Reclassification will not jeopardizing human health because no one drinks ground water in the area and there is no future intention to use it as a potable water source.

- **Minimal Environmental Impact**.

  Reclassification will not jeopardize the environment.

  - A review of wildlife, fish and plants in the area confirms that there are no endangered species. There are only hardy species indigenous to an urban/industrial environment that will not be harmed by reclassifying ground water.

  - A review of wetlands confirms that few wetland habitats exist in the area except for some areas along the bank of the Passaic River. The ecology of these areas will not be affected by reclassifying ground water.

  - A review of data confirms that surface water and sediments in the Passaic River are already polluted by a variety of contaminants from upstream industrial dischargers who have been discharging to the river for decades. An analytical model of the potential impact that contaminated ground water may have on the Passaic River confirms that, of the 22 pervasive compounds found throughout the Petition Area, only two may reach the river in excess of acceptable standards (chloroform and vinyl chloride). Both of these compounds have an insignificant bioaccumulation potential.

  - Given the tremendous volume of surface water that flows by the Petition Area (98,236,800 cu ft^3/day), it is anticipated that the slight impact of these two compounds that may enter the river will be quickly diluted and rendered harmless.

  - Based on the preceding facts, the reliance on natural attenuation for ground water cleanup, as proposed by the Petitioners, is a reasonable proposal.

- **Positive Economic Advantage for Newark**.

  New Jersey's environmental laws are strict. In other words, current owners and operators who are not responsible for the discharge of contaminants from long ago, are, nevertheless, responsible for their cleanup. This liability creates a tremendous "chill" on the desire to develop contaminated properties, especially when the potential liability for pre-existing ground water contamination alone is in excess of $2.5 billion dollars for the area. Developers simply prefer to go elsewhere. Reclassification should significantly reduce this liability, remove the "chill" and bring back developers to the Ironbound.

  Petitioners had the Rutgers Economic Advisory Service (R/ECON) of the Center for Urban Economic Studies, analyze the economic impact that the Petitioner's proposed regulations would have on the economy of Newark. Rutgers concluded that the proposed regulations would stimulate development, create new jobs and increase municipal tax revenues since exposure to cleanup liability for historic contamination would be significantly reduced.

  In particular, Rutgers projected that if the money that would otherwise be spent on a potentially ineffective active ground water remediaiton remedy was otherwise reinvested into the area, it could result in the following economic and fiscal advantages to the Ironbound: 4,600 new jobs, $205 million in additional wages, $403 million in additional output, and $20 million per year in additional property taxes for contaminated properties that could be redeveloped.

- **Proper Balance of Environmental and Economic Priorities**.

  Petitioners recognize the need for regulations that protect the environment and they support such measures. However, Petitioners also recognize the need to balance environmental protection with the need to promote economic development in New Jersey. Petitioners are convinced, given the research provided as part of their Petition, that reclassifying the Petition Area as a non-potable Class II-B Area will promote the goals of environmental protection and economic redevelopment without jeopardizing the environment.

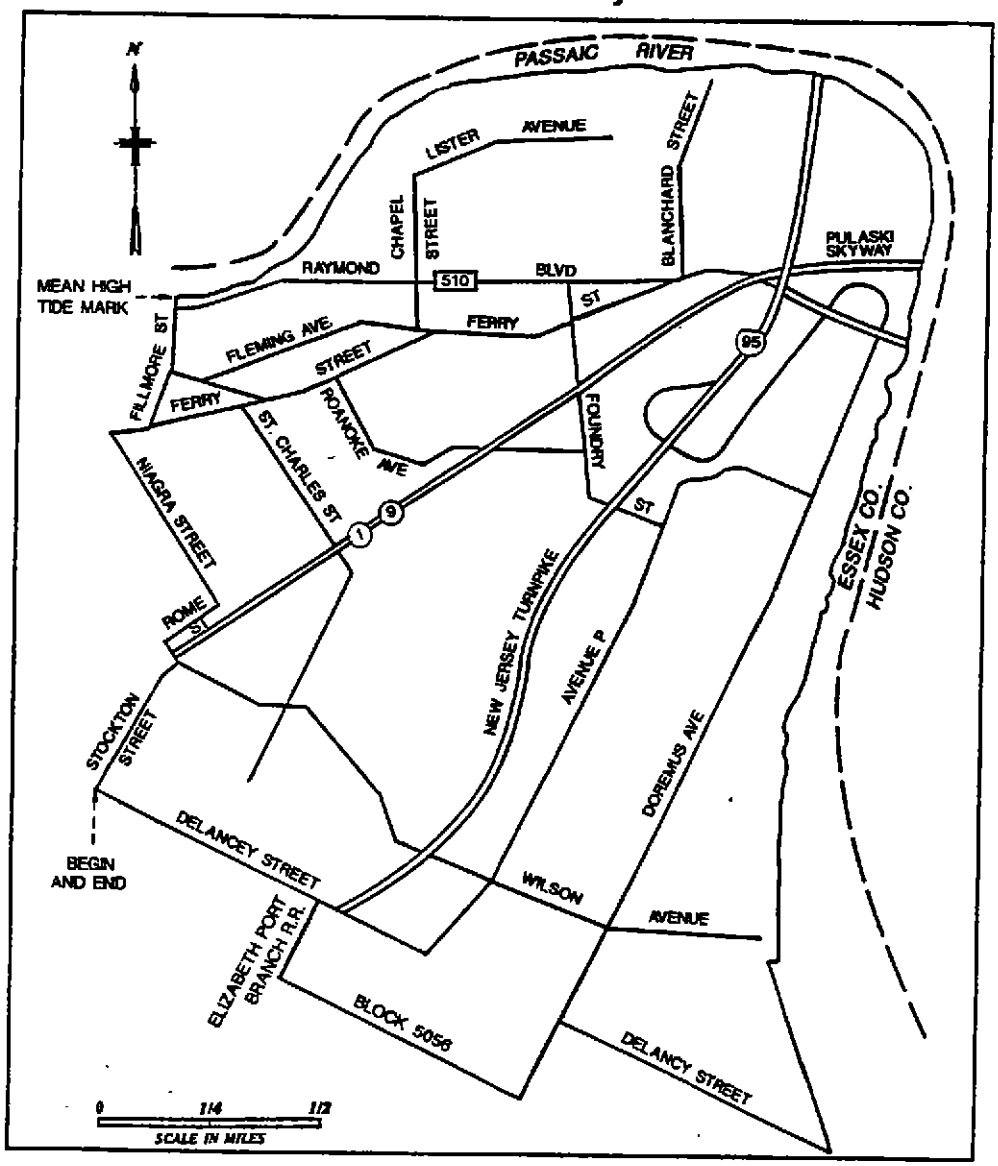
  Simply put, much of the $2.5 billion that may presently have to be spent in the Petition Area on a potentially ineffective ground water cleanup remedy might be better spent on economic redevelopment and business growth, since reliance on natural degradation should not impact human health and the environment.

The Petitioner's proposal to balance these two goals is consistent with the State's present philosophy. The Petitioners have obtained data to support their position that reclassifying ground water in the Petition Area will produce little or no risk to human health and the environment while providing economic benefits to local businesses, Newark, and the State of New Jersey.

For more information about this Petition, contact 2B Environmental, Inc.

Figure 1-1

New Jersey Ground Water Classification System
Class II - B
Newark Ironbound Area
Essex County



Horizontal Boundary - [4.2 square mile area]. Beginning at the center line of the intersection of Stockton Street and Delancy Street, then north along the center line of Stockton Street to Wilson Avenue, then west along the center line of Wilson Avenue to Rome Street, then northwest along the center line of Rome Street to Niagra Street, then northwest along the center line of Niagra Street to Ferry Street, then east along the center line of Ferry Street to Fillmore Street, then north along the center line of Fillmore Street to the mean high tide mark of the Passaic River, then easterly along the mean high tide mark of the Passaic River around the horn and south to a point where a line representing the center line of Delancy Street intersects the mean high tide mark of the Passaic River, then westerly along the center line of Delancy Street to Doremus Avenue, then south to the corner of Block 5056, Lot 70, then west along the southern boundary of Block 5056, Lots 70, 72, 86, 84 and 60 to the Elizabeth Port Branch Central Railroad, then north along the center line of the Elizabeth Port Branch Central Railroad to Delancy Street, then north along the center line of Delancy Street to the beginning.

Vertical Boundary - All unconsolidated overburden material and associated water bearing zones above the Passaic (Brunswick Shale) Formation to the ground surface and beneath the Horizontal Boundary. The Passaic (Brunswick Shale) Formation and below is not included in the Class II-B Newark Ironbound Area.

New Jersey Department of Environmental Protection - 1997

PETITION TO RECLASSIFY GROUND WATER IN THE IRONBOUND SECTION OF NEWARK

2.0 BACKGROUND

2.1 INTRODUCTION

Petitioners respectfully request that, for the reasons set forth herein, the New Jersey Department of Environmental Protection ("NJDEP" or "Department") reclassify the shallow ground water beneath the Ironbound section of Newark (hereinafter "Petition Area") (see Figure 1-1) as a Class II-B Area by proposing and adopting the regulations recommended in the Notice of Proposed Rule Making (see Section 11.0). Appropriate public notifications have been made (see Appendix A).

The regulations in Section 11.0 recommend that the Ground Water Quality Standards (GWQS), N.J.A.C. 7:9-1 et seq., be amended to identify the 4.2 square mile Petition Area as a Class IIB Area. They also recommend that the Technical Requirements for Site Remediation regulations, N.J.A.C. 7.7:26E-1 et seq., be amended to define "natural ground water remediation" and to provide that natural ground water remediation be the presumed remedy in Class IIB Areas if no free product is found at a site or emanating from a site within the area.

The requirements for this Petition have been provided by the Department in the GWQS and a Draft Guidance Document entitled "Petitions for Ground Water Reclassification" (July 1993). This Petition establishes each of the characteristics of a Class IIB Area with convincing evidence.

The Petitioners request that the Department adopt the proposed regulations because they represent an appropriate balance between the need for environmental protection and the promotion of economic redevelopment within the state of New Jersey.

Characteristic Number 1 - Ground Water Exhibits Extensive Exceedances of 22 Contaminants.

Ground water in the Petition Area is contaminated with 107 contaminants including volatile compounds, semi-volatile compounds, metals and pesticides. Twenty-two of those compounds are found throughout the Petition Area, at ten or more locations (Pervasive Compounds). These Pervasive Compounds are associated with historic discharges from industrial activity occurring in the area over the last one hundred years. The primary industries in the area include the chemical, paint, plastics, iron and steel, non-ferrous metal, fabricated metal, petroleum, leather and paper/cardboard industries, among others.

Characteristic Number 2 - Active Ground Water Remediation Will Cost Over $2.5 Billion Dollars and is "Technologically Impracticable" to Achieve

Many of the Pervasive Compounds are DNAPLs, i.e., contaminants that tend to sink to the bottom of an aquifer. They are difficult and often impossible to remove using active ground water remediation technology available today. If active remediation were attempted

throughout the Petition Area, it is not expected that ground water could be returned to potable water quality standards as set forth by the Department in the GWQS.

Petitioners had the Georgia Institute of Technology (Georgia Tech) calculate the cost of undertaking active ground water remediation within the Petition Area using a computer model that has been approved by USEPA for estimating clean-up costs at U.S. military bases. Georgia Tech calculated that it would cost over $2.5 billion dollars to attempt a clean-up of the Petition Area and that, even if attempted, it would probably be ineffective.

Characteristic Number 3 - No Public Water Supply Wells Exist in the Petition Area

The Petition Area is an excellent location for ground water reclassification because ground water in the area has never been used as a source of drinking water and there is no future intention to use it as a source of drinking water. As a result, no adverse impact on human health and safety is expected by reclassifying the area as Class IIB.

Characteristic Number 4 - There is No Significant Risk of Pollution Migration Into Class I, IIA or IIIA Areas

Class I, IIA, and IIIA Areas are generally unpolluted ground water areas. The flow of ground water in the Petition Area is to the Passaic River and Newark Bay. These surface water bodies represent the northern and eastern boundaries of the Petition Area. Since there are no Class I, IIA and IIIA areas between the Petition Area and these surface waters, no risk of impact to these ground water areas is expected.

Characteristic Number 5 - Natural Ground Water Remediation Can Be Relied Upon to Remediate Ground Water Without Contravening Surface Water Quality Criteria

Natural ground water remediation is the reliance on natural processes, such as biodegradation, adsorption, volatilization and other processes to remove contaminants from ground water over time. Petitioners have collected over 44,000 ground water data points from 57 contaminated sites within and just outside of the Petition Area. A review of the data indicates that natural remediation processes already appear to be removing most of the 22 Pervasive Compounds from within the Petition Area.

An analytical model was prepared to determine how many of the 22 Pervasive Compounds, if any, might reach the Passaic River/Newark Bay. Using reasonable and conservative assumptions, it was determined that only four of the 22 Pervasive Compounds might reach the surface water bodies and only two of them (vinyl chloride and chloroform) would be above surface water quality criteria.

The flow of water in the Passaic River/Newark Bay is estimated to be over 93 million gallons per day. This volume would dilute ground water contaminants from the Petition Area 110,000 times. This dilution factor is expected to render the contaminants harmless.

In addition, surface water quality and sediments in the Passaic River/Newark Bay are already known to be contaminated with a variety of pollutants due to upstream dischargers, including a nearby Superfund Site - The Diamond Alkali Site. Unlike the bioaccumulation potential for other contaminants, the four Pervasive Compounds that may impact these

surface water bodies (chloroform, vinyl chloride, tetrachloroethene and trichloroethene) have a low or insignificant potential for bioaccumulation in fish and other living organisms. Consequently, the potential impact of ground water from the Petition Area on these surface water bodies is not expected to be significant.

The Department recognizes the need to balance environmental protection with the need to promote economic redevelopment in the state, as long as human health and the environment is not jeopardized in the process. The Petitioners believe that the adoption of the proposed regulations set forth herein is an excellent example of how these goals can be balanced.

Simply put, much of the $2.5 billion dollars that may presently have to be spent in the Petition Area on a potentially ineffective ground water clean-up remedy might be better spent on economic redevelopment and business growth since the reliance on natural degradation should not impact human health and the environment.

The Petitioners had the Rutgers Center for Urban Economic Studies analyze the economic impact that the Petitioners proposed regulations would have on the economy of Newark. Rutgers concluded that the proposed regulations would stimulate development, create new jobs and increase municipal tax revenues since exposure to clean-up liability for historic contamination would be significantly reduced by adopting the proposed regulations.

The Petitioners efforts to balance the goals of environmental protection and economic development is consistent with the state's present philosophy. For example:

- **NJIT Study**. The New Jersey Institute of Technology ("NJIT") published a report entitled "Review of the Economic Impact of Environmental Statues, Rules and Regulations on New Jersey Industry" in March 1994. The report stated that "New Jersey cannot afford to adopt a simplistic approach to governance or economic development that views the state's economic and environmental challenge as an either/or situation. Industrial health and growth can co-exist with effective environmental regulation." This Petition promotes that goal.

- **New Jersey State Plan**. The New Jersey State Plan encourages the continued use of urban areas for urban purposes in order to protect suburban and rural areas from industrial damage. The regulations proposed by this Petition promote that policy by encouraging commercial/industrial users to return to the Ironbound since the environmental liability associated with active ground water remediation will be eliminated or significantly reduced. NJDEP has recently issued an Administrative Order announcing the Department's intention to support the objectives of the State Plan when proposing and adopting new regulations.

- **Brownfields Initiative**. Brownfields refer to contaminated urban properties that are underutilized. There is a significant trend in New Jersey and elsewhere to promote the redevelopment of these properties.

  The City of Newark owns hundreds of Brownfield acres in the Ironbound. Recently, Newark applied for and received a $200,000 grant from USEPA for proposing a creative Brownfields revitalization program. As part of its application for this grant,

Newark identified its interest in ground water reclassification as an appropriate Brownfields tool.

Ground water reclassification is an important Brownfields tool because it supplements the policies set forth in recent New Jersey legislation including, for example, the 1996 Environmental Opportunity Zone Act and the 1996 Urban Redevelopment Act.

- **NJDEP Environmental Master Plan**. NJDEP is building a statewide Geographic Information System ("GIS") database that will allow NJDEP personnel, local officials, planners, developers and the public to have access to much of the environmental data NJDEP has accumulated over the years. Presently, the Department's GIS does not contain ground water data. This Petition will assist the Department improve its GIS database by providing the Department with ground water data in a compatible format. NJDEP has identified the GIS database as the backbone of its Environmental Master Plan.

- **Public/Private Partnership**. This Petition is an example of how the private sector can work cooperatively with NJDEP in the proposal and adoption of appropriate environmental regulations by providing NJDEP with the technical and economic justification for such regulations.

- **The Governor's STARR Report**. In 1995, the Governor and her Cabinet published the Strategy to Advance Regulatory Reform ("STARR") Report. The purpose was to determine why the public believed that state government was not working efficiently to promote economic vitality and job growth in New Jersey.

  The Report was intended to be a non-judgmental attempt to provide state agencies with suggestions on how to reform New Jersey's regulations to make them more responsive to the needs of its citizens, while still protecting public health, welfare and the environment.

  Significantly, the first reform suggested by the report was to "provide for a more open and timely process by which ... Petitions for Rule Making are reviewed and acted upon [in a way] that will allow citizens to petition for rule changes without the need of a lawyer." It is this regulatory reform objective that this Petition promotes.

For all these reasons set forth more fully in the Petition, the Petitioners respectfully request that the Department propose and adopt the regulations provided herein.

2.2 THE PETITIONERS

Petitioners include the businesses, business and industry associations, and legislators listed in Table 2-1. The Signature Page and Statement of Interest for each Petitioner follows Table 2-1. The location of each Petitioner having a facility within the Petition Area is identified in Figure 2-1.

2.3 REASONS FOR THE PETITION

Petitioners submit this Petition because it is the only method available to properly classify the Petition Area as a non-potable Class II-B Area.

The New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-4 authorizes the Department to adopt and enforce regulations to classify ground water and to determine Ground Water Quality Standards (GWQS) for each classification. The GWQS are used by the Department to restore, enhance and maintain surface and ground water quality within the State.

The Department first adopted GWQS in 1981 and readopted them without change in January 1991 (23 N.J.R. 406(c)). On January 21, 1992, the Department proposed to repeal the then existing GWQS and adopt new GWQS because (i) "the Department determined that many aspects of the existing standards [did] not reflect current knowledge of hydrogeology, pollution control, toxicology, and laboratory analysis of ground water contaminants" and (ii) the Department wanted to "improve consistency and coordination" among other regulatory programs, including the NJPDES program. (24 N.J.R. 182). The present GWQS were adopted on February 1, 1993 (25 N.J.R. 464 to 546).

The present GWQS state that:

> Ground water shall be classified according to the hydrogeologic characteristics of the ground water resources and the designated use(s) which are to be maintained, restored and enhanced within the classification area. Classifications shall be regional in nature and shall not reflect localized infringements on designated uses due to natural quality or pollution incidents.

N.J.A.C. 7:9-6.5(a).

The Department now defines three classes of ground water:

- ***Class I ground water is of special ecological significance.*** Class I ground water refers to pristine ground water sources such as Natural Areas, Pinelands, Watersheds and other exceptional quality ground water sources which are defined in the GWQS.

- **Class II ground water is for potable water use.** Class II ground water refers to all areas of the state not designated Class I (pristine), Class II-B (non-potable) or Class III (saline).

The Department has divided Class II ground water into two subclassifications:

> ***Class II-A*** - is ground water that can be used for potable water based upon its current quality or after conventional water supply treatment.
>
> ***Class II-B*** - is ground water that cannot be used as potable water given historic pollution problems, but which can have other reasonable uses (e.g., cooling water, air conditioning, etc.). The management policy for Class II-B Areas is that no further degradation shall be permitted. Class II-B ground water may not be impacted further because that might impede the ability for it to someday be restored to potable use with conventional water supply treatment.

- **Class III ground water is for other than potable water use**. Class III ground water generally refers to aquitards (Class III-A) and saline ground water (Class III-B), both defined and mapped in the GWQS.

The Department did not identify Class II-B Areas in the present GWQS but instead classified all areas of the State that are not Class I, Class II-B or Class III as Class II-A potable ground water. Consequently, all appropriate non-potable Class II-B Areas in the State are presently "misclassified" as potable Class II-A Areas.

This is the first Petition formally submitted to the Department seeking to reclassify a Class II-A Area as a Class II-B Area. Reclassification will permit natural ground water remediation to be used as the presumed clean up remedy for the area instead of active remediation such as pump and treat technology (see Section 11.0 - Notice of Proposed Rule Making). Reclassification is expected to save the Petition Area $2.5 billion that can be used for other economic development activities without jeopardizing human health and the environment (see Sections 8.2 and 10.0).

The Department has stated that, since "most of the benefits of a Class II-B Area accrue to the regulated community," they should be responsible for preparing the technical justification documents required to support reclassification (25 N.J.R. 967, 525). The Department has also stated that "there are severe constraints on staff time" which prevent the Department from doing this work. (25 N.J.R. 467). Consequently, the Department has left Class II-B reclassification to the regulated community, recommending that if they wish to proceed they should submit a Petition for Rule Making. To assist them, the Department has identified the criteria required to establish a sufficient reclassification Petition. N.J.A.C. 7:9-6.5(e)(2) and N.J.A.C. 7:9-6.10. See, also, the Department's Draft Guidance Document entitled, "Petitions for Ground Water Reclassification" (July 1993).

The Department has no intention of "writing off" contaminated ground water by reclassifying contaminated areas as Class II-B Areas (25 N.J.R. 466). Instead, it is the intention of the Department that, eventually, Class II-B Areas may once again become potable water sources using conventional water supply treatment.

However, the Department is not opposed to Class II-B reclassification because it "believes that criteria required for achieving a reclassification are reasonably balanced between protecting public health and the environment and allowing legitimate petitions for reclassification to be successful." (25 N.J.R. 524). In addition:

> The Department believes that the Class II-B concept, sparingly and carefully applied, provides an important recognition that past discharges have, in a small percentage of New Jersey ground water, resulted in pollution that is beyond the reach of current technology. Rather than applying cumbersome, site-by-site procedures within these areas [e.g., Classification Exception Area Waivers], the Class II-B process should provide a method of making one consolidated decision with public input.

(25 N.J.R. 484). The Department estimates that less than 10% of New Jersey ground water is appropriate for Class II-B reclassification (25 N.J.R. 466, 488).

2.4 THE PETITION AREA BOUNDARIES

The Petition Area is approximately 4.2 square miles or 2668 acres located in the eastern portion of Newark. Figure 1-1 is a map and narrative description of the Vertical and Horizontal Boundaries of the Petitioned Area. It is the same Figure being proposed by Petitioners as an Appendix to the Class II-B regulations set forth in the Notice of Proposed Rule Making (see Section 11.0).

2.4.1 Description of the Boundaries

2.4.1.1 Horizontal Boundary

The Horizontal Boundary was chosen for two reasons: First, the Department prefers to have Class II-B Areas defined conservatively and not expansively and second, the economic reality of creating a Class II-B Petition requires that the Petition Area be designed conservatively. Making the

boundaries too expansive would be more expensive than the budget of this project would allow. The Department recognizes that cost is an issue when preparing a Petition and understands that cost will dictate the size of the Petition Area. (25 N.J.R. 467)

The street boundaries of the Petition Area were chosen because they were easily recognizable boundaries that closely captured the properties of the outer-most Petitioners (see Figure 2-1). Using the mid-line of each street provides a crisp demarcation between the proposed Class II-B Area and the "outer" Class II-A Area. Also, since ground water flow in the Petition Area is towards the Passaic River (see Section 5.0) ground water is moving away from the western street boundaries of the Petition Area. Consequently, there is no realistic concern that Class II-B ground water will flow towards Class II-A ground water.

Identifying Class II-B Areas is a goal of the Department: "It is the Department's intent to more thoroughly map classification areas over time as improved geologic and hydrogeologic data are published and digitized on the Department's Geographic Information System" (25 N.J.R. 481). The Department is slowly gathering parts of this database itself through the CEA Program. However, the Department recognizes that the petition process better addresses the regional Class II-B issue and is more cost efficient than the CEA program. (25 N.J.R. 484). This Petition will assist the Department in that effort.

The Block and Lot references in the narrative description of the southern boundary of the Petition Area are intended to capture all of the property owned by the Passaic Valley Sewerage Commissioners (PVSC). Figure 2-2 is a detail of that part of the boundary taken from the Tax Map of the City of Newark.

2.4.1.2 Vertical Boundary

The Vertical Boundary of the Petition Area is the top of the Passaic (Brunswick Shale) Formation. By definition, this captures the three overburden geologic units located beneath the Horizontal Boundary which are described in Section 5.0. The Vertical Boundary does not include the Passaic (Brunswick Shale) Formation itself.

2.4.2 The Petition Area Complies with NJDEP Boundary Requirements

The Department requires that the boundaries of a Class II-B Area -

- constitute a "significant portion of one or more geologic units or formations", and

- not constitute only an area underlying property owned by a single person, an area affected by one discharge, or an area affected by a set of discharges owned or controlled by a single person.

N.J.A.C. 7:9-6.10(d). The purpose for these requirements is that all ground water areas in New Jersey, including Class II-B Areas, must "be regional in nature and not reflect localized conditions." (25 N.J.R. 526).

2.4.2.1 The Petition Area Captures a "Significant Portion" of the Geologic Units

The Petition Area includes only the unconsolidated overburden material and associated water bearing zones above the Passaic (Brunswick Shale) Formation. Figure 2-3 is a cross-section diagram that shows the geologic formations in the Petition Area.

As described more fully in Section 5.0, the unconsolidated overburden consists of the following three geologic units:

The First Geologic Unit consists of "historic fill material". It is located above the tidal marsh deposits and covers the surface of most of the Petition Area. The historic fill material ranges in thickness from 0 to 40 feet.

The Second Geologic Unit consists of "tidal marsh deposits" and is located above the glacial deposits. This second geologic unit consists of silt, organic silt, peat and occasional lenses of alluvial sand and gravel. This unit varies in thickness from 0 to 35 feet beneath the Petition Area.

The Third Geologic Unit consists of "glacial deposits" located directly above the Passaic (Brunswick Shale) Formation and consists of stratified and unstratified clay, silt, sand, gravel and boulders. This third geologic unit varies in thickness from 25 to 97 feet beneath the Petition Area.

The Petition Area captures a "significant portion" of these three geologic units because the Petition Area is 4.2 square miles.

2.4.2.2 The Petition Area Captures Regional Contamination Not Local Contamination

The Department requires that ground water classification areas incorporate regional areas of pollution not localized areas of pollution. The Petition Area is not a localized area of pollution for the following reasons:

- The Petition Area does not consist only of an area underlying property owned by a single individual or entity. Based upon a review of the tax records for the City of Newark, there are over 500 property owners in the Petition Area.

- The Petition Area does not consist only of an area affected by one discharge. As the data shows in Section 3.0, there have been many documented discharges in the Petition Area over the past 100 years.

- The Petition Area does not consist of only an area affected by a set of discharges owned or controlled by a single individual or entity. There have been many documented and undocumented discharges in the Petition Area. Collectively, those discharges are attributable to many known and unknown sources. See Section 3.0 for more details.

For all these reasons, the Horizontal and Vertical Boundaries of the Petition Area are appropriate and comply with Department requirements.

2.5 THE INDUSTRIAL HISTORY OF NEWARK AND THE IRONBOUND

2.5.1 Introduction

The City of Newark was founded in 1666 and incorporated in 1836. It is the third oldest American City. The City covers approximately 24.4 square miles and has a population of about 275,000 (1990 census) making it the largest city in New Jersey.

Newark took an early lead in industrial development primarily because of its unique location between the financial centers of New York and Philadelphia. Between 1826 and 1836, Newark grew tremendously. The population doubled. New industries expanded. Young men from all over came to Newark to take advantage of apprenticeships and journeymen opportunities.

By the 1830's, Newark was already well known for the manufacture of carriages, shoes, hats and saddlery hardware. Tanners, soap factories, iron and brass foundries, as well as malleable iron foundries were also developing rapidly. By 1832, the Morris Canal was completed. It connected Newark (including the Petition Area) to Pennsylvania coal towns. The canal opened the way for the use of coal powered steam machinery in Newark because it provided an easy way to ship coal from Pennsylvania. Steam was an important source of power. The City could not take advantage of hydro power from the Passaic River because the City was too far below the fall line.

By 1846, there were 100 steam driven factories throughout Newark - mainly located along the Morris Canal. Although the Canal was primarily used to bring coal from Pennsylvania, it was also used to move finished products from Newark to other locations.

Newark's development during the second half of the 19th Century was even more dramatic than the first half given the tremendous growth of railroads which quickly replaced the Morris Canal as the primary transportation route for raw materials and industrial goods in and out of the City.

Newark provided the spark of creativity to many of this country's early industrial inventors and entrepreneurs. For example:

- Seth Boyden built the City's first steam engine in 1825 and in 1826 he invented a process for the manufacture of malleable iron - building the first malleable iron foundry in the United States in Newark.

- In the 1850's, Samuel Wetherill and Samuel Jones developed improvements in the production of zinc oxide used to produce fine quality paints. The New Jersey Zinc Company, located in the Petition Area, was started in the 1850's.

- Benjamin Atha developed one of the finest blacksmith and farrier tool manufacturing companies in the United States in the 1860's. His Company, also located in the Petition Area, would later be purchased by Stanley Tools.

- John Wesley Hyatt was the inventor of synthetic plastic known as celluloid. In the 1870's he started the first companies to manufacture plastic goods. They were located in the Petition Area.

- Edward Balbach, Jr., invented a new process of refining gold and silver that revolutionized the smelting and refining of those precious metals. He began Balbach Smelting & Refining Co. which had a location in the Petition Area.

- Frederick Heller and Henry Merz were the first to successfully manufacture artificial ultra-marine blue in the United States. It was used in the manufacture of paint, paper, printing inks and other products. In the 1870's, they started their company Heller & Merz which was located in the Petition Area.

These men and others undertook an early assault on the Industrial Revolution that helped transform Newark into one of the leading factory towns in America.

This following section focuses primarily on the industrial development of the former Newark Salt Marsh - a section of Newark that had little use until after the turn of the 20th Century when it was filled in and used as a location for industrial facilities. The Petition Area captures a significant portion of this former salt marsh.

2.5.2 Newark Salt Marsh

Prior to 1900, the Newark Salt Marsh was part of an 18 mile long salt marsh ecology that stretched as far north as Hackensack and Englewood and as far south as Elizabeth. It had a general width of about 4 miles and hugged the shore and low-lying areas around the Passaic and Hackensack Rivers as well as the Newark Bay. It originally covered over 27,000 acres (Vermeule 1896), see Figure 2-4. Vast portions still exist today in areas generally known as the "Meadowlands." Much of it can still be seen while traveling the New Jersey Turnpike between Exits 13 and 18.

The Newark Salt Marsh, which is just a small section of this larger salt marsh ecology, was originally about 4,000 acres in size (Vermeule 1896). The 4.2 square-mile Petition Area captures about sixty-five (65%) percent of it.

In the 19th Century, the Newark Salt Marsh was generally regarded as wasteland. It was wet marsh subject to tides and could not be built upon. It was also regarded as a nuisance because it held many stagnant pools of water that were breeding grounds for mosquitoes carrying malaria.

The primary use of the Newark Salt Marsh during the 19th Century was as a garbage dump. The few roads that led to the edge of the Meadows - Plum Point Road (now Roanoke Avenue) and Hamburg Place (now Wilson Avenue) led to Newark City Dumps. The Lehigh Valley Railroad (LVRR) and Central Railroad of New Jersey (CRRNJ) built tracks and switching yards in the area. They were built on fill material that was composed mostly of New York City garbage (Drummond 1979).

The meadows did provide some agricultural advantages. Salt hay had been raised in the Newark Salt Marsh for centuries, ever since the Puritans settled in the area in the 1600's. The Brill Family, located on the edge of the meadow, was a well-known farming family in the area. They even wrote a book about farming (Brill 1872). The Brill property later became a switching yard for CRRNJ known as "Brill's Yard."

As early as the 1870's, the City had a vision of turning the Newark Salt Marsh into usable property. An 1873 map of the area (Figure 2-5) shows nicely blocked paper streets for the area - a grand plan for future development that would not come to fruition for another 40 years.

2.5.3 Draining and Filling the Newark Salt Marsh

It was not until the 1890's that the vision of reclaiming the meadows began to take shape with practical planning. In 1896 and 1897 the New Jersey State Geologist prepared a comprehensive plan for draining and filling the salt marsh. In his 1896 Report the State Geologist stated:

> If drained, [the meadows] will at once begin to attract manufactories along the banks of the waterways, where excellent sites are offered but are now unavailable because of mosquitoes and unfavorable sanitary conditions.

(Vermeule 1896:291) The desire to expand industrial activity in the meadows was not being developed just because waterway locations were good sites, but also because the population of Newark was growing so rapidly that it simply could not handle the nuisances created by more industrial activity within the present city limits.

In 1897 the State Geologist stated, "every such great community must have its commercial and manufacturing center, and the marshes are admirably fitted to serve this purpose, leaving the uplands for residences." (State Geologist 1897:299-300). The State Geologist described three ways to pursue the reclamation of the meadows:

(1) fill in the marsh with dredged material,

(2) fill it in with "extraneous material, either ashes and other solid refuse from the City's," and

(3) drain it using embankments, dikes, tide sluices and pumps.

(Vermeule 1896:292) The State Geologist envisioned that the reclamation process would move forward as follows: ***First***, install embankments around the edge of the meadows to exclude the tides. ***Second***, spend a few years digging ditches to drain and pump the meadows dry. ***Third***, fill in the meadows with dredge material and City refuse starting at the water's edge, since that land would be the most valuable for commercial and manufacturing uses. ***Fourth***, fill in the interior portions of the meadows until the entire area was reclaimed (Vermeule 1896).

The State Geologist believed that if the meadows could be reclaimed as outlined above, a new industrial zone could be created. The 1897 Annual Report stated:

> The rate of increase which has prevailed during the past quarter of a Century, if continued, will produce a total population of 4,000,000 in the Metropolitan District of the State by 1940, so that, if the meadows are reclaimed as herein suggested, it is entirely within the bounds of probability that many adults of the present day will live to see the entire reclaimed area occupied as a City.

(State Geologist 1897:306). With regard to the Newark Salt Meadow, this remarkable vision of the State Geologist came true.

This plan for reclaiming the meadows took time to be acted upon. It took years to decide whether the reclamation project should be carried out on the state level or the municipal level. By the early 1900's, it was decided that it should be a municipally - led enterprise (State Geologist 1901).

Newark wasted little time in proceeding forward with its plan. The City hired a number of consulting engineers to study and implement a plan for the reclamation of the Newark Salt Marsh and the construction of a new ship channel that would eventually become the Port of Newark. Newark also established a Mosquito Commission as part of the existing Essex County Mosquito Extermination Commission. The job of the Mosquito Commission was to drain the meadows and other standing pools of water that might be breeding grounds for disease - carrying mosquitoes.

Annual reports of the County Mosquito Commission, which began in 1912, indicate that the Commission undertook the Yeoman's job of draining and filling in the meadows as originally envisioned by the State Geologist. Members of the Newark Mosquito Commission dug miles of drainage ditches, constructed dozens of tidal gates and sluices and filled in hundreds of acres of the Newark Salt Marsh with garbage and other fill. From 1912 to 1920, local garbage contractors for the City were encouraged to dump in the Newark Salt Marsh. In its 1913 Annual Report, the County Mosquito Commission stated - "Under the supervision of the Chief Inspector, many unsightly swamps and pools adjacent to the City of Newark were filled in with ashes and garbage carted by the wagons of the City contractors." (Essex County Mosquito Commission 1913) New York garbage was also used. In 1914, the County Mosquito Commission bragged that sixty (60) acres of the Newark Salt Marsh had been filled in with New York City garbage. Figure 2-6 is a "trophy photo" showing members of the Commission standing on top of that garbage heap.

Regular application of crude oil was also applied to standing pools of water in the meadows and elsewhere to kill developing mosquito larvae. Each Annual Report documented the number of gallons used by the City for that purpose.

The reclamation plan of the State Geologist was well underway in Newark by the time World War I broke out. In 1915, a Comprehensive Plan for the City of Newark, prepared by the Newark Planning Commission, recommended that the Salt Marsh now be bulkheaded along the rivers edge to permit filling (Newark Planning Commission 1915). Bulkheading was installed and filling activity then continued along the bulkhead line. This area was originally known as paper street "Avenue R" (see the 1873 map at Figure 2-5). Later it was renamed Doremus Avenue in honor of a Newark Mayor of the day. Ash, slag and solid refuse were all used as fill material for Avenue R.

By 1916, America had entered World War I and government demand for manufactured goods exploded. Fortunately, Avenue R was filled by this time and manufacturers took advantage of the opportunity to literally develop the area overnight by building factories needed to manufacture products required to support the country's war effort.

An interesting article in the ***Newark Sunday Call*** on June 18, 1916 entitled "Amazing Two-Year Growth on Newark Marsh" tells the story very well:

> Wonder tales of the Arabian Nights contained no story more fantastic in its conception than that of the actual development which, during the last 18 months, has transformed a strip of practically waste meadow land, bordering Avenue R [now Doremus Avenue] and the Newark Bay, into one of the busiest industrial centers of the entire world. Where but a short time ago a few manufacturing plants dotted the marshy meadows, plants representing an investment between 15 million and 20 million dollars have sprung up and between 2000 and 3000 men are there earning their daily bread.
>
> On this land which a few years ago could have been purchased for $5.00 or $10.00 an acre, a great manufacturing center has sprung into being. Its existence is due principally to the war in Europe which has created the need in this country for the manufacture of dyestuffs, acids and munitions of warfare. It would be no misnomer to refer to Avenue R as "Chemical Row," as practically every one of the plants in operation along its entire length of a mile or more, from Doremus Avenue to the Old Plank Road, is turning out some sort of chemical products.
>
> * * *
>
> Avenue R, which is a corduroy road, filled in with slag and waste material from the furnaces along "Chemical Row," has become one of the most important industrial thoroughfares in the world. At the present time, it is little more than unpaved roadway, elevated 8 or 10 feet above the marshy meadow swamp land on the west of it.

The author went on to describe the operations of many of the pioneer plants on the meadow including Mass & Waldstein (chemical company) and Balbach Smelting & Refining Company. Balbach covered approximately 100 acres and smelted gold, silver, copper and lead.

The phenomenal growth of industrial facilities required more railroads to move raw material and finished products in and out of the area. The author went on to state:

> With the location of these immense plants on the meadows, freight business of the Central Railroad of New Jersey and Lehigh Valley Railroad has been greatly increased and each of these railroads has hundreds of cars constantly in the service of the plants. The last year and a half has seen a phenomenal increase in freight business on the meadows and indications are that all previous records will be broken during the coming year.

The crisscrossing of these railroad tracks in and around this new industrial Mecca literally "bounded" the area in iron. That is why the area soon became known as the "Ironbound."

In its 1930 Annual Report, the County Mosquito Commission looked back over its reclamation work for the past twenty-five (25) years and proudly described the good work it had done in the Newark Salt Marsh:

> Today this area is a scene of great activity. The railroads have spread out and built large storage, classification and transfer yards for freight. The Port of Newark, with its ship canal and adjoining warehouses, has occupied a large part of the frontage on Newark Bay. North of Wilson Avenue, the waterfront is occupied by a continuous line of industrial plants. The Newark Airport, founded on a great hydraulic fill, covering hundreds of acres of salt marsh, now receives and sends out more passengers and mail than any other airport in the world. The new State Highway, part of the main line from New York to Florida, now runs the full length of the salt marsh, and is filled with its never ending stream of motor-driven vehicles.
>
> The City of Newark has opened and improved other highways, and is constantly reducing the salt marsh areas by filling it in with City ashes and refuse. Manufacturing and industrial plants have occupied much of this filled ground. Within the last two years, the United States Government re-dredged the canal of the Passaic River near its mouth, and the dredged material was pumped into adjacent salt marsh areas, raising them above the level of the spring tides.
>
> As the filling spreads over the salt marsh, the drainage ditches disappear. Many thousands of linear feet of ditching are buried under the filled areas, and are no longer included in the summary of ditches in the Annual Reports of the Commission. The total length of ditches grows less each year.

(Essex County Mosquito Commission 1930). Figure 2-5 shows "before" and "after" pictures of the Newark Salt Marsh indicating the areas filled in by the Commission's activities by 1933. The County Mosquito Commission planned to fill in the remaining marsh areas with garbage from the City of Newark.

By the 1940's, most interior areas within the Newark Salt Marsh were filled. The amount of fill material used to complete the job, including garbage, ash, slag, refuse and dirt, is estimated to be 21 million tons (Zdepski 1992).

2.5.4 Industry of Newark and the Petition Area

Since World War I, manufacturers have literally flooded the Petition Area with new facilities. Each decade has seen new facilities settle in the area. Some have come and gone, others have stayed. One thing remains constant - given the Petition Area's unique location near the airport, the river ports, the Turnpike and New York City, the Ironbound remains one of the premier industrial locations in the State of New Jersey.

The Primary Industrial Groups in the Petition Area include the following: (1) chemicals and allied products, (2) paint and varnish, (3) plastic, (4) iron and steel, (5) non-ferrous metal, (6) fabricated metal products, (7) petroleum, (8) leather, (9) paper/cardboard, (10) motor freight transportation and warehousing, (11) truck/auto/equipment sales/service/lease, (12) scrap metal and (13) landfills. A detailed discussion of how these industries developed in the Petition Area is provided in Appendix B. Figures 2-7 are drawings and photos of some of the earlier factories in the area showing their large size and many smoke stacks.

Table 2-2 identifies the 1344 facilities that have located in the Petition Area since the 1850's. This is a phenomenal number of businesses for such a small area (about 4.2 square miles).

Tables 2-3 and 2-4 break down these facilities into Primary Industry Groups in the Petition Area and Other Significant Businesses. Many of the raw materials used by the Primary Industrial Groups are now found in the ground water as contaminants (see Table 2-6). Potential sources of contamination are discussed in Section 3.0.

2.6 LOCATION OF PRIMARY INDUSTRY GROUPS IN THE PETITION AREA

The 1,344 industrial facilities (see Table 2-2) were literally "shoe horned" into a small area. These facilities occupy or have occupied virtually every square acre of the Petition Area.

In order to express how well distributed these facilities are, the street address for each facility identified on Table 2-2 was set forth on Table 2-5 with the number of facilities located on each street. The primary transportation corridors of Delancy Street, Wilson Avenue, Avenue P, Doremus Avenue, Lister Avenue, Blanchard Street and Ferry Street showed the most significant concentration of facilities. However, many other facilities were located on other streets in the area as well.

2.7 CORRELATION BETWEEN INDUSTRIAL ACTIVITY AND GROUND WATER CONTAMINATION

Section 6.1 describes the poor ground water quality in the Petition Area. One hundred and seven (107) ground water contaminants have been identified in the Petition Area and twenty-two (22) are "Pervasive Compounds", i.e., contaminants that appear throughout the Petition Area (Section 6.2).

Table 2-6 identifies the Primary Industry Groups in the Petition Area that use chemicals in their manufacturing processes that may potentially become the Pervasive Compounds found in the Petition Area. This table shows a significant correlation between ground water pollution in the Petition Area and the historic use of these compounds by the Primary Industry Groups and others. Section 3.0 describes the activities that probably released these contaminants to the environment.

3.0 INDUSTRIAL-SPECIFIC INFORMATION

This section explains that significant environmental protection laws were not adopted by the federal government or New Jersey until the 1970's and that prior to this time discharges of industrial wastes were largely unregulated. As a result, a large amount of industrial waste was discharged into the Petition Area as a result of contaminated fill, burying and landfilling of wastes, unlined lagoons, leaking underground storage tanks, and other sources. This section discusses the various ways that the Petition Area became contaminated. Table 3-1 identifies hundreds of known potential sites of historic contamination in the Petition Area.

3.1 THE RECENT DEVELOPMENT OF ENVIRONMENTAL PROTECTION LAWS

It was not until the 1960's and early 1970's that the detrimental impact of pollution on human health and the environment fully entered public consciousness. This "awakening" was due in part to such events as Love Canal, Times Beach, rivers catching fire, off shore oil rigs causing oil slicks, smog, and the publication of Rachel Carsons's book, Silent Spring (1962). These were just a few instances that sparked the need for environmental protection laws. As a result, Congress passed the following laws, among others:

1963 - the first Federal Air Pollution Law
1965 - the first Federal Solid Waste Law
1970 - the Federal Water Pollution Control Act
1976 - the Toxic Substance Control Act (TOSCA)
1977 - the Resource Conservation and Recovery Act (RCRA)
1980 - Superfund

The first Earth Day was celebrated in 1970 and, in that year, USEPA and NJDEP were created.

These new environmental protection laws and enforcement agencies have generally been successful in preventing and cleaning up pollution by using regulation, litigation, and administrative enforcement as tools for control.[1] However, the Ironbound has had land reclamation activity and unregulated pollution discharges occurring since before the turn of the century. As a result, a tremendous amount of pollution has been discharged in the Petition Area primarily because few people years ago understood that discharges might be harmful and should be regulated.

[1] Frank, Nancy, "From Criminal Law to Regulation: A Historical Analysis of Health and Safety Law", Garland Publishing, Inc. (1986).

3.0 INDUSTRIAL-SPECIFIC INFORMATION

Government attitudes toward protecting surface and ground water from pollution has undergone dramatic change over the last century. In the 1800's, sickness from epidemic disease such as yellow fever, cholera, typhoid, smallpox, and diphtheria was thought to be punishment for the sinful conduct of the sick and not due to drinking polluted water. The impact of sewage and industrial pollution on human health and the environment was simply not known.

By the early 1900's, scientists began to understand that disease was caused by germs and realized that contact with polluted water could cause disease. Consequently, the purification of drinking water and the construction of sewage treatment plants began. However, in the early 1900's, the discharge of industrial pollutants was thought to be only a nuisance, not a public health issue.

The belief that industrial pollutants might actually be harmful to human health and the environment took many more years to develop and did not result in water protection laws until after World War II. For example, in 1945, New Jersey passed the Public Health Nuisance Act[2] and in 1948, Congress passed an early version of the Federal Water Pollution Control Act.[3]

New Jersey's Public Health Nuisance Act was inadequate because it required a finding of common law nuisance which in turn required balancing the plaintiff's harm against the social value served by the conduct of the defendant. This balancing act led to inconsistent results. Plaintiffs often did not have the money to wage expensive litigation against corporate defendants when success was uncertain. In addition, local boards of health were not equipped to pursue massive public enforcement actions because of budgetary constraints, proof problems and the shear number of potential violators.

The 1948 Water Pollution Control Act was also not a good tool to deter water pollution. This law permitted the Federal Government to take a potential violator to Court but only with the permission of the State Governor. Not a single lawsuit was filed under the 1948 Act.[4]

Not until the 1970's, when New Jersey enacted the New Jersey Water Pollution Control Act, the Spill Compensation and Control Act ("Spill Act") and other laws did the State have effective tools to combat water pollution. These laws imposed strict liability for pollution which made enforcement

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[2] L. 1945, c. 192, N.J.S.A. 26:3B-7.

[3] Statutes at Large Vol. 62, Chapter 758 (1948).

[4] Barry, Frank J. "The Evolution of the Enforcement Provisions of the Federal Water Pollution Control Act, A Study of the Difficulty in Developing Pro-Active Legislation", Michigan Law Review, 68 (1970): 1107.

- Newark Fire Department Records identifying sites in the Petition Area that have had fires responded to by the Newark Fire Department from 1900 to 1927. More recent records were not available. These incidences may have caused the release of contaminants (152 sites).
- USEPA List of all Treatment Storage and Disposal (TSD) Facilities in the Petition Area (4 sites).
- NJDEP List of all Facilities in the Petition Area that have filed Discharge Prevention Control and Countermeasures (DPCC) Plans (30 sites).
- NJDEP List of Solid Waste Facilities in the Petition Area (15 sites).
- USEPA List of Identification Numbers. These facilities use or generate hazardous substances (218 sites, about 50% of the sites listed in Table 3-1).
- NJDEP List of Hazardous Waste Generators in the Petition Area (54 sites).
- NJDEP Site Status Report (1992) (15 sites).
- NJDEP Spill Reports received during the period 1986 to 1993 for the Petition Area (38 sites).
- Sites listed on the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) List.
- Superfund sites (1 site).
- Historical information from the Newark Public Library (various sites).

There are 95 sites within and just outside of the Petition Area that have been or are being investigated (see Figure 3-1 and Table 3-2). 57 of those sites have ground water contamination (see Table 6-1). The 57 known sites are also referenced in Table 3-1, where the environmental investigations undertaken at each site are briefly described.

In addition to the 57 known sites, there are hundreds of potential sites that have, or may have, contributed to ground water contamination which have been identified in Table 3-1. However, many other potential sites are not listed in Table 3-1. They cannot be identified since discharges occurred before record-keeping was required for such events.

Suspected discharges can, however, be inferred for the known and unknown potential sites by reviewing appropriate reference materials and other sources describing historic filling activity and industrial waste management practices. Appendix C describes the historic discharge sources that have or may have impacted the Petition Area. They include the following:

3.0 INDUSTRIAL-SPECIFIC INFORMATION

- Historic Use of Contaminated Fill
- On-Site Burial of Waste and Use of Lagoons
- Historic Landfills
- Leaking Underground Storage Tanks
- Scrap Metal Yards
- Anthroprogenic Pollution

4.0 LAND AND WATER USE

This section explains that land use in the area is predominantly industrial and that neither ground water nor surface water in the area are used as a source of drinking water.

4.1. LAND IS USED PRIMARILY FOR FOR INDUSTRIAL PURPOSES

Land use within and immediately adjacent to the Petition Area is shown on Figure 4-1. This map was created using the Land Use/ Land Cover data found on the NJDEP Geographic Information System CD-ROM Series 1, Volume 3, dated March 7, 1996 (NJDEP 1996).

Land use within and adjacent to the Petition Area falls almost entirely within the main category of "urban or built-up land". This category is described as having "... intensive land use where the landscape has been altered by human activities" (NJDEP 1996).

The "urban or built-up land" category is divided into several sub-categories, which include commercial and service use, industrial, mixed urban or built-up land, other urban or built-up land, recreational land, residential, and transportation/communication/utilities. It is apparent from Figure 4-1 and Table 2-2, listing the 1,344 businesses in the Petition Area, that predominant land use within and adjacent to the Petition Area is, and has been, industrial. See Table 2-3 which identifies the Primary Industrial Groups in the area.

The northwest portion of the Petition Area contains some residential areas, interspersed with commercial and service businesses, and mixed uses. The "mixed urban" category is defined as areas where there is a mixture of residential, commercial, industrial and transportation/communication/utility uses.

Two small parcels of land found along the New Jersey Turnpike, in the center of the Petition Area, are classified under the main category of "barren land" (Figure 4-1). One parcel falls into the sub-category, "altered lands", while the other parcel falls into the sub-category "undifferentiated barren lands". "Altered lands" are defined as "...areas outside of an urban setting that have been changed due to man's activities other than from mining" (NJDEP 1996). Included in this category are solid waste disposal sites, dredge material disposal sites, and disturbed wetlands. "Undifferentiated barren lands" are defined as "... cleared lands that have no apparent site preparation nor any indication of past activities" (NJDEP 1996).

Aerial photographs taken in 1951, 1961 and 1979 also show the historic industrial use pattern for the area (see Figures 4-2, 4-3, 4-4) and the discussion in Section 3.2.2.

4.2 GROUND WATER IS NOT USED FOR DRINKING WATER

All ground water units beneath and directly adjacent to the Petition Area are currently classified as Class II-A. The primary designated use for Class II-A ground water is potable water supply. Ground water in the Petition Area has historically been used by industries for cooling, air-conditioning and processing. Heavy pumping in the past (especially by Ballantine Co.) severely lowered the water table, thereby inducing saltwater intrusion from the nearby river and bay. High chloride concentrations resulted in the abandonment of many supply wells in Petition Area (Herpers and Barksdale 1951).

An extensive search for all public, domestic and industrial supply wells within and around the Petition Area was conducted. A well search request was made to the NJDEP Bureau of Water Allocation in August 1994. Results of the search indicate that there are no domestic or public potable supply wells within the Petition Area or within a one-half mile radius of the Petition Area. One industrial supply well, with a reported capacity of greater than 70 gallons per minute (gpm) was identified within the Petition Area. This well, belonging to Rokeach Food Corporation (formerly Mother's Food Products), was reportedly used for non-contact cooling water. Based on correspondence between NJDEP and Federal Pacific Electric, this well was determined to be out of service because of high sulfide concentrations (Law Environmental 1993).

The City of Newark Department of Health was also contacted for information concerning supply wells. Review of well records kept by the Newark Division of Water and Sewer, as well as conversations with city personnel, confirmed there are no public or domestic potable supply wells in the Petition Area or within a one-half mile radius of the Petition Area.

However, the City's records indicated there may be non-potable industrial supply wells operating within and adjacent to the Petition Area. Consequently, each well operator, or someone who might be familiar with the well, was interviewed over the telephone regarding the status of their well. Facilities at which no one could be reached by telephone were field checked on October 30, 1996.

Table 4-1 provides a list of the wells that were investigated and their current status. Based on conversations and site visits, it was determined that only one industrial supply well outside but near the Petition Area is currently in use. The well is operated by Newark Refrigeration Warehouse, located on Avenue C. It is used to supply water for cooling. The well is reportedly pumping at 200 gpm. It is located approximately 1.2 miles from the Petition Area boundary (See Figure 4-5), which

is not within a one-half mile radius of that boundary. Therefore, inducing ground water flow from the proposed Class II-B area toward this well is unlikely.

4.3 SURFACE WATER IS NOT USED FOR DRINKING WATER

Figure 4-6 shows all surface water bodies located in the Petition Area and within a one-half mile radius of the Petition Area. Essex County lakes and streams information from the NJDEP GIS CD-ROM were used to create this figure (NJDEP 1996).

As shown on Figure 4-6, the Passaic River and Newark Bay are the largest surface water bodies in the area. They also form the northern and eastern boundaries of the Petition Area. Several unnamed tributary creeks are also found within the Petition Area. Two of these creeks have locally become known as Plum Creek and Pierson's Creek.

The Passaic River Basin is the most urbanized large river basin in New Jersey, and its waters are subject to many competing uses. The Passaic River and its tributaries are shown on Figure 4-7. Although the Main Stem Passaic River and its tributaries are designated as limited recreational and agricultural resources, principal uses are for public and industrial water supply, and as a disposal system for municipal and industrial wastewater. As a result of upstream wastewater discharges, the Central and Lower Passaic River and its tributaries are considered to have serious water quality problems. Lower Passaic River water quality is also impacted by roughly 89 private dischargers, many of them industrial (US Army Corps of Engineers 1987). There are no potable surface water intakes located on the Lower Passaic River. See Section 7.2.5 for a further discussion of Passaic River water quality.

Plum Creek, located near the Hoechst Celanese property, flows through a culvert beneath Doremus Avenue and discharges into the Passaic River. This creek receives runoff from many sites in the surrounding area. Pierson's Creek originates north of the Englehard Corporation property, flows through a culvert underneath the Lehigh Valley Railroad, and eventually discharges into Newark Bay. This creek receives runoff from many adjacent sites, as well as water from storm water outlets on the Englehard property.

The lower portion of the Passaic River, from its confluence with the Second River to its mouth, is currently classified as Class SE-3. Newark Bay, north of Elizabeth Port up to the mouth of the Passaic River, is also classified as Class SE-3. The SE Class is the general surface water classification applied to saline waters of estuaries. Designated uses for Class SE-3 are secondary

contact recreation, maintenance and migration of fish populations, migration of diadromous fish, maintenance of wildlife and any other reasonable uses.

According to N.J.A.C. 7:9B-1.15(b)v, any unnamed or unlisted saline waterways which enter SE-3 waters in the Passaic, Hackensack and New York Harbor Complex Basins are classified as SE-2. Freshwater portions of unnamed streams entering Class SE-1, SE-2 or SE-3 waters are classified as FW2-NT. Investigations at the Hoechst Celanese site have determined Plum Creek to be tidally influenced (Environ 1996); therefore it would be classified as SE-2. Since Pierson's Creek is also tidally influenced, it would also be classified as SE-2 (Environ 1990).

As stated above, there are no potable surface water intakes located on the Lower Passaic River. There are also no potable surface water intake points within one-half mile of the Petition Area or within one mile downstream of the Passaic River and Newark Bay. The nearest downstream surface water intake is on the Rahway River, located many miles from the Petition Area.

5.0 DESCRIPTION OF HYDROGEOLOGIC AND HYDROLOGIC SETTING

5.1 GEOLOGY/HYDROGEOLOGY

The Petition Area is located in the Northern Peidmont Lowlands of the Peidmont Plain physiographic province. The lowlands are bounded by the Coastal Plain to the south and east, the New England Uplands to the north, and the Peidmont Uplands to the west.

The Triassic Bedrock Group of the area, also referred to as the Newark Super Group, consists of three formations: the Passaic, Lockatong and Stockton. The Petition Area is underlain by the Passaic Formation, consisting of thin-bedded shales, mudstones and sandstones. The configuration of the bedrock surface varies across the Petition Area from 17 feet below mean sea level (msl) near the Passaic River to 87 feet below msl near the western boundary of the Petition Area (Nemickas 1974). See Figure 5-1 for the approximate configuration of the bedrock surface in the Petition Area.

Before the last glaciation, rivers that drained Essex County cut deep valleys into the Brunswick Formation. These valleys were subsequently filled and buried with Pleistocene age glacial ground moraine deposits, during the last glaciation. One such valley, referred to as the Newark-Kenilworth Valley, trends southwesterly from Newark, outside of the southwestern edge of the Petition Area, to the Town of Kenilworth. The bottom of this bedrock valley is at 220 feet below msl west of the boundary of the Petition Area (Nemickas 1974).

Unconsolidated deposits of Pleistocene Age overly the Passaic Formation across the Petition Area. These sediments were deposited by glaciers and glacial melt water, as ground moraine or stratified drift. The thickness of the unconsolidated material is controlled by the underlying bedrock topography. The glacial deposits, consisting of stratified and unstratified clay, silt, sand, gravel, and boulders, vary in thickness from 25 to 97 feet across the Petition Area. The Pleistocene deposits are thickest in the buried bedrock valley outside of the southwest edge of the Petition Area (Nemickas 1974).

The Pleistocene deposits are overlain by post-glacial tidal marsh deposits of silt, organic silt, peat and occasional lenses of sand and gravel. These sediments were deposited by the Passaic River and streams flowing through the area. The tidal marsh deposits range in thickness from 0 to 35 feet across the eastern part of Newark (Herpers and Barksdale 1951).

Most of the sites in the Petition Area are immediately underlain by fill deposited by man. Widespread filling has historically occurred in this area in order to reclaim and develop the existing

wetlands. The fill was derived from various sources, including municipal solid waste, railroad cinders, dredged materials and industrial wastes (See Section 2).

Several geologic cross-sections, prepared for various sites across the Petition Area, were reviewed during preparation of this petition. A generalized cross-section through the Petition Area was drawn using this existing data. As shown on Figure 5-2, the thickness of man made fill ranges from approximately 10 to 20 feet, the peat layer ranges from approximately 5 to 20 feet, pinching out in the central portion of the Petition Area, and the glacial deposits range from 20 to 80 feet. Cross Section A-A' is presented in Figure 5-3.

Ground water in the Petition Area occurs in both the consolidated and unconsolidated deposits. The Passaic Formation is the major aquifer in this area and underlies most of Essex County. Water in this formation occurs in joints and fractures (Nichols 1968).

Water in the Passaic Formation occurs under unconfined and confined conditions. Unconfined ground water is found mainly in upland areas, west of the Petition Area, where the unconsolidated deposits are thin or not present. Confined and semi-confined conditions exist in lowland areas, such as in Newark, where clay beds in the unconsolidated glacial deposits mantle the underlying bedrock (Nichols 1968).

Problems with water quality in the Passaic Formation in the Petition Area were first presented by Herpers and Barksdale in 1951 and further described by Nichols in 1968. Historical industrial pumping in this area has caused documented saltwater contamination in the Passaic Formation. By 1900, water levels in the Petition Area were drawn down considerably below sea level. This reversed the natural gradient between the ground water and surface water and induced the flow of saltwater from the Passaic River and Newark bay into the aquifer. By 1948, a well located in the northern part of the Petition Area contained 1,900 parts per million (ppm) of chloride.

The unconsolidated deposits of stratified and unstratified drift, overlying the bedrock, also contain ground water. However, only the sand and gravel aquifers of the stratified drift deposits are capable of yielding significant amounts of water to be considered for development. Most of the Petition Area is underlain by unstratified glacial ground moraine (Nichols 1968).

Water in the stratified drift occurs under both unconfined and confined conditions. Unconfined ground water occurs where the sand and gravel have not been covered by clay, silt or till. These deposits generally are not thick and therefore do not yield large amounts of water. Deposits of this nature are found in the northwest corner of the Petition Area (Nichols 1968). See Figure 5-4 for the approximate extent of the stratified drift deposits in the Petition Area.

Confined and semi-confined ground water occurs where the sand and gravel have been covered by clay, silt or glacial till. These deposits are largely confined to the buried bedrock valleys. The stratified drift in the buried valleys contain the most productive aquifers. However, the Newark-Kenilworth bedrock valley, lying west of the Petition Area is filled with till and clay, and contains only minor amounts of water bearing sand (Nichols 1968).

Although most of the Petition Area is underlain by the unconfined unstratified moraine deposits, there are portions of the area where the ground moraine is confined by the recent tidal marsh deposits. In these areas, there appears to be a third water bearing unit above the glacial ground moraine water bearing zone. The Pleistocene deposits appear to be confined or semi-confined by the low permeability of the organic silt and clay marsh deposits. The third water bearing zone is in the manmade fill which lies on the bed of organic silt and clay.

Existing monitoring wells and peizometers were used to determine the horizontal component of shallow ground water flow beneath the Petition Area. Water level measurements collected during 1990 to 1996, from 71 wells at various sites within the Petition Area were used to prepare a ground water contour map. Water level elevations and construction details for all wells used are presented in Table 5-1. As can be seen on Figure 5-5 shallow ground water flow across the Petition Area is generally toward the Passaic River.

Figure 5-5 also shows local ground water flow anomalies within the Petition Area. For instance, ground water mounding occurs on the Getty Newark Terminal and Hilton Davis sites. The flow direction on these and other sites are likely to be influenced by construction debris in fill, old subsurface structures, or underground storage tanks. As a result, preferential flow paths may have developed that are not representative of regional shallow ground water flow.

Several sites in the Petition Area are also currently operating ground water remediation systems. Pumping of recovery wells has reversed the natural flow of ground water toward the Passaic River on these sites. These local differences in ground water flow direction can also be seen on Figure 5-5.

The average hydraulic gradient across the Petition Area is 0.007 ft/ft, based on values presented in previous reports prepared for sites within the area. Reported hydraulic gradient values ranged from 0.005 ft/ft to 0.011 ft/ft. Several slug tests and pumping tests were also performed on wells at different sites, in the fill material, as well as the glacial deposits. Hydraulic conductivity values ranged from 3.15×10^{-4} cm/sec to 6×10^{-1} cm/sec in the fill and from 1.7×10^{-3} cm/sec to 3.9×10^{-4} cm/sec in the glacial material. A 24-hour pumping test performed at the Georgia Pacific

facility determined the transmissivity of the shallow aquifer beneath the site to be 302 ft^2/day and the specific yield to be 0.043. The affect of these hydraulic values on contaminant movement is presented in Section 7.0. These ground water flow values were used to calculate the travel times and concentrations for contaminants in the petition area as they migrate towards the Passaic River.

Based on previous hydrogeologic investigations at many sites, regional ground water flow beneath the Petition Area is to the Passaic River or to Newark Bay. Therefore, ground water is not flowing to any other ground water classification area.

5.2 SURFACE WATER HYDROLOGY

The mean high tide of the Passaic River and Newark Bay is the eastern boundary of the Petition Area.

The Passaic River is approximately 100 miles long, from its beginning in Mendham Township, Morris County, to its confluence with Newark Bay. It has seven major tributaries, including the Whippany River, the Rockaway River, the Pompton River, the Pequannock River, the Wanaque River, the Ramapo River, and the Saddle River (US Army Corps of Engineers, 1987).

The Passaic River Basin is a 935 square mile watershed, with 787 square miles in New Jersey and 148 square miles in New York (see Figure 4-7). The basin contains all or part of 117 municipalities in eight counties - Bergen, Essex, Hudson, Morris, Passaic, Somerset, Sussex, and Union. In New York State, the Passaic Basin includes 15 municipalities in Orange and Rockland Counties. The Basin has an elliptical shape, with a 56 mile long northeast to southwest axis, and a width of 26 miles (US Army Corps of Engineers, 1987).

The Passaic River Basin has a wide diversity of features, ranging from heavily wooded, mountainous, rural areas to suburban lowlands, to densely populated, highly industrialized urban concentrations. The Basin is divided into three distinctly separate areas, the Highland Area, the Central Basin, and the Lower Valley. The Lower Valley, where the Petition Area is located, is the eastern flat urban belt, which contains the tidal, saline lower reach of the Passaic River. The populous, urban, industrial Lower Valley area covers 173 square miles, and carries the main stem Passaic River into Newark Bay through an area 8 miles wide and 26 miles long. Its major tributary is the Saddle River. The Lower Passaic River is tidally influenced for approximately 17 miles from the Dundee Dam in Garfield, downstream to Newark Bay (US Army Corps of Engineers, 1987).

Flow measurements for the Passaic River were downloaded from the USGS Water Resources Information page on the Internet. The nearest gaging station on the Passaic River, for which measurements were provided, is upstream at Little Falls. The flow rate measured on October 24, 1996 was 6,500 cubic feet per second. The long-term median daily flow was reported as 281 cubic feet per second.

As stated above, previous investigations at many sites in the Petition Area indicate both the River and Bay act as ground water discharge boundaries. Several sites have also conducted studies to determine tidal influence on ground water flow. Minimal tidal effects were seen in shallow wells at many sites including, Industrial Petrochemicals, Lehigh Portland Cement, Siloo, Hoechst-Celanese and McKesson. At sites where the glacial deposits are confined by marsh deposits, the tidal effects are less prominent than in the fill material which overlies the area (Diamond Shamrock).

6.0 GROUND WATER QUALITY/NATURAL ATTENUATION

6.1 GROUND WATER QUALITY IN THE PETITION AREA IS POOR

The Department's assessment of ground water quality in the State is that "there is an ample supply of good quality ground water in most of the State of New Jersey." (New Jersey 1994 State Water Quality Inventory Report, p. IV-4). However, the Department does recognize that ground water quality is degraded in certain densely populated areas. In particular, the Department recognizes that ground water quality in the Newark area is "generally poor." (p. IV-20).

This Petition is the first time that an extensive regional study of ground water quality for the Ironbound section of Newark has been undertaken and the analysis confirms that ground water quality is poor. This confirmation was reached after reviewing ground water data for 57 sites (listed in Table 6-1) located within and adjacent to the Petition Area. Figure 6-1 identifies where each of these sites is located. These 57 sites represent more than 90% of the sites in the Petition Area that have generated ground water data.

A total of 44,004 individual ground water data points were obtained from 593 monitoring wells located within and adjacent to the Petition Area. The analytical data from ground water in these wells has been collected over a 20-year period. The ground water data was organized using Access Database Software which can be interfaced with Geographic Information System (GIS) Software. ARC View 2.1 was used to manipulate the data and produce the various maps and figures used in this report. This software is compatible with NJDEP's GIS system. Appendix D, which accompanies this Petition, references each of the 44,004 individual ground water data points.

Based upon a review of the data, 107 constituents have been found to exceed the GWQS criteria for Class II-A (potable) ground water; 171 constituents are listed in the Class II-A criteria. Consequently, ground water in the Petition Area exceeds 62% of the Class II-A criteria.

Table 6-2 identifies the 107 constituents that exceed the GWQS. Twenty-two (22) of those constituents have been identified as Pervasive Compounds given their aerial distribution within the Petition Area. A discussion of Pervasive Compounds is set forth later in this Section.

Table 6-2 confirms that ground water in the Petition Area is contaminated with a wide variety of constituents including volatiles, semi-volatiles, pesticides/PCBs, and metals. Maximum concentrations for significant contaminants of concern range from 1 ppb of polychlorinated biphenols (PCB) to 380,000 ppm of toluene in ground water. Many of the constituents were detected at multiple sites. For example, toluene was detected at 44 sites and ethylbenzene was detected at 40 sites. Metals (total and dissolved) were also detected at numerous sites, including zinc (38 sites), arsenic (30 sites), and lead (37 sites). Xylenes were detected at 32 sites.

6.0 GROUND WATER QUALITY/NATURAL ATTENUATION

Figure 6-1 shows that the 57 sites where ground water contamination was observed are well distributed within the Petition Area. Given the significant amount of ground water data available, it is clear that the pollution problem is regional and affects virtually the entire 4.2 square miles of the Petition Area.

The Department recognizes that, "while Class II-B areas are not necessarily ***entirely*** polluted, they are expected to contain a high concentration of polluted sites" (25 N.J.R. 488). The Petition Area has a high concentration of polluted sites which accounts for its poor ground water quality.

6.2 22 PERVASIVE COMPOUNDS IN THE PETITION AREA

The Department's Draft Reclassification Guidance Document suggests that each Petition include a "discussion of the degradation characteristics for Pervasive Compounds." (p. 9) A "Pervasive Compound" is a contaminant that exhibits an "extensive exceedance" of the GWQS throughout the Petition Area. "Extensiveness" is a concept of aerial distribution rather than isolated high concentration (25 N.J. R. 487).

Aerial distribution is the concept incorporated into the Department's definition of "extensive exceedance" which is defined "as a condition where ground water quality in an area exceeds the criteria of N.J.A.C. 7:9-6.7 for one or more contaminants over the vast majority of the subject area for such contaminants..." N.J.A.C. 7:9-6.4. "The area may be affected by one constituent or many in combinations of varying concentrations." (25 N.J.R. 487).

In determining whether a detected contaminant was aerially distributed over the vast majority of the Petition Area, the list of 107 contaminants (see Table 6-2) was reviewed and the number of sites where each contaminant was detected was recorded. This approach was used because the sites producing ground water data were generally well distributed within and adjacent to the Petition Area (see Figure 6-1). Consequently, the more sites at which a contaminant was found, the more it was aerially distributed within the Petition Area.

Since the Department considers pervasiveness to mean extensive aerial distribution (25 N.J.R. 487), Pervasive Compounds are being defined herein as any contaminant found at 10 or more sites above the GWQS. Applying this definition to the list of the 107 detected contaminants yields a count of 22 "Pervasive Compounds" found at 10 or more sites within the Petition Area (see Table 6-3). Excluded from this list were Total Dissolved Solids, Iron, Chloride, Sodium, and

Manganese (even though they exceeded GWQS at 10 or more sites - see Table 6-2). They were excluded because they are subject to conventional treatment and the Department believes that they should not drive the determination for a Class II-B reclassification (25 N.J.R. 486). The remaining constituents from the list of 107 were excluded from the list of Pervasive Compounds because they were found at less than 10 sites.

The wells where the 22 Pervasive Compounds were found have been plotted on Figures 6-2 through 6-24. Figures 6-2 through 6-23 represent the aerial distribution for each of the 22 Pervasive Compounds while Figure 6-24 plots all 22 on one map. The size of each point on the figures is important in that a higher concentration is shown as a larger point, and a lower concentration is shown as a smaller point. These figures clearly show the magnitude of ground water contamination in the Petition Area and confirm that these Pervasive Compounds are well distributed throughout the area.

6.3 DEGRADATION PROCESSES

6.3.1 Introduction

Natural degradation is the reliance on chemical and biological processes to break down, destroy, or immobilize environmental contaminants over time. These natural processes primarily include adsorption, biodegradation, water solubility and volatilization. Each process can be considered a "soldier" that combats a contaminant using a different breakdown process. This section will discuss how each of these processes breakdown contaminants over time and how they are already degrading the Pervasive Compounds in the Petition Area.

Natural degradation has been studied by NJDEP (McLaughlin, 1996 and McLelland, 1996), USEPA (USEPA, 1994) and others. Each agency has confirmed that it can be a reliable and effective method for remediating ground water. For example, NJDEP has stated, as part of its proposed amendments to the Technical Requirements for Site Remediation, as follows:

> The Department acknowledges that there are situations where it is technically impracticable or unreasonable for an active ground water remediation to be implemented, making natural ground water remediation the appropriate mechanism for remediating a contaminated plume to applicable standards.

(28 N.J.R.1110). The Department has also proposed a definition for "natural ground water remediation[1].

The Department has been relying upon natural ground water remediation for several years as part of its CEA Program which approves this remedy for site-specific discharges. N.J.A.C. 7:9-6.6. See also, NJDEP Classification Exception Area Final Guidance (April 17, 1995). In a letter to State Legislators dated February 21, 1996, NJDEP Commissioner Robert C. Shinn, Jr. examined recent statistics regarding the Department's approval of natural ground water remediation and stated:

> A review of the last 200 remediation approvals issued (since tracking this information) by the NJDEP, indicates that over 65% of those approvals apply this passive remediation approach. Of the 100% of active remediation cases, the Department includes language that recognizes a time when active remediation will no longer be cost-effective, at which time the NJDEP could be petitioned to revise the approved remediation plan to a passive system. In addition, the Department recognizes that in most circumstances, cases employing a "passive" remediation approach [will] no longer require oversight.

While the Department has been routinely approving passive ground water remediation for site-specific discharges, this is the first Petition where the Department is being requested to acknowledge the effectiveness of natural ground water remediation on a regional basis. The Department expects passive remediation to be effective on a regional basis and has stated that the use of natural ground water remediation as part of a reclassification petition is nothing more than the creation of a "regional CEA". (25 N.J.R 495).

6.3.2 Adsorption

Adsorption refers to "any process that acts to inhibit the movement of a [contaminant] in ground water, such that the [contaminant] travels more slowly than the ground water itself". (28 N.J.R.1117). In other words, certain contaminants tend to "attach" themselves to subsurface material such as soil or peat particles. This attachment retards their movement as they travel through the ground water aquifer.

In general, the higher the organic content of the subsurface material, the more it will adsorb organic contaminants. The ability of subsurface materials to adsorb contaminants is typically

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[1]"Natural ground water remediation" includes any form of ground water remediation in which only (1) degradation, (2) retardation or (3) dispersion mechanisms are used to achieve applicable remediation standards. (N.J.A.C. 7:26E1.8 (28N.J.R.1116)).

expressed as a carbon/water partition coefficient (Koc). The higher the Koc value, the more the contaminant tends to adsorb to subsurface materials.

Adsorption can be a reversible process, in that, contaminants may attach themselves to subsurface material but can be replaced or desorbed by other contaminants causing the original contaminant to "break loose" to continue its migration. Therefore, adsorption is important because it can slow the rate of contaminant migration or in some cases immobilize the contaminant in ground water. Irreversible adsorption (or fixation) will immobilize a contaminant due to ionic bonding. This type of adsorption generally occurs with metals which have positively charged ions (cations) that bond strongly with negatively charged soil or clay particles (anions).

Each subsurface particle can only adsorb contaminants as long as there are available surfaces on the particle to permit adsorption. Once all surfaces are "fixed", additional contaminants may not be adsorbed and may continue to migrate with the flow of ground water.

6.3.3 Biodegradation

Biodegradation is the biological break-down of a contaminant by microorganisms that use enzymes to digest organic contaminants in order to promote their own survival, growth and reproduction. If complete biodegradation occurs, the contaminant will be reduced to carbon dioxide and water.

Efficient biodegradation of organic contaminants often depends upon the dissolved oxygen (DO) concentration in the aquifer and the nature of the contaminant. Aquifers can generally be classified as aerobic (DO >2.0 ppm), hypoxic (DO = 0.1 to 2.0 ppm) or anaerobic (DO <0.1 ppm). Some microorganisms are more efficient at breaking down organic contaminants in aerobic or oxygenated aquifers because they derive more energy from oxygen as an electron acceptor than other secondary electron acceptors, such as nitrate, iron, sulfate, and carbon dioxide. If the secondary electron acceptors are abundant, then the environment is considered anaerobic.

According to NJDEP, "most aquifers in New Jersey are aerobic environments typically containing dissolved oxygen greater than 2 parts per million". (McLaughlin, 1996). It is anticipated that shallow ground water in the Petition Area will have a variety of conditions including aerobic, hypoxic and anaerobic conditions which will be beneficial to a variety of microorganisms that thrive in different environments.

The extent and rate of degradation is dependent upon several factors, including the nature and size of the microbial population, acidity, temperature, pH, adsorption, the concentration of the initial organic contaminant and other chemical constituents preexisting in the ground water which

may impede or enhance biodegradation. The rate of biodegradation will be dependent upon the extent to which these factors are at their optimal levels. Since microorganisms required to degrade organic contaminants have been found at most depths in the subsurface, and since the factors which promote biodegradation often appear at most depths, it is expected that biodegradation of some form is occurring in the Petition Area at different rates of efficiency depending upon localized conditions.

6.3.4 Water Solubility

Water solubility is the maximum concentration of a chemical that can be dissolved in pure water at a given temperature and pH. High water solubilities exceed 1,000 mg/l; low solubilities are less than 10 mg/l.

The volatile organic contaminants in the Petition Area vary significantly in solubility. For example, in the BTEX group, benzene and toluene have relatively high water solubilities (1,280 and 535 mg/l, respectively) and will therefore tend to migrate faster in ground water than ethylbenzene or the xylenes which have lower solubilities (152 and 150 to 200 mg/l, respectively).

The semi-volatile and metal contaminants have lower solubilities and tend to adsorb to soil particles. The solubility of a metal is a function of several factors, including the pH and the nature of the solid aquifer material. The presence of certain salts and other anionic particles, such as chlorides, will greatly increase the solubility of certain metals as will a low pH environment. Since metals exist in ground water in the Petition Area, this suggests relatively high metal solubilities, which in turn suggests that low pH salts and anions which enhance solubility are also present in the ground water.

6.3.5 Volatilization

Volatile organic compounds (VOCs) can volatilize into the atmosphere as well as into air in the subsurface. If a contaminant is discharged into the subsurface, the volatilization process will occur mainly as the contaminant migrates down through the unsaturated zone to the water table. Volatilization also occurs in the ground water at the air-water interface where the contaminants can contact the air in the overlying materials.

Volatilization of a contaminant is a function of its vapor pressure, water solubility, and diffusion coefficient. In the ground water, a contaminant must diffuse to the air-water interface before volatilization occurs. The Henry's Law Constant (Kh) for a contaminant combines the vapor pressure and the water solubility. Contaminants with high Kh values, such as VOCs, can be

expected to volatilize readily into air, while contaminants with low Kh values, such as pesticides and many semi-volatile compounds will volatilize from water to a lesser degree.

VOCs identified in ground water within the Petition Area include, among others, the solvent tetrachloroethylene (PCE) which has a relatively low volatility and vinyl chloride, which is extremely volatile.

6.3.6 NAPLs and DNAPLs

The discussion concerning natural degradation of contaminants has so far assumed that the compound is dissolved in ground water. However, if it is not dissolved in water or if its concentration exceeds the soluble limit, then the contaminant may take the form of a non-aqueous phase liquid, (NAPL).

If the contaminant is present as a NAPL, the physical processes that dictate contaminant movement in the subsurface are somewhat different than those that govern dissolved contaminants. If the NAPL is lighter than water (light nonaqueous-phase liquid or LNAPL), it will spread over the top of the capillary fringe above the first water it encounters as it moves downward. As the LNAPL spreads, it continues to volatilize, degrade, and adsorb to the soil particulates. The LNAPL gradually follows the prevailing gradient or ground water flow direction, but it will also be affected by the permeabillty of the subsurface materials. If the contaminant concentration exceeds the solubility of the aquifer below it or if the permeability inhibits its movement causing it to "pool", LNAPLs can occur as "floating free product".

The natural degradation of LNAPLs is predominantly by aerobic biodegradation and volatilization because they are found near the soil/water interface, where more oxygen is available. The Pervasive Compounds that can occur as LNAPLs in the Petition Area include benzene, toluene, ethylbenzene, and xylenes (BTEX Group).

If the contaminant exists as a denser-than-water NAPL (dense nonaqueous-phase liquid or DNAPL), it will gradually sink by gravity into the ground water. Movement of the DNAPL is controlled more by density and permeability than by the direction of ground water flow. The DNAPL sinks until it reaches a horizon with a permeability that impedes or stops its downward migration. It will then travel down along the slope of this horizon and form pools in depressions or low spots.

It is often difficult if not impossible to locate these pools and remove them. Therefore, they act as continuing "sources" of ground water contamination as dissolution into the ground water occurs at an extremely low rate. See USEPA "Guidance for Evaluating the Technical Impracticability of Ground-water Restoration", Directive 9234.2-25 (September 1993).

Although there is no clear evidence to suggest that DNAPL pools exist in the Petition Area, there are certain Pervasive Compounds that are denser than water. If they occur at sufficient concentrations, it is possible for them to exist in a non-aqueous phase. The Pervasive Compounds that fall into this DNAPL category include 1,1,1 trichloroethane; 1,1 dichloroethane; 1,2 dichloroethane; tetrachloroethene; trichloroethene; methylene chloride; chlorobenzene; and chloroform.

6.4 NATURAL DEGRADATION OF THE PERVASIVE COMPOUNDS

The 22 Pervasive Compounds are divided into four groups; BTEX compounds, volatile organic compounds, semi-volatiles, and metals (see Table 6-3). The Primary Industrial Groups in the Petition Area have historically used these compounds, which explains their presence in the ground water (see Table 2-6). It is anticipated that the natural degradation processes described earlier are degrading each of these contaminants (see Tables 6-4 and 6-5). This conclusion is based on several factors:

(1) The monitoring data indicates that concentrations of certain compounds have decreased over time without the help of active remedial actions (see Table 6-5).

(2) There is evidence of daughter products from the breakdown of more complex organic compounds.

(3) The subsurface peat and clay found in the Petition Area typically provides excellent adsorption sites for metals and other low mobility contaminants.

(4) Toxicological Profiles prepared by the Agency For Toxic Substances and Disease Registry (ATSDR) as part of the Superfund Program confirm that each of the Pervasive Compounds is subject to at least one degradation process. Many are subject to more than one (see Table 6-4).

6.4.1 BTEX Compounds

The BTEX Compounds are found in the environment as a group predominantly as a result of leaking underground storage tanks that contained gasoline. Since this is a pervasive problem throughout the country as well as the Petition Area, there has been a significant amount of research conducted to examine the natural degradation potential of these compounds.

6.0 GROUND WATER QUALITY/NATURAL ATTENUATION

In 1995, the Lawrence Livermore National Laboratory (LLNL), along with the California Environmental Protection Department and the University of California undertook an 18 month study to examine the effectiveness of bioremediation on petroleum-based contaminants from leaking underground storage tanks. The California Environmental Protection Department wanted to determine why gasoline contaminated ground water plumes were shorter and more stable than expected. The result of the LLNL study is contained in a Report entitled "Recommendations to Improve the Process for California's Leaking Fuel Tanks" (LLNL 1996) and concluded:

> We now know that when plume lengths are measured in the field, plume length stability is often reached at a distance from a source shorter than would be expected without considering natural biodegradation. Ground water scientists now recognize that a major factor responsible for the shorter stable plume lengths is the aerobic and anaerobic metabolism of indigenous soil microorganisms that digest [petroleum-based contaminants] and remove [their] mass from the plume.

The LLNL Report explains that microbes initially use oxygen as an electron acceptor but, as oxygen becomes scarce, microbes begin to use other electron acceptors such as iron, nitrate and sulfate. This process results in a large core area of the ground water plume in which oxygen, pH and oxidation-reduction potential measurements are low. Along the outer edge of the plume is a transition zone in which oxygen becomes increasingly more available and aerobic microbial degradation proceeds more quickly. The anaerobic core of the plume is much larger than the aerobic edges of the plume. It is this aerobic edge that biodegrades faster than the anaerobic core which explains why petroleum plumes were shorter than expected. For this reason, the LLNL Report recommended that California could rely on passive remediation for BTEX discharges.

The NJDEP, Bureau of Ground Water Pollution Abatement has also confirmed the effectiveness of bioremediation on BTEX discharges, stating:

> Virtually all petroleum hydrocarbons are biodegradable under aerobic conditions and many field studies have shown that the more soluble petroleum compounds such as benzene, toluene, ethylbenzene and xylene (BTEX) readily biodegrade in aerobic aquifer environments.

(McLaughlin, 1996). Monitoring data suggests that reduction of BTEX compounds to carbon dioxide and water is already taking place in the Petition area. A discussion of the origin, fate, and transport of each compound is presented below.

Benzene - is a highly volatile, colorless liquid used in making gasoline. Benzene contamination in the Petition Area could be the result of leaking USTs, coal tar production, or other industrial uses.

There is evidence to show that benzene is degrading. For example, historic ground water data from Hoechst Celanese Corporation shows a benzene concentration of 39 ppb in 1988 reduced to 2.5 ppb in 1995 (see Table 6-5). There could be several reasons for this reduction. Benzene is very volatile with a vapor pressure of 95.2 mm of mercury at 25 C. Therefore, volatilization could be responsible for the lower concentration. It is also highly susceptible to biodegradation, both aerobically and anaerobically. Therefore, this could also account for its reduction.

Toluene - is a clear colorless liquid used in making gasoline and other fuels from crude oil. It is also a by-product in the manufacture of styrene.

Toluene at the Ashland Chemical Company site was detected at 24,000 ppb in 1993 but only 1400 ppb in 1996 (see Table 6-5). Even more dramatic is the data from Textron Inc. which shows toluene at an initial concentration of 35,200 ppb in 1993 but was not detected in 1995 (see Table 6-5). Toluene is volatile and biodegrades readily under both aerobic and anaerobic conditions. Under certain circumstances, studies have shown that the half life of toluene in shallow ground water ranges from 7-28 days. Its volatility and biodegradability may explain the reduction at these two sites.

Ethylbenzene - is used to make gasoline. It is also used in paints, inks, and insecticides. Ethylbenzene is not soluble or absorptive but will biodegrade under aerobic conditions. This is possibly evidenced by the fact that at the Ironbound Recreation Center the concentration of ethylbenzene dropped from 340 ppb in 1988 to 27 ppb in 1990 (see Table 6-5). At the Textron site, the concentration of ethylbenzene went from 7170 ppb in 1993 to 6200 ppb in 1995 (see Table 6-5).

Xylene - isomers are used in industrial solvents and the production of ethylbenzene. They are also blended into gasoline. Xylenes are ubiquitously distributed in the environment but they do not move well through saturated media. Biodegradation is primarily a function of co-metabolism where other degradable hydrocarbons must be present as a substrate. Where nitrates are present, studies show that biodegradation of m-and p-xylene/isomers can occur within 40 days. The limiting factor in xylene biodegradation appears to be oxygen, making it more susceptible to aerobic microbes. At the Ashland Chemical Company site total xylenes were measured at 4200 ppb in 1993 but only 25 ppb in 1996 (see Table 6-5). This data suggests that this compound is naturally degrading, possibly via biodegradation.

6.4.2 Volatile Organic Compounds

In addition to BTEX, there are seven other compounds that make up the volatile organic compound (VOC) group. As with the BTEX group, volatility is a predominant degradation process. In addition, most VOCs can be biodegraded aerobically or anaerobically.

A major difference between VOCs and the BTEX group is that VOCs are not always reduced to carbon dioxide and water. For example, 1,1,1 trichloroethane (TCA) can break down into a series of "daughter" compounds including 1,1 dichloroethane, chloroethane, and vinyl chloride. Therefore, when determining the degradation chain for 1,1,1 TCA and other VOCs, it is necessary to determine the degradation chain for each daughter compound that may be produced.

There is evidence to suggest that the VOC compounds in the Petition Area are already breaking down in the Petition Area. A discussion of each is presented below.

1,1,1 Trichloroethane (1,1,1 TCA) - was developed as a safer solvent to replace carbon tetrachloride. It is used extensively in household products such as liquid detergent, adhesives and insecticides and in metal degreasing and industrial cleaning. It is highly volatile and biodegrades anaerobically through reductive dechlorination by methane producing bacteria. Studies suggest that a predictive half life for this compound in ground water undergoing anaerobic biodegradation is 200-300 days. The primary daughter product of 1,1,1 TCA is 1,1 dichloroethane, which slowly degrades to chloroethane.

There is evidence to suggest that the degradation of 1,1,1 TCA is taking place in the Petition Area. 1,1 dichloroethane is also a Pervasive Compound and its presence can be linked to the degradation of 1,1,1 TCA as a daughter compound. The two compounds were detected in the same well during the same sampling event at Industrial Petrochemical (see Table 6-5). Reduction of 1,1,1 TCA was also seen at the Ashland Chemical Company site which had 5100 ppb of 1,1,1 TCA in 1989 but was not detected in 1995 (see Table 6-5). Volatilization and/or biodegradation is probably responsible for this reduction since there is no active remediation occurring at these sites.

1,1 dichloroethane (1,1 DCA) - this compound was developed as a solvent and is used for similar purposes as 1,1,1 TCA. Because of its high volatility, very little of this compound will make its way into the subsurface. It is expected to partition rapidly to the atmosphere. When it is detected in subsurface soils and ground water its presence is usually the result of the degradation of 1,1,1 TCA, since 1,1 DCA one of its daughter compounds. 1,1 DCA is also anaerobically biodegraded and produces chloroethane. It will not absorb readily onto soil unless there is a high organic content. Therefore, some studies suggest that 1,1 DCA can be expected to exist in ground water for as long as 60 years (half-life).

It is possible that biodegradation and volatilization are responsible for the reduction of 1,1 DCA at the Ashland Chemical Company site where the concentration went from 6500 ppb to below reliable detection limits in 3 years time (see Table 6-5).

1,2 dichloroethane (1,2 DCA) - is produced by the chlorination of ethylene and is used as a chemical intermediate and a solvent. Almost 84% of 1,2 DCA in the United States is used to produce vinyl chloride. It is also used in the synthesis of 1,1,1 TCA, TCE and PCE. Since 1,2 DCA is highly volatile it readily partitions to the atmosphere where it is photo-oxidized. In ground water, biodegradation of 1,2 DCA occurs aerobically; however, the degrading organisms gain little energetic benefit. Therefore, biodegradation is slow. Studies indicate that the lifetime of 1,2 DCA in ground water may last several years. This being the case, it would be expected that 1,2 DCA would be detected at fairly consistent concentrations over time.

Degradation or possible migration of 1,2 DCA is occurring at the Ashland Chemical Site. It was detected at 64,000 ppb in 1993, but found to be below reliable detection limits in 1996 (see Table 6-5).

Tetrachloroethene (PCE) - is used as a chemical intermediate, a scouring solvent in textile processing and as a degreasing agent. Although it is moderately volatile and partitions primarily to the air it can still migrate through the soil and into the ground water. Once in ground water it is a persistent and highly mobile contaminant. Biodegradation does occur anaerobically but at a slow rate. Like 1,1,1 TCA, PCE produces daughter compounds as a result of reductive dehalogenation by microorganisms. These compounds include dichloroethene, vinyl chloride and ethylene.

Monitoring data in the Petition Area show that PCE is also being reduced naturally. Ground water on the Ashland Chemical site showed 8000 ppb of PCE in 1993, but it was not detected in 1996 (see Table 6-5). PCE, dichloroethene and vinyl chloride, daughter products of PCE, were also found together in the same monitoring well at the Federal Pacific and Industrial Petrochemical sites suggesting that anaerobic biodegradation of PCE is taking place in the Petition Area.

Trichloroethene (TCE) - is an excellent extraction solvent for greases, oils, fats, waxes and tars and is used by the textile industry to scour fabrics. It is also used as a chain transfer agent in the production of polyvinyl chloride (PVC). TCE is highly volatile and very mobile, so it does not readily absorb to soil. Therefore, TCE can leach through the soil and into the ground water. Biodegradation will breakdown TCE, but slowly. When it does degrade, it can produce dichloroethylene and vinyl chloride as daughter compounds.

TCE is a common ground water contaminant throughout the country. In the Petition Area it was detected at 26 sites; however, it appears to be degrading naturally. At the Ashland Chemical

site, monitoring data shows that TCE concentrations fell from 45,000 ppb in 1993 to none detected in 1996 (see Table 6-5). The Hudson Tool and Die site also showed a reduction of TCE from 250 ppb in 1992 to none detected in 1996 (see Table 6-5). Mobility may also be responsible for this reduction. However, Passaic River sediment data does not show the presence of TCE (see Section 7.0) suggesting that it may not be reaching the river.

Methylene Chloride (MC) - is produced by the chlorination of methane. It is used as a solvent in paint removers, as a propellant in aerosols and as a process solvent in the manufacture of drugs, pharmaceuticals and film coatings. MC is also used as an extraction solvent for spice oleoresins and decaffination of coffee.

MC is highly volatile and readily partitions to the atmosphere. When it does enter the subsurface it is not adsorbed on soils and is consequently highly mobile. Biodegradation occurs both aerobically and anaerobically with no adverse daughter compounds produced.

The only data that shows a reduction of this compound in the Petition Area is from the Georgia-Pacific site which is one of the only sites that has a pump and treat system installed specifically to remove MC. As a result, concentration of MC has dropped from 38,955 ppb to non detected in an eight year period (see Table 6-5).

Vinyl Chloride (VC) - is an important industrial chemical because of its wide variety of end use products and its ability to produce low cost polymers, particularly PVC. In fact, vinyl chloride is used almost exclusively in the U.S. by the plastics industry to produce PVC and several copolymers.

VC is highly volatile and readily partitions into the atmosphere. An interesting feature of VC is that it can form complexes with various salts which increase its water solubility. This fact combined with its low adsorption to soil makes it a mobile compound. In addition, VC is resistant to microbial degradation. Nevertheless, VC is detected in ground water less than 1% of the time that samples are analyzed to detect its presence.

In the Petition Area VC was detected at 37,000 ppb at the Ashland Chemical site in 1989. In 1994 it was not detected (see Table 6-5). Volatility is a possible reason for its reduction. Migration is another possibility. The fate and transport model conducted and discussed in Section 7.3.1 suggests that VC will reach the Passaic River above surface water quality standards. However, VC does not bioaccumulate (see Section 7.3.4). Therefore, its impact to the surface water ecology would be expected to be minimal.

Chlorobenzene - is used predominantly as a solvent for pesticide formulations, diisocyanate manufacture, degreasing automobile parts and the production of nitrochlorobenzene. Production

has declined significantly in recent years because of the cessation of DDT production in the U.S. and its replacement by cumene in phenol production.

Chlorobenzene is produced by the chlorination of benzene. It is volatile but adsorbs moderately to soil and is not particularly soluble in water. It bio-degrades rapidly under aerobic conditions but is fairly persistent in ground water with lower oxygen levels. It adsorbs readily to soil. This is evidenced at Hoechst-Celanese where 82 ppb of chlorobenzene was detected in 1988 with only a reduction to 18 ppb seven years later (see Table 6-5).

Chloroform - is formed by the chlorination of methane or methyl chlorine. Its principle use is in the production of fluorocarbon-22 which is one of the few fluorocarbons not restricted by the international agreement to reduce the usage of ozone-depleting chemicals.

Because of its volatility, a majority of chloroform will be released into the atmosphere with only minor amounts entering ground water. However, if chloroform is contained in the soil, its low adsorption and high solubility will cause it to leach into ground water. It is not readily biodegradable so it may persist in the environment for a long time. Nevertheless, chloroform was found at Deleet Merchandising at 23 ppb in 1993 and at non-detectable levels in 1996. In 1991 it was found at Industrial Petrochemical at 2700 ppb and then at 1900 ppb in 1994 (see Table 6-5).

In summary, the VOCs that are included on the Pervasive Compound list are currently degrading to other compounds or to lower concentrations via a combination of volatilization, migration, or biodegradation. Some of them may be migrating out of the area towards the Passaic River, but their impact on the surface water ecology surrounding the Petition Area is expected to be minimal (see Section 7).

6.4.3 Semi-Volatile Organic Compounds

There is only one Pervasive Compound in the Petition Area that is a semi-volatile compound - Bis(2 ethylhexyl) phthalate. Monitoring data suggests that it is naturally breaking down in the Petition Area.

Bis(2-ethylhexyl) phthalate (BEHP) - is a member of a group of compounds referred to as the dioctylphthalates. BEHP is principally used as a plasticizer during the production of PVC. The addition of BEHP to PVC makes it more flexible so it can be used for items such as toys, shower curtains, and coatings. BEHP can also be used as a solvent for erasable ink and as an inert ingredient in pesticide products. Concern for potential carcinogenicity from exposure to BEHP has lead to the discontinuation of its use in toys and pacifiers.

BEHP is the 13th most common ground water contaminant recorded in the CERCLA Database. It sorbs strongly to soil and is somewhat volatile. BEHP is fairly insoluble; however, in the presence of organic solvents such as alcohols and ketones the solubility of BEHP can increase, facilitating its migration into and through ground water. BEHP will biodegrade aerobically but not anaerobically; however it is a persistent contaminant in ground water. If BEHP were to migrate to the Passaic River, studies indicate that its half-life, due to aerobic biodegradation in river sediments, would be about 1 month.

BEHP was found at the Getty Newark Terminal in 1988 at 420 ppb. In 1993 it was 1 ppb (see Table 6-5). This suggests the compound is either biodegrading or has possibly migrated or dispersed.

6.4.4 Metals

The fourth group of Pervasive Compounds found in the Petition Area are the metals which include: Antimony, Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, and Zinc. Metals occur naturally in the environment as elements in the earth's crust as well as anthropogenically (see Section 3). Once in the environment metals can transform through oxidation or reduction, adsorb onto soil or other ligands, co-precipitate out of solution, or be biologically absorbed by plants and animals. Factors which greatly affect the environmental fate and transport of metals include the pH of the soil and ground water and the amount of organic matter present in the soil or aquifer material.

The pH is a measure of the positively charged hydrogen ions present in the fluid found in the soil pore space and ground water. Soil is predominantly negatively charged and therefore readily bonds with the metal cations or positively charged particles. Thus, if low pH conditions exist most metals will tend to be more mobile. If the pH is higher most metals will become less mobile and in some cases will actually precipitate out of solution and form a hydroxide.

Organic matter in soil determines the type and amount of acid produced. Acid acts to lower the pH thus making metals more mobile. The cation exchange capacity (CEC), or the ability to adsorb metals, is affected by the type of acid produced. The relative retention of metals by soil is in the order of lead>antimony>copper>chromium>zinc>nickel>cobalt>cadmium. The mobility of a metal is important because, unlike volatile organics or other man made compounds, metals will not completely degrade, but will instead be transformed into different versions or species of itself. If a metal is transformed into a more mobile state it has a better chance of being exposed to organisms that will ingest it. Since metals do not breakdown completely, they can remain in organisms for long

periods of time. Animals that feed on these organisms may in turn have high levels of this metal. This can continue up the food chain and is known as bioaccumulation (see Section 7.3.4).

Metals already appear to be adsorbing to the indigenous peat and clay in the Petition Area. This is supported by monitoring data as well as the fate and transport analytical model (Section 7.3.1) which indicates that metals may take thousands of years to reach and impact receptors such as the Passaic River.

Antimony (Sb) - exists in two valence states +3 and +5 and is commercially mined from Stibnite and Lead ores. Lead-antimony alloy is used in storage batteries, flame retardants, pigments and explosives. Its presence in the environment is usually from the weathering of Sb rich parent material or from chemical fertilizers, sewage sludge and fly ash.

Antimony will be adsorbed by clays and hydrous oxides but it is considered to have moderate mobility in soil. Lower pH increases its adsorption to soil particles. Certain forms of antimony can be biotransformed to less toxic forms; however, data confirming this transformation is scarce. Because it will adsorb to clay, peat, and subsurface materials, the opportunity for antimony to migrate through the aquifer and into the river sediments is limited (see the analytical model Section 7.3.1).

Engelhard Corporation and Sun Chemical Company have each detected Sb in wells over the years. Its detection has been inconsistent and therefore it is difficult to determine whether Sb is migrating, adsorbing, or both (see Table 6-5). However, it is not expected to migrate to the Passaic River (Section 7.3.1) and has not been detected in the river sediments (Section 7.2.5).

Arsenic (As) - is the 20th most abundant element in the earth, and is used in wood preservatives and the production of agricultural chemicals. Arsenic is also used in medicine for treatment of parasitic diseases such as amoebic dysentery.

Most arsenic in the environment exists in soil or rock. As with most of the metals in the Petition Area it is highly adsorbent to soils and would be expected to travel only short distances. Arsenic can be biotransformed by microorganisms which will reduce arsenate, (the predominant form of the metal in ground water) to arsenite. However, the surrounding geology, oxidation-reduction potential and pH may play a significant role in this transformation.

Considering its highly adsorbent nature it is unlikely that arsenic will migrate through the ground water aquifer into the surface water bodies surrounding the Petition Area (see the analytical model, Section 7.3.1). However, because of its various forms and valence states, it is difficult to say with certainty that arsenic is not migrating to the Passaic River. Arsenic has been found at

Federated Metals Corporation at 200 ppb in 1981 and at 10 ppb in 1992, suggesting that it is migrating slowly given its absorptive tendency (see Table 6-5).

Chromium (Cr) - is used by the metallurgical, refractory and chemical industries to produce, alloys, linings for high temperature industrial furnaces, and pigments. Chromium exists in two valence or oxidation states CrIII or CrVI. CrVI is more mobile because of its solubility and is therefore a greater concern with respect to bio-availability. CrIII is less mobile but lower soil pH can facilitate complexation which can increase CrIII solubility.

Chromium enters the environment predominantly from landfilling. This is especially the case in the Petition Area because chromate wastes were used throughout Hudson and Essex Counties as fill material. There are 186 sites identified as chromate waste areas on New Jersey's list of Known Contamination Sites, several of which are located in Newark.

The speciation of chromium in ground water depends on the redox potential and pH conditions. CrVI is more common under high oxidation conditions whereas chromium III exists under reducing conditions. In general, oxidizing conditions are found in shallow aquifers and reducing conditions in deeper ground waters. pH also affects the type of chromium present in ground water. If the pH is normal, between 6-8, CrVI will predominate while CrIII will be more common in lower pH waters.

The sorption of chromium to soil depends primarily on the clay content of the soil. Chromium can be irreversibly sorbed onto clayey soils and therefore not be bioavailable to plants and animals. Organic matter will also convert soluble Chromium VI to insoluble Cr III. Again, if the metal is not bioavailable, its affect on the ecosystem is minimal (see the analytical model, Section 7.3.1). Chromium was found at Engelhard and Sun Chemicals. Results were ambiguous, and like arsenic it can occur in many forms, so it is difficult to determine if Cr is migrating, adsorbing, or both (see Table 6-5).

Cadmium (Cd) - is mainly obtained as a by-product during the processing of zinc bearing ores and the refining of lead and copper from sulfide ores. It is currently used for the production of nickel-cadmium batteries and metal plating. Cadmium is also used for pigments, plastics, and synthetics. Land disposal of cadmium containing wastes, land application of sewage sludge, and the use of phosphate fertilizers are the principal sources of cadmium releases to the soil.

Cd is more mobile in aquatic environments than most of the other metals. Cd concentration in water is inversely related to pH and the amount of organic material in the water. Cd is affected by bacteria which can partition it from surface water to sediments.

In the Petition Area, cadmium was detected at 13 sites. As with the other metals, migration of cadmium over long distances in ground water is unlikely. Although it is more soluble than the other metals discussed so far, there are countless adsorption sites where cadmium ions can bond, making them relatively immobile. As an example, Cd was found at Federated Metals Corporation where it has gradually reduced over a 14 year period, suggesting absorption and slow migration is occurring (see Table 6-5 and the analytical model, Section 7.3.1).

Lead (Pb) - Lead is commercially important because it is easy to cast, acid resistant, and chemically stable in air, water, and soil. Eighty percent (80%) of lead produced in the U.S. is used in the manufacture of lead-acid batteries for motor vehicles. Although its use is being reduced or eliminated in gasoline and paint, many new uses are being developed. In addition to protection against radiation exposure, lead is used extensively in the electronics industry for superconductors and printed circuit boards.

Most lead today is recycled; however, 25 to 30% is still being disposed of in municipal and hazardous waste landfills. Although this seems to be significant, lead does not leach readily from the soil and its migration into ground water is slow, except in highly acidic environments. Lead was found at Federated Metals Corporation where it has gradually reduced over the years, indicating that adsorption and slow migration is occurring (see Table 6-5 and the analytical model, Chapter 7).

Mercury (Hg) - occurs naturally as a mineral and has three valence states. It is found in the environment in various inorganic and organic complexes as well as the metallic form. Mercury is primarily used in the electronics, medical, chemical and mining industries. It is a critical element in alkaline batteries, but due to its high toxicity, battery manufacturers and others that use mercury are gradually reducing or eliminating its use.

Although mercury can exist in the vapor phase in the atmosphere, it is highly adsorbed onto soil and water particles. Most mercury found in ground water is derived from atmospheric sources. However, given its high adsorption to soil, mercury does not leach down into the ground water. Adsorption of mercury in the soil decreases with increasing pH and/or chloride ion concentrations. Mobilization of sorbed mercury can occur through chemical or biological reduction of higher valence mercury to elemental mercury.

There are high levels of mercury in the sediments in the Passaic River; however, its presence is most likely attributable to direct industrial discharges to the river. The lower Passaic River water quality and sediment quality is affected by 80 private dischargers, 20 of which are industrial (ACOE, 1987). Again, the fact that it readily adsorbs onto soil makes it unlikely it will travel through the aquifer and discharge into the Passaic River (see the analytical model, Section 7.3.1).

Mercury was found at Engelhard Corporation and reduced over time suggesting adsorption and possibly slow migration is occurring (see Table 6-5).

Nickel (Ni) - is the 24th most abundant metal in the earth's crust. Since nickel is corrosion resistant and adds strength to products, it is primarily used in alloys. Copper-nickel alloys are used in industrial plumbing, marine equipment, heat exchangers, and welding electrodes. Coinage metal consists of 75% copper and 25% nickel. Nickel combined with other metals such as chromium, iron, silver and aluminum provides a wide variety of usable alloys.

Nickel is strongly adsorbed to soil and actually forms covalent bonds with some particles. Most nickel found in surface water and sediments is a result of runoff. Adsorption is strongly affected by chloride concentration. The higher the chloride concentration, the less adsorptive nickel becomes. Even so, nickel does not readily migrate down into ground water.

The levels of nickel found in the Petition Area are probably the result of plating and smelting operations conducted in the Ironbound. Its ability to migrate through the subsurface in the ground water to impact the Passaic River is expected to be negligible given nickel's high adsorption to soil (see Section 7.3.1).

Nickel was found at Engelhard Corporation where it reduced over time, suggesting adsorption or slow migration is occurring (see Table 6-5).

Zinc (Zn) - is widely distributed in nature and accounts for 0.027% (by weight of the earth's crust). Zinc is used predominantly as a protective coating for other metals. It is also used as an alloy and in salt form for wood preservatives, textiles, fertilizers, pigments and batteries.

Zinc is not very mobile, does not volatize and is primarily deposited in sediments through adsorption and precipitation. The environmental releases of zinc from anthropogenic sources far exceed releases from natural sources. Publicly owned treatment works are the largest point source for zinc discharges to surface water. Zinc in drinking water is predominantly the result of the distribution system and plumbing. Common piping materials contain zinc and trace amounts can enter the water via corrosion or dissolution with the contact water.

Because zinc is highly sorptive, its ability to travel through the aquifer to the Passaic River is severely limited. Therefore, zinc impacts to the river from ground water discharge is unlikely (see Section 7.3.1).

Zinc was found at Federated Metals Corporation and gradually reduced over a 12 year period suggesting adsorption or slow migration is occurring (see Table 6-5).

6.0 GROUND WATER QUALITY/NATURAL ATTENUATION

Summary

In summary, the Petition Area contains over 107 contaminants that exceed their individual ground water quality criteria. 22 of these are considered pervasive in that they were detected in ground water at 10 or more sites. Although contamination in the Petition Area is extensive and wide spread, there is evidence to suggest that natural degradation processes are taking place and that the concentrations of the contaminants are being reduced.

The well search and current ground water use in the Petition Area confirm that ground water is not and will not be used for potable use within the next 25 years. Therefore, ground water is not likely to come into contact with the human population thereby minimizing risk from direct contact or ingestion. There is the possibility that contaminated ground water will migrate to the Passaic River. Its impact on that receptor is discussed in Section 7.0.

7.0 IMPACT OF GROUND WATER ON RECEPTORS

This section explains that (1) there will be no impact on human receptors by reclassifying ground water since it is not a source of drinking water; (2) the impact of contaminated ground water on wildlife, fish, plants, and wetlands should be insignificant since only species indigenous to an industrial/urban environment exist in the area; and (3) the impact of contaminated ground water on the Passaic River/Newark Bay should be negligible since:

(i) there is a reasonable expectation that only four ground water contaminants will reach the river, according to predictions from a ground water model for the area;

(ii) the volume of river water flow will significantly dilute the ground water contaminants that might reach the river; and

(iii) the few contaminants that are projected to reach the river bank have a low potential for bioaccumulation.

7.1 NO IMPACT ON HUMAN RECEPTORS

Ground water in the Petition Area has never been used as a source of drinking water in Newark or other nearby municipalities. Newark obtains its primary supply of drinking water from the Wanaque Reservoir located in Upper Passaic County which is supplied to the City by the North Jersey District Water Supply. Also, the City of Newark owns and maintains a series of surface water reservoirs, pumping stations, and treatment facilities in northern Passaic County. A secondary water source is provided to the City by the Passaic Valley Water Company which maintains reservoirs located outside the City. They supply water to the City on an as needed basis. Since ground water in the Petition Area is not used as a source of drinking water, there is no impact to human health created by the presence of contaminants in the ground water.

There is also no reasonable expectation of human impact in the future. North Jersey District Water Supply and the City of Newark have confirmed in writing that they have no future plans to use ground water in the Petition Area as a source of drinking water for at least the next 25 years, which is as far as their future planning provides. (Appendix D).

There has been some past industrial use of ground water in the Petition Area, primarily for non-contact cooling water. However, this use normally exposes equipment to ground water, not

humans. In addition, based upon a recent survey of existing industrial wells in the Petition Area, none of them are presently operational (see Table 4-1).

The only time that ground water within the Petition Area may come into contact with humans is during excavation activities when the depth exceeds the water table elevation, or when entering manholes to effectuate telephone, sewer or electrical utilities maintenance or repair. It is anticipated, however, that precautions will be taken by workmen, such as the use of appropriate protective clothing and gloves, to prevent potential harmful dermal exposure, if any; especially since these precautions would be required by OSHA regulations. It is further anticipated that by reclassifying the Petition Area to non-potable Class II-B ground water, this will put workmen on notice that appropriate precautions may be required. Given the area's present classification as potable Class II-A, workmen may be misled to believe that certain precautions are unnecessary when, in fact, they might be necessary.

7.2 PRESENT ASSESSMENT OF ENVIRONMENTAL RECEPTORS

This Section provides a qualitative assessment of the actual or potential impacts that reclassifying ground water in the Petition Area may have on wildlife, fish, plants, wetlands, and the Passaic River. The purpose of this assessment is to identify the ecosystems, habitats, and populations most likely to be found in the Petition Area and to characterize the contaminants, exposure routes, and potential impacts on the environmental receptors. This assessment follows guidelines established in EPA's "Interim Final Risk Assessment Guidance for Superfund, Volume VII, Environmental Evaluation Manual" (EPA 1989) which is recommended by NJDEP in its proposed amendments to the Technical Requirements for Site Remediation Regulations.

The basic components of this assessment include:

- Identification of the ecosystems, habitats, and populations of ecological species within the Petition Area, including those protected, endangered, or threatened.
- Identification of the contaminants of concern, source areas, concentrations, toxicity, and pathways of migration and/or exposure.
- Summarization of potential environmental risks that may exist in the Petition Area.

7.0 IMPACT OF GROUND WATER ON RECEPTORS

The assessment confirms that there will be little or no impact to environmental receptors by reclassifying ground water and relying upon natural attenuation processes to reduce contamination in the Petition Area.

7.2.1 Wildlife

According to the New Jersey Natural Heritage Program, four rare, threatened, or endangered species or natural communities may exist in the larger area that includes the Petition Area. They are the American Coot (Fulica americana), Savannah Sparrow (Passerculus Sandwichenis), Pied-Billed Greeb (Podilybus podiceps) and Least Tern (Sterna antillirum). The American Coot habitat includes freshwater marshes and ponds with abundant emergent vegetation; the Savannah Sparrow habitat includes open areas, such as grasslands, meadows, bogs and marshes; the Pied-Billed Greeb habitat includes lakes, ponds, sluggish streams and marshes; and the Least Tern habitat includes the seacoast. However, none of these habitats exist in or close to the Petition Area, (TRC 1993). Therefore, impacts from reclassification on these four species are not expected to be of concern.

The U.S. Army Corps of Engineers (USACE 1987) did an extensive ecological study of the lower Passaic River basin as part of the investigation to build a flood tunnel that would discharge near the Petition Area. According to this Report, there is a general lack of terrestrial habitats along the Lower Passaic River. This has dramatically changed the wildlife composition from indigenous fauna to predominantly human-tolerant species found only in urban settings. Wildlife such as the raccoon, eastern gray squirrel, eastern cottontail rabbit and opossum may still exist in the Petition Area, but it is expected that the number of these species are very low given the predominantly industrial activity of the area and the few areas of protective flora.

The Passaic River does still provide stop over habitats for certain species of water fowl, such as the canvasback, redhead, bufflehead, mallard and black duck. These and other passerine birds are very transient and, therefore, it is difficult to estimate individual exposure, if any, to contaminants - especially since these birds do not stay in the area for an extended period of time.

7.2.2 Fish

The aquatic habitat of the lower Passaic River is unobstructed with dams from Newark Bay upstream to Dundee Dam. Within this reach of the river, there are two different types of aquatic habitats. The lower Passaic River is considered estuarine (brackish) from Newark Bay up to the Rutgers Street Bridge in Belleville (approximately 12.3 miles), and riverine (freshwater) from that

point up to Dundee Dam (USACE 1987). Upstream of Dundee Dam, to Beatties Dam, the riverine aquatic habitat has been altered by man-made and natural structures. The riverine habitat extends for approximately 17.4 miles.

Benthic macroinvertebrate species tolerant of heavy inorganic pollutant loads, are characteristic of the lower Passaic River (USACE 1987). Benthic species found include chironimid larvae, tubificed worms, nematodes, leeches and polychaete worms. It should be noted that, for the USACE study, benthic samples were only taken in the freshwater reaches of the river, above Dundee Dam. From May 1993 to April 1994, the National Marine Fisheries Service (NMFS) intensively sampled Newark Bay (downstream of the Petition Area) for biological resources for the Passaic River Flood Damage Reduction Project (USACE 1995). 54 species of benthic organisms were found. Their populations varied with the seasons. They were dominated by polychaete worms but also included oligochaete worms and several species of mollusks and crustaceans (see Table 7-1).

Fish sampling in the lower portion of the tidal Passaic River, where open access to Newark Bay still exists, was conducted by the U.S. Army Corps of Engineers in 1980 for the Passaic River Flood Protection Feasibility project (USACE 1987). This sampling effort revealed fish species characteristic of the lower Hudson River estuary (see Table 7-2). These include Atlantic tomcod, red and silver hake, and northern pipefish. Species characteristic of estuarine marsh areas, such as mummichogs and Atlantic silversides, were also found. In the 1993 and 1994 sampling conducted by the NMFS, forty-three (43) species of finfish were collected in the deep water areas of Newark Bay and twenty-seven (27) species were collected in the shallow water areas (see Table 7-3). These surveys revealed that species abundance varies seasonally. The most numerous species (>1,000 individuals) collected during the deep water surveys were striped bass, Atlantic tomcod, white perch, weakfish and winter flounder. In the shallow water areas, only one species, the bay anchovy, exceeded 1,000 individuals. Only four other species were collected in numbers exceeding 100 individuals. These are the Atlantic herring, Atlantic tomcod, striped bass and winter flounder (USACE, 1995).

The connection of the Passaic River to Newark Bay and the Hudson River/New York Bay estuary, coupled with the existence of fresh or nearly freshwater habitats at the upper reaches of the lower Passaic River, downstream of Dundee Dam, creates an aquatic system potentially capable of supporting the reproduction of anadromous fish (USACE, 1987). In the Hudson River/New York Bay estuary, anadromous fish species include members of the herring or clupeid

family (American shad, hickory shad, blueback herring and alewife) and the temperate bass family (white perch and striped bass).

Fish sampling in the tidal lower Passaic River and its tributaries in 1980 demonstrated the presence of ripe (ready to spawn) adult alewife, blueback herring and white perch. Juvenile (immature) American shad, alewife, blueback herring and white perch have also been captured in the Main Stem and the lower portions of the Passaic Rivers major tributaries in the reach below Dundee Dam. These samples indicated successful spawning of American shad, alewife, blueback herring, and white perch. Striped bass have been sighted in the area on a limited basis, although their spawning has not been confirmed. All striped bass specimens collected in this survey were immature fish. In the 1993 and 1994 sampling, small numbers of blueback herring, alewife, and American shad were found in the channel and the shallow waters of Newark Bay.

Poor water quality and limited spawning habitat are the apparent principal reasons preventing the spawning success of anadromous clupeids in the lower Passaic River (USACE, 1987). Specifically, reduced levels of dissolved oxygen associated with the warm summer temperatures produce "blocks" which can prevent the emigration of juvenile clupeids. Short term drops in dissolved oxygen may kill large numbers of juveniles before emigration can occur. Evidence also indicates that juvenile American shad are not found in waters with dissolved oxygen levels below 5 mg/l.

Spawning habitat requirements for anadromous clupeids varies from clean, swift-moving water with a sand and gravel substrate, for blueback herring, to sluggish flows where the bottom substrate may range from gravel to detritus, in the case of alewife. American shad prefer sandy to pebbly flats, with the clarity of the water not an important factor. The lower Passaic River is a relatively slow-moving river, with substantial amounts of fine substrate, and some limited flats (USACE, 1987). Therefore, alewife are the anadromous clupeid which should have the best chance of finding suitable habitat. Surveys indicate only limited recruitment of all three species of clupeids; thus physical-chemical factors such as limited dissolved oxygen, appear to be the crucial elements curbing spawning success.

7.2.3 Plants

The Natural Heritage Data Base identifies no species of rare, threatened or endangered vascular plants located within the Petition Area. Industrial activity dominates most of the Petition Area. Those areas that are available for growth tend to support an extremely opportunistic

vegetation typical of an Old Field Community (i.e., an area that once was in heavy use and then abandoned) (TRC 1993).

Vegetation that dominates the Petition Area falls into four categories: trees, shrubs, herbaceous vegetation, and grasses. Species found in each of these categories are listed in Table 7-4. Those plant species were compared with the list of rare, threatened, or endangered vegetation in New Jersey. N.J.A.C. 7:5C-5.1 et. seq. (New Jersey Endangered Species List). No plants identified in the Petition Area are found on the New Jersey Endangered Species List.

According to the 1987 USACE investigation, most of the land along the Lower Passaic River up to Beatties Dam is urban and most of its vegetation is classified as upland cover typical of an urban setting - no rare or endangered species are expected to be found in this area.

7.2.4 Wetlands

Lower Passaic River wetlands have been almost all eliminated, with over 7,500 acres filled and developed in the Lower Valley alone since 1940 (USACE, 1987). See Sections 2.3.2 and 2.3.3 for a discussion of historic filling activity in the Petition Area. Only a few remnant pockets of wetlands remain.

Riparian wetlands in the Lower Valley are characterized as irregularly spaced, discontinuous, remnant pockets. According to the United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), the Petition Area (Figure 7-1), Newark Bay and the Passaic River are classified as E1OW (estuarine, subtidal, open water) wetlands. There are several E2FL (estuarine, intertidal flat) and E2EM (estuarine, intertidal, emergent) wetlands located along the banks of the Passaic River and Newark Bay in the Petition Area. Small pockets of PEM (palustrine emergent) and POW (palustrine open water) wetlands are also scattered within the Petition Area.

Extremely dense development in this area of the Passaic River has diminished and degraded its environmentally sensitive areas. Because so much natural vegetation has been destroyed, the environmentally sensitive areas remaining are even more important due to their scarcity. Tidal wetlands along the Passaic River and Newark Bay are considered to be significant, based on technical recognition of their ability to sustain migratory birds and anadromous fish by the USFWS NMFS (USACE, 1987).

7.2.5 Passaic River

The Passaic River basin is the most urbanized large river basin in New Jersey, and its waters are subject to many competing uses. Although the main stem Passaic River and its

tributaries are limited recreational and agricultural resources, principal uses are as a major source of public and industrial supply water, and for the discharge of municipal and industrial wastewater. As a result, the quality of water in the Passaic River and its tributaries is generally poor.

The water quality is rated very poor in both the freshwater regime above Dundee Dam, and below it in the saline tidal reach near the Petition Area. The poor water quality in the central Passaic is caused by lower dissolved oxygen and biological oxygen demand, nutrients, ammonia and fecal coliform. While higher quality water from the Pompton River improves the quality of Passaic River water at the confluence of these two rivers, lower Passaic River water near the Petition Area is impacted by private discharges, many of them industrial. The density of industrial development and associated land uses also generates domestic and process water from sewage and wastewater treatment facilities. These discharges, combined with poor upstream water quality and non-point runoff, cause severely degraded water in the lower Passaic, near the Petition Area.

Federal fishable and swimmable goals set forth in Section 208 of the 1972 Clean Water Act are not being met throughout the Passaic River basin (USACE 1987). The effluents of New Jersey permitted point pollution sources enter the area and discharge approximately 122 mgd, which is about 16% of the Passaic River average flow, and 820% of the low flow. The Peckman River, a highly contaminated minor tributary which enters the Passaic River at West Paterson, is an important contributor to the main stem Passaic's poor water quality.

PCB and dioxin contamination of aquatic animals and sediments has resulted in fishing restrictions on the lower Passaic River near the Petition Area (USACE 1987). In 1983, NJDEP issued an advisory against consumption of all fish and shellfish taken from the tidal Passaic River. In 1984, the advisory was extended to include striped bass and blue crabs in Newark Bay, the Arthur Kill, the Kill Van Kull and the tidal Hackensack River. A 1985 NJDEP study showed elevated levels of dioxin in the edible tissues of all resident and migratory species tested (USACE 1987). These species included blue crab, striped bass, American eel, carp, catfish, and goldfish.

The lower six miles of the Passaic River, including the portion of the river adjacent to the Petition Area, is currently being investigated by the EPA as part of the Diamond Alkali Superfund Site investigation. The USEPA is investigating this six mile area because pesticides, dioxin, PCBs, metals and other hazardous substances have been found in river sediments near the Diamond Alkali facility (USEPA, 1996a). Data suggests that the ecology of this part of the Passaic River has been adversely impacted by the presence of these substances.

The USEPA, the U.S. Army Corps of Engineers (USACE), the National Oceanographic and Atmospheric Administration (NOAA) and NJDEP are working cooperatively to determine the

location, movement and quantity of contaminated sediments near the former Diamond Alkali facility. A specific Human and Ecological Risk Assessment Report for that facility is currently being prepared to explain any risks caused by the contaminated sediments to humans, animals and the ecosystem in the area (USEPA, 1996a).

7.3 POTENTIAL EFFECTS OF CONTAMINATED GROUND WATER ON RECEPTORS

This section confirms that natural attenuation processes already occurring in the Petition Area should provide remediation of the ground water sufficient to protect the Passaic River ecosystem.

7.3.1 Ground Water Model

A ground water model has been prepared for this Petition to estimate the time it will take each Pervasive Compound to travel to the river bank and to determine the concentration of each contaminant once if it reaches the river. The model addresses the horizontal movement of contaminants only, not the vertical movement. A one dimensional model has been chosen because the horizontal movement of contaminants is expected to be the predominant flow path. Also, there are no ground water production wells in the Petition Area that would cause significant downward movement of contaminants. If the vertical movement were considered, a two dimensional model would be more appropriate.

An analytical model was used and it relies upon standard mathematical equations to determine the fate and transport of contaminants in ground water. It also relies upon conservative assumptions about certain variables that pertain to the Pervasive Compounds, the nature of the soil in the Petition Area and the hydraulic characteristics of ground water in the Petition Area. These variables, as well as the model's conclusions, are set forth in Table 7-5.

Table 7-5 shows that, of the 22 Pervasive Compounds in the Petition Area, only four are expected to have a concentration above zero or minimum detection limits once they reach the river bank, and of those four, only two - vinyl chloride (340 µg/L) and chloroform (157 µg/L), will have concentrations above the Surface Water Quality Criteria (SWQC). This section later explains that all four contaminants have little or no bioaccumulation potential in the Passaic River ecosystem.

7.0 IMPACT OF GROUND WATER ON RECEPTORS

The following assumptions have been made with regard to this model:

1. The aquifer material through which each Pervasive Compound will migrate is homogeneous and isotropic.

   This assumption is made because the subsurface of the Petition Area has a variety of discrete geologic units, i.e., historic fill, tidal marsh deposits and glacial deposits (See Section 5.0). Each unit has its own unique impact on the movement of contaminants and therefore each would require its own model. Existing data from the petition area is not detailed enough to support individual modeling efforts.

2. The primary component of ground water transport will be advection and horizontal movement will be the predominant flow direction.

   This assumption is made because there are no pumping wells in the Petition Area to enhance vertical movement.

3. Dispersion and diffusion of the Pervasive Compounds in ground water will be negligible.

   This assumption is made because the dynamics of dispersion and diffusion, while complex, are unlikely to significantly impact the model, given the other assumptions being used.

4. Natural degradation will be the primary process by which the concentration of each Pervasive Compound will decrease as it travels to the river bank.

   This assumption is made because natural degradation is already occurring in the Petition Area (See Section 6.0).

5. Environmental conditions, such as temperature, pH, nutrients, oxygen, microorganisms and chemicals will be present in sufficient quantities to permit natural degradation.

   This assumption is made because natural degradation is already occurring at some level in the Petition Area, which necessarily requires that these environmental conditions exist.

Conservative assumptions have been used in order to present a "worst case" analysis. In other words, in order to create a reasonable level of confidence in the model's predictions, each variable was assumed to be a value that would most likely contribute to the contaminant reaching the river bank at the highest concentration possible. Even with these conservative assumptions, the model predicted that only two contaminants would reach the river bank in excess of the SWQC.

The best way to understand the model is to explain the step-by-step construction of Table 7-5 and to provide an example of how the model was applied to one of the Pervasive Compounds. That explanation is set forth in Appendix E.

Surprisingly, even though the most conservative assumptions were used in the model, the model shows that 10 of the 22 Pervasive Compounds are expected to be detected below reliable detection limits (see Table 7-5). This supports the assumption that the process of natural degradation already occurring in the Petition Area may significantly reduce the concentration of these contaminants over time.

Four (4) Pervasive Compounds may have some detectable concentration at the river bank, even with the effects of natural degradation, but the concentration of two of them, tetrachloroethene and trichloroethene, are expected to be many orders of magnitude below the Aquatic TRV (see Table 7-6). Chloroform is expected to be one order of magnitude below the Aquatic TRV (see Table 7-6). The other contaminant, vinyl chloride, is expected to be above the Aquatic TRV when it reaches the river bank (see Table 7-6). However, given the minimal bioaccumulative effect presented by these contaminants, it is not expected that they will harm the Passaic River ecosystem. These issues are discussed later in this section.

This model supports the position that, since natural degradation is occurring in the Petition Area (See Section 6), it can be relied upon to significantly degrade most of the Pervasive Compounds such that they present little or no threat to the Passaic River ecosystem.

7.3.2 Pervasive Compounds that May Reach Receptors

The Pervasive Compounds include thirteen volatile organics, one semi-volatile organic and eight metals. As shown in Table 7-5, the concentrations of most of the 22 Pervasive Compounds will be reduced to (or nearly to) below detection before the ground water is discharged to the river.

The assessment which follows is based on the results presented on Table 7-5 and the analysis presented in Section 6. Based on this information, the only contaminants likely to reach the river are tetrachloroethene, trichloroethene, vinyl chloride and chloroform. While ground water in the Petition Area contains some relatively high concentrations of metals, the analytical model suggests that they will not travel through ground water to the Passaic River.

The estimated concentrations of the four organic contaminants, when they reach the river, (as shown in Table 7-6) are compared with appropriate Toxicity Reference Values (TRVs) to confirm that there will be little impact to the river ecosystem. TRVs are criteria, guidelines or toxicity values specific to each contaminant. Chronic USEPA Ambient Water Quality Criteria (AWQC) for marine

environments (USEPA, 1991) are used primarily as TRVs. AWQC are non-regulatory values based on scientific assessment of ecological effects. If only acute AWQC were available for a contaminant, this value was divided by 10 to simulate a chronic value. If AWQC were not available for a particular contaminant, other TRVs were taken from the available literature. These include USEPA Tier II Secondary Chronic Values (Suter and Mabrey, 1994) and other toxicity data such as LC50s.

Tier II Secondary Chronic Values were developed so that aquatic benchmarks could be established with fewer data than are required for the National AWQC, and are based on the Tier II method described in the EPA's Proposed Water Quality Guidance for the Great Lakes System (Suter and Mabrey, 1994). This standard is being used as an initial screening to determine which contaminants in ground water may present a risk to aquatic life in the Passaic River following discharge of ground water into the river.

The quotient method was used to identify contaminants posing potential threats to aquatic life. This method characterizes possible ecological hazard as the ratio of concentration in the environmental medium to the corresponding criterion (in this case, the AWQC). If a Hazard Quotient (HQ) exceeds one, there is concern for possible adverse effects. In ground water, this is considered to be a conservative approach, since dilution of ground water can be expected at the point of discharge into surface water. Also, other factors such as adherence of chemicals to soil and/or sediment particles, volatilization once the chemicals are discharged, and other methods by which chemicals can be broken down or rendered unavailable, play a role in determining what the concentration in the surface water body will be once discharged from ground water.

The HQs for three of the four contaminants (chloroform, tetrachloroethene and trichloroethene) at the river bank are well below one, which indicates very low potential risk to aquatic organisms (see Table 7-6). The HQ for vinyl chloride at the river bank is 3.87, or nearly four times the TRV (see Table 7-6). This indicates that a potential risk would exist if the concentration in ground water was not diluted or reduced in any way once entering the Passaic River. This is not expected to be the case since 98,236,800 ft^3/day of river water flows by the Petition Area (see Section 7.3.5 - Dilution). Therefore, concentrations of vinyl chloride originating from the Petition Area should also be a low risk to aquatic organisms.

7.3.3 Surface Water and Sediment Quality

Surface Water. Very little surface water sampling (for chemical analysis) has been conducted in the Passaic River in the vicinity of the Petition Area. Based on conversations with state and federal agencies, most of the sampling has been conducted in the upstream (freshwater) reaches of the river. However, in a site evaluation study conducted in 1985 for the NJDEP (Diamond Shamrock et al.., 1985), some surface water analysis was done. The results of two rounds of sampling in the river (10/9/84 and 10/30/84) indicate the following concentrations of the four contaminants of concern: chloroform - 1 µg/l and ND; tetrachloroethene - 2 µg/l and 3 µg/l; trichloroethene - 2 µg/l and 1 µg/l; and vinyl chloride - ND in both rounds. These concentrations are all well below the aquatic TRVs listed in Table 7-6.

Sediment Quality. Considerable sampling of Passaic River sediment has been conducted in the vicinity of the Petition Area, as part of the Diamond Alkali Study being undertaken as a Superfund investigation. The most recent sediment data available from this study for areas near the Petition Area was collected in the Spring of 1995 (USEPA, 1997). Chloroform was not detected in any of the sediment samples analyzed. Tetrachloroethene was detected at a range of 95 to 240 µg/kg in three samples taken in the Harrison vicinity. Trichloroethene was detected in only one sample, also in the Harrison vicinity, at a concentration of 51 µg/kg. Vinyl chloride was detected in two samples taken in the Kearny vicinity at concentrations of 13 and 49 µg/kg. Both the Harrison and Kearny areas are upstream of the Petition Area.

These concentrations were compared with USEPA Ecotox Thresholds (USEPA, 1996b) for sediment. Ecotox Thresholds (ETs) are defined as "media-specific contaminant concentrations above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation" (typically used in Superfund ecological risk assessments as screening levels). "Ecological effects" include effects on benthic organisms.

The ET for tetrachloroethene, based on one percent organic carbon in the sediment, is 530 µg/kg. The ET for trichloroethene, also based on one percent organic carbon, is 1,600 µg/kg. There is no ET available for vinyl chloride. Concentrations of tetrachloroethene and trichloroethene in sediment upstream of the Petition Area are below these ETs. Total organic carbon (TOC) values for the areas in which the sediment samples were taken were much higher than one percent. At Harrison, the average TOC of the three samples in which tetrachloroethene was detected was 13.2 percent. The TOC of the sample in which trichloroethene was detected was 15.8 percent. Typically, the higher the TOC in the sediment, the less bioavailable a contaminant will be to benthic organisms, and the higher the ET will be. It is expected that the actual ETs for these contaminants

at the sediment sampling locations would be much higher than the ETs shown above which are based on TOC of one percent. Therefore, this is a conservative comparison.

The relatively low concentrations of these organic constituents in sediment is expected since these chemicals do not tend to bind heavily to sediments. If released into surface waters, they would tend to volatilize from the water column, rather than be deposited to the sediments.

7.3.4 Bioaccumulation Potential

The bioaccumulation potential is low for the four Pervasive Compounds which may reach the Passaic River. Therefore, even if they reach the river, they are not expected to create an environmental hazard, especially since the dilution factor expected from the river is significant (see Section 7.3.5).

- **Chloroform** - Based on the slight bioaccumulation potential of this chemical, the concentration of chloroform that may be found in fish tissue is likely to be slightly higher than the average concentration of chloroform in the water from which the fish was taken (NJDOH, 1997a). An equilibrium Bioconcentration Factor of six with a tissue half-life of less than one day was determined for the bluegill (freshwater fish) (Clement Associates, 1985). Although chloroform is not strongly bioaccumulated, it is thought to be widely distributed in the environment and can be detected in fish, water, birds, marine mammals and various crops.

- **Tetrachloroethene** - Experimentally measured Bioconcentration Factors for tetrachloroethene have been found to range from 39 to 49 (Barrows et al., 1980; Kenaga, 1980; Neely et al., 1974; Veith et al., 1980). Data from two Japanese studies also indicate that this contaminant has low bioconcentration potential (Kawasaki, 1980; Sasaki, 1978).

- **Trichloroethene**- An experimentally measured Bioconcentration Factor of 17 in fish was reported for trichloroethene (Barrows et al., 1980; Veith et al., 1980). The maximum overall increase in concentration between sea water and the tissues of animals at the top of food chains, such as fish liver, sea bird eggs, and sea seal blubber, is less than 100-fold for this contaminant (ATSDR, 1993). Biomagnification in the aquatic food chain does not appear to be important (Pearson and McConnell, 1975).

- **Vinyl chloride** - The concentration of vinyl chloride found in fish tissue is expected to be about the same as the average concentration of vinyl chloride in the water from which the fish was taken (NJDOH, 1997b). Based on the reported water solubility, a Bioconcentration Factor of 7 was estimated (Lyman et al., 1982). Consequently, vinyl chloride will not be expected to significantly bioconcentrate in aquatic organisms (Howard, 1989).

7.3.5 Dilution

The estimated flow of ground water from the entire Petition Area, into the Passaic River, is approximately 890 cubic feet per day (ft3/day), based on the following assumptions: 1) the hydraulic gradient is equal to the slope of the water table, 2) for small water-table gradients, the streamlines are horizontal and equipotential lines are vertical, and 3) recharge or evaporation are not accounted for as the flow traverses the region.

According to stream monitoring data compiled by the United States Geological Service (USGS), the average flow in the Passaic River at Little Falls (upstream of the Petition Area, in a freshwater section) is 1,137 cubic feet per second (cfs), or 98,236,800 ft3/day (USGS, 1973). Therefore, ground water from the Petition Area would be diluted approximately 110,000 times once discharged into the river.

Since the concentration of vinyl chloride in ground water at the river bank was only four times the aquatic TRV, this dilution is considered to be more than adequate in protecting aquatic life from potential adverse effects of this and all other Pervasive Compounds.

This dilution estimate of 110,000 times is a conservative estimate, considering that the Passaic River flow value was taken from a freshwater reach of the river. The actual flow in the portion of the river near the Petition Area would be expected to be higher due to other sources of freshwater flow (e.g. the Saddle River) combined with tidal flow from Newark Bay.

Since (1) the background concentrations of the four Pervasive Compounds in both surface water and sediment of the Passaic River are low; (2) the concentrations in ground water at the river bank are low; and (3) the ground water is diluted to a great extent once discharged, it is not expected that surface water impairment would be caused by contaminants in ground water from the Petition Area.

7.4 SUMMARY

The Petition Area is in an urban complex with a very dense human population. Likewise, the Passaic River basin is the most urbanized large river basin in New Jersey, and its waters are subject to many competing uses. These uses include limited recreational uses, public and industrial water and discharge of municipal and industrial wastewater. Also, the lower six miles of the river comprise the Passaic River Study Area, an area being evaluated as part of the USEPA Superfund Program. As a result, the Passaic River is considered to have serious water quality problems.

7.0 IMPACT OF GROUND WATER ON RECEPTORS

Very few wetland areas remain within and in the immediate vicinity of the Petition Area. Tidal wetlands along the Passaic River and Newark Bay are considered to be significant, based on their ability to sustain migratory birds and anadromous fish. Benthic macroinvertebrates tolerant of heavy inorganic pollutant loads are characteristic of the lower Passaic River. Sampling of fish in the river revealed fish species characteristic of the lower Hudson River estuary. The spawning success of anadromous fish such as blueback herring, alewife and American shad is limited in the Passaic River due to the poor water quality and limited spawning habitat. There is currently an advisory against consumption of all fish and shellfish taken from the tidal Passaic River due to PCB and dioxin contamination of aquatic animals and sediments in the lower Passaic.

Of the 22 Pervasive Compounds in ground water within the Petition Area, four organic constituents (chloroform, tetrachloroethene, trichloroethene and vinyl chloride) may be discharged into the Passaic River. Comparison of the estimated concentrations of these chemicals at the river bank with USEPA AWQC indicate that a potential risk could exist for vinyl chloride for aquatic species, such as benthic organisms and fish in the river, if this concentration at the river bank was not diluted or reduced once entering the Passaic River. Based on the estimated ground water discharge from the Petition Area into the Passaic River (890 ft^3/day), and the average flow of the Passaic River (98,236,800 ft^3/day), ground water would be diluted approximately 110,000 times once discharged into the river. Based on this dilution factor, and the fact that the four contaminants of concern do not exhibit high bioaccumulation potential, it appears unlikely that surface water impairment would be caused by contaminants in ground water from the Petition Area.

In general, receptors in the Petition Area are most affected by the ambient surface water and sediment quality of the Passaic River. Ground water discharges to the Passaic River from the Petition Area are considered a minor contributor of the contamination found in surface water. With time, the currently low contribution of ground water to surface water contamination will decrease as contaminant levels in ground water are reduced following source remediation, pollution prevention and natural attenuation. Therefore, because future contributions of contaminated ground water to surface water will be lower than current levels and because the current levels are not believed to be significant, future contributions of ground water to surface water contamination are also expected not to be significant.

8.0 DEMONSTRATION OF THE FIVE CHARACTERISTICS OF CLASS II-B GROUND WATER

The Department's regulations and Draft Guidance Document require that the Petitioners demonstrate that ground water in the Petition Area meets the following five Class II-B characteristics:

Characteristic No. 1: Ground water quality must exhibit "extensive exceedences " of one or more of the ground water quality criteria as a result of past discharges of ground water pollutants.

Characteristic No. 2: Restoration of ground water to applicable GWQS cannot be achieved using "technologically practicable means".

Characteristic No. 3: No public water supply (or less than 5%) is derived from the Petition Area and there is no significant potential for this to change over the next 25 years.

Characteristic No. 4: There is no significant pollution migration into Class I, II-A or III-A areas.

Characteristic No. 5: Natural attenuation can be relied upon for the restoration of ground water in the Petition Area and reliance thereon will not contravene surface water quality criteria.

The information presented in this Petition supports the petitioners opinion that the area meets all five Characteristics.

8.1 CHARACTERISTIC NO. 1

Ground Water Exhibits Extensive Exceedences for 22 Constituents

Ground water data for the Petition Area shows that of the 171 constituents listed as having Class II-A ground water criteria, 107 of them, or 62%, are exceeded in the Petition Area (see Table 6-7). Of these 107 constituents, 22 have been identified as "Pervasive Compounds" which are defined as those compounds that are aerially distributed within the Petition Area (see Table 6-3). The Pervasive Compounds generally fell into four categories: the BTEX group, other volatile organic compounds, semi-volatile organic compounds and metals. It is apparent that these contaminants originated from historic filling and industrial activity that has taken place within the Petition Area. A significant discussion of the historic development of the Petition Area was set forth in Sections 2.0 and 3.0. The area has historically been used by industrial facilities that produce chemicals, paints, plastics, iron and steel, non-ferrous metals, fabricated metal products, petroleum, leather, paper and

other products. There is also a significant correlation between the raw materials used by these industries and the presence of related contaminants found in ground water in the area (see Table 2-6).

8.2 CHARACTERISTIC NO. 2

Active Ground Water Remediation in the Petition Area would cost $2.5 billion dollars and be "technologically impracticable" to achieve.

As part of the engineering studies performed for this Petition, Delta Technologies Group of Littleton, Colorado assisted by Dr. J. David Frost, Head of the Geosystems Engineering Program in the School of Civil and Environmental Engineering at the Georgia Institute of Technology, were retained to estimate the cost of actively remediating ground water in the Petition Area to current Class II-A GWQS. The methodology used to perform this study and the results obtained are presented below.

Cost Estimating System

The cost estimating system used in this study was the RACER/ENVEST system which was developed by the U.S. Air Force in association with other federal government agencies including the USEPA. RACER/ENVEST is a PC-based environmental cost estimating system that can be used to accurately estimate costs for all stages of remediation projects including the study phases, remedial design phases, remedial action phases, long term operation and maintenance phases and any site work and utility activities related to the remediation project.

System Validation

The RACER/ENVEST cost estimating system has been used to estimate costs on projects with a total cost in excess of $10 billion that have already been successfully completed. It has also been used to estimate costs on a large number of additional projects which are still in the planning phases or early phases of study, design or remediation. The system has been used by the USEPA in all 10 EPA regions for Superfund project management and facilities oversight. Accordingly, the system has been rigorously field tested and proven.

8.0 DEMONSTRATION OF THE FIVE CHARACTERISTICS OF CLASS II-B GROUND WATER

Cost Estimating Approach for Ironbound Ground Water Reclassification Project

While the Petition Area encompasses approximately 2688 acres and thus as a project represents an area significantly larger than is typically encountered in most single owner private/industrial sites being remediated, it is comparable in extent to many military facilities. Further, given that the Petition Area can be readily sub-divided into smaller sites or remediation units based on the former activities conducted at the sites and the contaminants present, it has an even greater resemblance to military facilities which typically involve many sub-sites contaminated as a result of different military related activities (eg., aircraft refueling areas, maintenance facilities, ammunitions storage areas). The similarity between the Petition Area and a typical military facility makes RACER/ENVEST ideally suited for estimating cleanup costs since it was developed to be used in estimating remediation costs for small single site projects as well as large projects, including multiple sites with different contaminants and different geologic and hydrogeologic conditions requiring different treatment trains for remediation.

Notwithstanding the technical suitability of RACER/ENVEST for use in estimating remediation costs for this project, the complexity of the Petition Area as a result of the lateral and vertical extent and distribution of the multiple contaminants present in the subsurface, as well as the complex and variable geologic and hydrogeologic conditions, inherently introduces a significant amount of uncertainty into any estimate of costs. As a result, significant effort was expended in the process of generating the estimate summarized herein to perform sensitivity analyses, where possible, to quantify the implications of key assumptions required to complete the study and to use complementary data sources as the basis for supplemental confirmatory cost estimates.

Identification of Remediation Units and Treatment Trains

In keeping with the approach adopted in other engineering studies performed as part of this Petition Area (eg. 1-D groundwater flow model studies), RACER/ENVEST was used to estimate the cost of remediating sites where existing site characterization data indicated that one or more of the 22 Pervasive Compounds existed. Sites where other contaminants may exist were not considered.

The 22 Pervasive Compounds in the Petition Area include 6 Light Non-Aqueous Phase Liquids (LNAPL's), 8 Dense Non-Aqueous Phase Liquids (DNAPL's) and 8 metals. Further, the LNAPL's are all volatile organic compounds while the DNAPL's are all halogenated volatile organic compounds. Using the results of chemical analyses performed on samples recovered from the

monitoring wells included in the Petition database, remediation management units were identified as follows:

1. LNAPL's present only
2. DNAPL's present only
3. Metals present only
4. LNAPL's and DNAPL's present
5. LNAPL's and metals present
6. DNAPL's and metals present
7. LNAPL's, DNAPL's and metals present

These management units, based on the Pervasive Compounds present, were subsequently used as the basis for the selection of remediation trains for use in cost estimating. For example, for sites identified as having LNAPL contamination only, an in-situ remediation treatment train was selected consisting of air sparging, soil vapor extraction and vapor phase carbon adsorption with discharge of the liquid residuals produced to a publicly-owned-treatment-works, complemented by in-situ biodegradation, as a cost-effective and technically viable approach. Comparable proven technology trains were identified as appropriate for the other six classes of remediation units. A total of 44 remediation units were accordingly identified in the Petition Area ranging in size from about 2 acres to about 20 acres.

Lateral Extent of Remediation Units

The lateral extent of the remediation units was estimated using the locations of monitoring wells included in the Petition database and the results of chemical analyses performed on samples recovered from those wells. In some cases, the remediation units included adjacent properties with similar contaminant and subsurface conditions and thus suitable for remediation with a single treatment train; while in others, the remediation units included only property belonging to a single owner. In identifying these remediation units, a key factor was the contaminant types present since these formed the basis for the treatment trains.

Vertical Extent of Remediation Units

The vertical extent of the remediation units was estimated on the basis of the regional ground water surface map developed using data from the Petition database prepared by Malcolm-Pirnie, the idealized stratigraphic cross section of the site developed by Malcolm-Pirnie and a review

of the elevations of the screened sections from wells where analyses indicated contaminants were present. On the basis of these complementing data sources, the vertical extent of the expected zones of contamination for each of the remediation management units based on contaminants present were selected. In addition, this data was used to identify remediation sub-zones (West, North and East) within the complete Petition Area to facilitate cost estimating purposes. These zones were based on several factors including the direction of ground water flow proposed by Malcolm-Pirnie, the ground water surface elevations and the subsurface geological conditions. For example, remediation of units with LNAPL contamination present only in the East sub-zone was estimated using an expected contamination plume depth of 15 feet. Comparable vertical contamination extents were determined for each of the twenty other combinations of contaminant types and sub-zones.

Technology Impracticality Considerations

It was assumed for the purposes of this cost estimation that there is extensive DNAPL contamination present in each of the remediation sub-zones (West, North and East) within the Petition Area. This is based on the presence and concentrations of DNAPL compounds identified in the monitoring data. As noted earlier, treatment trains were identified for each of the contaminant-based remediation units within these sub-zones. Of the 44 remediation units identified, 27 included DNAPL contamination. Accordingly, while treatment trains have been identified which include "best available" technologies designed to remediate sites contaminated with DNAPL's, and thereby permit estimation of remediation costs, it is important to recognize that it is currently well accepted that DNAPL contamination is considered as one which is extremely difficult to remediate with current technologies. In many cases, the severity of contamination at sites has been compounded by poorly selected and implemented remediation efforts which result in cross-contamination between contaminated aquifers and underlying previously uncontaminated aquifers as a result of the physical and chemical properties of DNAPL's and their propensity to "sink". This position is endorsed for example by the USEPA in their interim final guidance document 9234.2-25 entitled "Guidance for Evaluating the Technical Impracticability of Ground Water Restoration" issued in September, 1993.

Common Parameters Used in Cost Estimate

In developing an estimate of the remediation costs for the Petition Area, a number of common parameters were selected for estimation purposes. In all cases, parameter values were

selected to represent conservative values so that the final cost estimate would tend to under-predict the actual cost rather than over-predict. For example, long-term operation and maintenance (LTO&M) for all treatment trains at the 44 remediation units was set at a fixed value of 10 years. This value was considered to be a lower bound estimate of the actual duration since chemical analyses performed during monitoring would likely lead to extended LTO&M periods at many sites based on meeting regulatory maximum contaminant levels. Other common parameters were similarly selected as lower bound values to be used in the estimate including:

- Project start-up period - 6 months
- Escalation: 1.066
- Project management - 10%
- Prime contractor overhead - 160%
- Sub-contractor overhead - 20%

While actual values for these common parameters are expected to vary from site to site, it was considered to be reasonable for the purpose of the present estimate to use uniform values across the Petition Area since many of these parameters can typically be expected to vary from contractor to contractor.

Remediation Units

As noted earlier, the methodology used to estimate the total cost of remediating the Petition Area was to identify remediation management units based on similarity of contaminant types, subsurface geologic and hydrologic conditions and remediation trains. This approach resulted in the identification of 44 remediation units of varying areas ranging between 2 and 20 acres. The distribution of sites by category is summarized in Table 8-1.

In addition, based on the total acreage to be remediated (327 acres) and the number of remediation management units (44), a typical remediation unit area of 8 acres was selected as the basis for subsequent cost estimating purposes.

Cost Estimate

Using the approach and parameters summarized above, the RACER/ENVEST system was used to determine the cost for remediation at 8 acre sites within each of the Petition Area sub-zones (West, North and East) for each of the different contaminant scenarios and treatment trains. Using these values, the per acre cost for each configuration was then computed and finally the cost for

each of the 44 remediation management units was estimated by multiplying the per acre cost appropriate for that unit by the actual unit area. The individual unit costs were then summed to determine the total estimated project cost of $2.5 billion. Key quantities are summarized in Table 8-2.

Sensitivity Analyses

As part of the cost estimating process, a number of sensitivity analyses were performed to quantify the impact of a number of assumptions on the final estimated cost. For example, the influence of selecting a typical operable unit size of 8 acres was evaluated by also computing costs for a range of assumed operable unit sizes ranging between 1 and 8 acres. This upper limit is related to practical limits for technologies such as air sparging. For actual remediation activities, units larger than this would be sub-divided into smaller units therefore it was considered inappropriate to use larger size units in estimating the costs. The difference in estimated costs depending on assumed typical operable unit size was determined to be about 2%. Further, by using smaller operable unit sizes, higher costs would be estimated, thus 8 acres was selected as a suitable size based on technological and financial factors.

Additional sensitivity analyses were performed to investigate the influence of the vertical extent of contamination on the total estimated cost. Even for the large database of contaminant concentrations available in the Petition Area, this factor has a significant influence on the computed mass distribution and hence remediation requirements. Since actual remedial design would require additional site specific data above what was available in developing the current cost estimates, it was decided to use lower-bound estimates of contaminant thickness in the current study to avoid over-estimating the remediation costs.

Costs Not Included in Estimate

A number of costs were intentionally not included in the estimate to avoid artificially inflating the costs of remediating the Petition Area in the event that the aquifer were to remain classified as a Class II-A aquifer relative to the costs of natural attenuation permissible following reclassification of the aquifer. These items and the effect of not including them are summarized below.

- ***Areas other than those contaminated with the 22 Pervasive Compounds*** - Costs were not estimated for remediating areas other than those where one or more of the 22 Pervasive Compounds were known to exist. Consideration of areas contaminated with less pervasive

contaminants would increase the total percentage of the Petition Area requiring remediation and thus increase the total estimated cost to an amount greater than $2.5 billion.

- ***Removal of the free product*** - costs for removal of free product were not included in the treatment trains used to estimate the costs herein since those costs would also likely be incurred as a pre-cursor to natural attenuation, even if the aquifer were reclassified. Since the purpose of the estimate was to identify the potential cost savings resulting from reclassification of the aquifer to Class II-B, it was considered appropriate not to include these costs.

- ***15 E landfill*** - this facility which is located at the North East corner of the Petition Area is a closed unregistered 45 acre facility which accepted bulky construction and demolition debris. Discharge from the landfill is monitored by a number of wells; however, results from chemical analyses performed on samples from these wells were not available for inclusion in the estimate. Obviously, if remediation were to be conducted at this facility, the estimated cost of remediating the Petition Area would increase.

- ***Remedial investigation/feasibility study costs*** - no RI/FS costs were included in the estimate since it was considered that many of the sites have already completed significant aspects of these studies. If additional studies were required, this would increase the total estimated cost.

- ***Contingency*** - environmental cost estimates typically incorporate a percentage of total costs to cover cost increases which may be incurred as a result of unforeseen conditions. No contingency was included in the present estimate; however, should such conditions actually occur, then obviously, the total estimated cost would increase.

Conclusions

This section has summarized the methodology used and results obtained in a study to estimate the cost of remediating the Petition Area should the Petition be denied and remediation subsequently required. The cost was estimated using the parametric estimating system RACER/ENVEST. The total estimated cost was $2.52 billion. This estimate is based on a thorough engineering evaluation of the available data, as well as a detailed consideration of contaminant, geologic and hydrogeologic conditions. Throughout the study, conservative assumptions were made such that the final estimated cost of $2.52 billion is considered to be a lower-bound estimate.

8.3 CHARACTERISTIC NO. 3

No Public Water Supply Wells Exist in the Petition Area.

Water for the Ironbound and the City of Newark is supplied by the North Jersey District Water Supply and the Passaic Valley Water Company. These purveyors do not have wells or water

intakes within or near the Petition Area. The Petition Area has never been used as a source of potable water supply. In addition, the North Jersey District Water Supply and the Passaic Valley Water Company have no intention in the near future (within the next 25 years) to begin using ground water from the Petition Area. See confirmation letters (Appendix E).

8.4 CHARACTERISTIC NO. 4

There is No Significant Risk of Pollution Migration into Class I, II-A or III-A Areas.

The Petition Area is relatively small in size, approximately 4.2 miles, and is uniquely located at the confluence of the Passaic River and Newark Bay. The northern and eastern boundaries of the Petition Area are bounded by these waterways.

Ground water flow has been demonstrated to flow towards these surface water bodies (Section 5.0). There are no pumping wells within or near the Petition Area to influence the flow of ground water in another direction. Since there are no Class I, II-A or III-/A areas between the Petition Area and the river, there is no chance for migration into these more stringent areas.

The western and southern boundaries of the Petition Area are, arguably, Class II-A Areas. However, since ground water flow is in the opposite direction, it is not anticipated that ground water will flow to these areas. In addition, since the area surrounding the Petition Area is also heavily industrialized, with ground water data showing contamination, the surrounding area should generally not be considered as having better ground water quality than the Petition Area.

8.5 CHARACTERISTIC NO. 5

Natural Attenuation Can Be Relied Upon to Remediate Ground Water Without Contravening Surface Water Quality Criteria.

Sections 6.0 and 7.0 address the migration and potential impact the Pervasive Compounds may have on the Passaic River. It has been determined that each of the 22 Pervasive Compounds are presently being impacted by one or more of the natural degradation processes of bioremediation, solubility, adsorption, or volatilization (see Table 6-4). This was supported by existing ground water data for the Petition Area (see Section 6.0).

In addition, the analytical ground water model set forth in Section 7.0 (see Table 7-5) provides supporting data that natural attenuation can be relied upon to destroy or impede the

movement of the Pervasive Compounds as they travel towards the Passaic River. Only four of the Pervasive Compounds were predicted to impact the Passaic River and of those four, only two (chloroform and vinyl chloride) were expected to impact the river in excess of Surface Water Quality Criteria.

A further examination of the quality of surface water and sediment in the Passaic River show that these contaminants are not significantly impacting the river in comparison to the variety of other compounds that have contaminated the river from upstream sources, direct dischargers, and the Diamond Alkali Superfund Site. In addition, given the high dilution rate that will occur by the constant flow of river water, it is anticipated that any ground water contaminants from the Petition Area impacting the Passaic River will be quickly reduced to insignificant levels. Lastly, to the extent that any of the four Pervasive Contaminants that may reach the Passaic River come into contact with fish or other living organisms, studies show that these four contaminants have little or no bioaccumulative impact.

9.0 RECLASSIFICATION WILL NOT RESULT IN SIGNIFICANT RISK TO PUBLIC HEALTH, SAFETY AND THE ENVIRONMENT

The previous sections have shown that the Pervasive Compounds in the Petition Area are being degraded by natural degradation processes. Previous sections have also shown that the impact of contaminated ground water on human receptors is virtually non-existent (since no potable wells exist in the Petition Area) and the potential impact on ecological receptors (animals, fish, plants, wetlands, etc.) is minimal given the attenuation of contaminant concentration over distances and the low bioaccumulation potential for most of the Pervasive Compounds. Nevertheless, in addition to these specific proofs, NJDEP procedures require a broader and more general analysis confirming that ground water reclassification will not result in "significant threats to public health, safety and welfare". N.J.A.C. 7:9-6.10(g). This "relative risk" issue can be examined using the Department's Remedial Priority System regulations. N.J.A.C.:26F-1.1 et seq.

The Remedial Priority System is a numeric ranking system which allows the Department "to evaluate the relative risks associated with sites that are contaminated with hazardous substances, wastes and pollutants that pose a risk to public health, safety and the environment." N.J.A.C. 7:26F-1.2. The Department intends to apply the scoring system to the 6000+ Known Contaminated Sites in New Jersey for the purpose of ranking them "worst-first" in order to determine which sites should be cleaned up first, using public funds.

This scoring system considers three factors when examining relative risk: (1) contaminant characteristics such as toxicity, mobility and bioaccumulation; (2) human and ecological receptors; and (3) the likelihood that contaminants might impact receptors. Since the Remedial Priority System is a tool used by the Department to determine relative risks, it is being used here to analyze the relative risk component in the Department's ground water reclassification requirements.

The Petition Area was scored using the Remedial Priority System as if it were one site in order to determine whether ground water contaminants in the Petition Area may be a significant threat to human health, safety and welfare. Since there is sufficient documented contamination for ground water pollution in the area, the scoring was based upon this documented contamination. There was no need to score the Petition Area based upon "potential contamination" (a less exact analysis).

The Department provides the Score Sheets for the purpose of generating a relative risk score. Based upon the scoring mechanics, the highest score a site can receive for relative risk

9.0 RECLASSIFICATION WILL NOT RESULT IN SIGNIFICANT RISK TO PUBLIC HEALTH, SAFETY AND THE ENVIRONMENT

relying upon documented ground water contamination is 90. This score indicates that the site scored the highest score for all factors.

The following table identifies the risk factors analyzed by the Remedial Priority System and compares the score received by the Petition Area with the highest scores available for each factor:

RELATIVE RISK SCORE

	Factors	Highest Possible Score	Petition Area Score
I.	Contaminant Characteristics		
	A. Contaminants of Concern for Ground Water		
	1. Contaminants of Concern Selection	N/A	N/A
	2. Contaminant Concentration	20	20
	B. Contaminant Source Status	10	0
	C. Contaminant Mobility	10	10
II.	Receptors		
	A. Ground Water Classification	10	1
	B. Type of Usage	10	1
	C. Natural Resources	10	0
III.	Likelihood of Impact		
	A. Distance to Point of Usage	10	0
	B. Hydraulic Conductivity	10	5
	TOTALS:	90	37

The Score Sheets (Appendix G) indicate that the Petition Area scored 37 out of a possible 90. While the Department compares a score with scores from other sites in order to rank them highest to lowest, the score can also provide relative risk information by itself.

As shown above, the Petition Area scored low for 6 out of 8 factors. This supports the fact that the relative risk to public health, safety and welfare by reclassifying the Petition Area is not a "significant risk". This is the same conclusion reached earlier in the Petition when the specific factors were individually analyzed (see Sections 6, 7 and 8).

Section 10

REPORT TO

2B ENVIRONMENTAL INC

ON THE ECONOMIC IMPACT

OF GROUNDWATER RECLASSIFICATION ON

THE IRONBOUND AND

THE CITY OF NEWARK



Submitted by:

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EXECUTIVE SUMMARY

The Ironbound Groundwater Reclassification Area is part of an old industrial section of the City of Newark in Essex County, New Jersey. As shown in the attached map, the reclassification area is on the eastern edge of Newark. It is bounded by Adams St. on the west, by the Turnpike extension to the Holland Tunnel on the south, and by the Passaic River and Newark Bay to the north and east. The area is bisected by the New Jersey Turnpike. It is just to the north of Port Newark and Newark International Airport and just to the east of downtown Newark. The Ironbound received its name because it was edged by highways and railroad tracks. It was the heart of Newark during the city's major industrial period, and, given its location and industrial base, the Ironbound could be a major contributor regional economy again.

During the period when heavy industry flourished in the area, the soil and groundwater became contaminated. One major drawback to redevelopment in the Ironbound is a result of modern environmental legislation. The groundwater in the Ironbound is classified as potable. Under the law, a company located in an area where the groundwater is so classified is responsible for groundwater cleanup to potability. This legislation, and the uncertainty of the costs connected with such cleanup, make it financially risky to operate in the Ironbound.

If, as is proposed in the solution to this problem proposed by 2B Environental, Inc., the groundwater in the Ironbound were reclassified to non-potable, the companies in the area would be able allow natural attenuation of the pollutants to occur. Their financial risks would decrease and they would be able to use the money that would be freed up for other business purposes. The impact study, which is the final section of this report, assumes that these funds, otherwise needed for cleanup, are used for productive investment purposes.

This study outlines the economic and fiscal impact of groundwater reclassification on the Ironbound, the city, and the county. We will do this using an input-output model calibrated to fit Essex county.

The report includes several sections:

- --descriptions of the economies of Essex county, Newark, and the Ironbound,
- --a description of the input-output model, and the assumptions made in using the model, and
- --the economic impacts of groundwater reclassification on the region.

The major findings of the report are that:

• the capital cost of cleanup would be about one third of a year's total output in the Ironbound, and ongoing costs would be about 4% of a year's output,

• the employment impact of the capital cost of cleanup would be about 6% of the employment base in Newark, and the the employment impact of the ongoing cost of cleanup would be about 0.5% of the employment base in Newark,

• the wage impact would be slightly greater than the employment impact, and

• the impact on output would be somewhat smaller and concentrated in manufacturing and transportation and utilities, the two industries that would bear most of the cost of cleanup.

ESSEX COUNTY, THE CITY OF NEWARK, AND THE IRONBOUND

Essex County

Essex County is situated in the northeastern part of New Jersey. With its old manufacturing base and concentrated transportation and financial services industries it is one of the most industrialized areas in the state.

During the 1970s and 1980s when New Jersey experienced strong growth in employment and some population increase, jobs in the county fell slightly and there was a steep drop in population. Although the population decline slowed in the early 1990s, as can be seen in Table 1, the job loss continued and worsened during the recession of the early 1990s.

Table 1

Employment* and Population

	1970	1980	1990	1994	1970-1980	1980-1990	1990-1994
			Employment			Annual %ch in Employment	
New Jersey	2075.0	2506.4	3022.9	2928.9	1.9%	1.9%	-0.8%
Essex County	315.7	308.2	310.7	284.3	-0.2%	0.1%	-2.2%
Newark		130.7	115.3	109.63		-1.2%	-1.3%
Ironbound			20.8				
			Population			Annual %ch in Population	
New Jersey	7203.3	7373.4	7740.0	7904.0	0.2%	0.5%	0.5%
Essex County	933.2	850.5	777.2	765.3	-0.9%	-0.9%	-0.4%
Newark	381.9	329.2	275.2	258.8	-1.5%	-1.8%	-1.5%
Ironbound			37.9				

*Private employment, covered by unemployment insurance

Sources: Employment: NJ DOL; Population and Ironbound employment: US Bureau of the Census

Foreign immigration has been a major source of population growth in the state in the past few years, although, as shown in Table 2, it has not quite offset domestic out-migration. Immigration into Essex county has been weak, counterbalancing only a third of domestic out-migration. Although the birth rate in Essex county is higher than the state average, and the birth to death ratio in Essex county is about the same as New Jersey's, the weaker immigration to Essex has meant that while New Jersey's population rose 2.1% between 1990 and 1994, Essex county's population fell 1.5%.

Table 2

Components of Population Change

1990 to 1994

	Change	Natural Increase	Births	Deaths	Migration Domestic	Migration International	Migration Net	Group Quarters
New Jersey	173793	204779	508211	303432	-188995	165731	-23264	-7722
Essex	-12616	24091	58841	34750	-56226	18539	-37687	980
Newark	-16469	13274	23428	10154	-36948	6319	-30629	886

Source: NJ Department of Labor

Because population and employment fell in the 1970s and 1980s in Essex county, personal income in the county grew more slowly than the state average. Personal income per capita, which was above the state average in 1970, fell relative to the state in the 1970s and 1980s. However, as shown in Table 3, in the 1990s personal income in the county rose faster than the state average, and by 1994 per capita income in the county and state were about equal.

Table 3

Income and Income per Capita

	1970	1980	1990	1994	1970-1980	1980-1990	1990-1994
	Income				Annual %ch in Income		
New Jersey	$ 34,548	$ 85,367	$193,216	$219,252	9.5%	8.5%	3.2%
Essex County	$ 4,654	$ 9,412	$ 18,204	$ 21,289	7.3%	6.8%	4.0%
	Income per Capita				Annual %ch in Income per Capita		
New Jersey	$ 4,796	$ 11,578	$ 24,963	$ 27,739	9.2%	8.0%	2.7%
Essex County	$ 4,987	$ 11,066	$ 23,423	$ 27,818	8.3%	7.8%	4.4%

Source:US Bureau of the Census, Bureau of Economic Analysis

The recession in Essex county started in 1988, a year earlier than in the rest of the the state, and ended a year later. Private sector employment peaked at 318,100 in 1988, and fell by 32,200 to 285,900 in 1993. In 1994 Essex county added fewer than 2,000 jobs. That growth was concentrated in air transportation, and business and health services.

Table 4 shows the industrial structure of the County, in comparison to that of the State and the City of Newark, in 1980 and 1994. In 1980 Essex county had a larger than average proportion of private employment in transportation, communications and utilities, finance, and services. The high shares of these industries was due in large measure to their predominance in Newark, with its port, airport, and bank and insurance company headquarters.

By 1994 mergers, restructuring, and downsizing had decreased the number of jobs in the communications and utilities and financial sectors in city and county, and decreased the industry share of finance in Essex county. Weak income growth induced a decline in employment in the retail trade sector, while manufacturing employment declined at about the same rate as in the rest of the state. The services sector grew, but less rapidly than the state average. Only transportation sector employment, driven by growth at the Port of Newark and the Newark International Airport, grew more rapidly than the state average.

Table 4

Industrial Structure of NJ, Essex County, and Newark*

1980 and 1994

	1980			1994		
	New Jersey	Essex	Newark	New Jersey	Essex	Newark
Agriculture & Mining	0.7%	0.3%	0.1%	0.9%	0.3%	0.0%
Manufacturing	31.1%	27.1%	31.0%	17.3%	15.8%	17.0%
Construction	4.4%	3.3%	2.7%	4.2%	3.2%	2.1%
Transportation	4.3%	5.3%	9.6%	5.0%	9.0%	19.7%
Communications & Utilities	3.1%	4.7%	6.7%	3.2%	3.4%	5.3%
Wholesale Trade	8.0%	7.1%	6.0%	8.9%	7.4%	5.4%
Retail Trade	19.0%	15.2%	11.0%	19.4%	13.8%	8.5%
Finance	6.2%	10.6%	12.5%	7.6%	10.7%	11.8%
Services	22.4%	26.4%	20.4%	33.1%	36.3%	30.2%
Unclassified	0.8%	0.0%	0.0%	0.3%	0.0%	0.0%

*Percent of Private Employment

Source: Trends in Employment and Wages, 1980 and 1994, NJ DOL

Wages rates, as shown in Table 5, in Essex county are, on average, higher than in the state as a whole. They are particularly high in the financial sector where they are raised by Newark's headquarters jobs.

Table 5

Annual Wages Rates($)

	1994			Compared to New Jersey	
	New Jersey	Essex	Newark	Essex	Newark
Agriculture & Mining	$ 21,842	$ 21,902	na	1.00	na
Manufacturing	$ 40,667	$ 39,171	$ 43,679	0.96	1.07
Construction	$ 36,954	$ 39,321	$ 34,468	1.06	0.93
Transportation	$ 31,422	$ 32,402	$ 32,976	1.03	1.05
Communications & Utilities	$ 55,725	$ 57,022	$ 61,474	1.02	1.10
Wholesale Trade	$ 42,149	$ 39,108	$ 36,544	0.93	0.87
Retail Trade	$ 17,696	$ 18,052	$ 17,917	1.02	1.01
Finance	$ 42,148	$ 48,055	$ 50,478	1.14	1.20
Services	$ 30,594	$ 32,584	$ 30,732	1.07	1.00
Average	$ 32,782	$ 34,736	$ 35,082	1.06	1.07

Source: Trends in Employment and Wages, 1994, NJ DOL

The City of Newark

The City of Newark is an old urban industrial center situated at the eastern edge of the county. Surrounded by major highway systems and on the major rail and transit lines, it is an easy commute to New York City as well as to most of New Jersey. Newark, as home to Port Newark and the Newark International Airport, is also a major focal point for freight movements by rail, truck, water and air.

The city has been losing ground economically for decades. That Newark has not shared in the prosperity of the state can be inferred from the population and employment statistics shown in Table 1, and the income statistics shown in Table 6. Newark has been losing population since it reached a peak of 438,000 in 1950. It lost 56,000 residents between 1950 and 1970, and another 124,000 between 1970 and 1994.

Between 1980 and 1994, even with a major recession in the early 1990s, private employment in New Jersey rose at an average annual rate of 1.1%. During the same period private employment in Newark fell at an average annual rate of 1.3%.

As can be seen in Table 6, per capita money income in Newark was comparatively low in both 1980 and 1990. In 1980 it was only 60% of per capita income in Essex county and only 63% of the state average. By 1990, per capita money income in Newark was even lower compared to the county and state at 54% and 50% respectively.

Table 6

Per Capita Money Income

	Ironbound	Newark	Essex	New Jersey
1979		$4,525	$7,538	$8,127
1989	$11,599	$9,424	$17,574	$18,714

Source: U.S. Census of Population, 1980 and 1990.

Although money income per capita in Newark is relatively low, Table 5 shows that wage rates in several of Newark's industries are higher than both the state and county averages. This is true of the manufacturing, transportation, communications and utilities, and financial sectors, industries in which Newark is a major headquarters site and, in the case of the transporation industry, also the site of a major port, airport, and ancillary activities.

Newark's economy has come to depend increasingly on its vibrant transportation sector, the only industry other than services which gained jobs in the city between 1980 and 1994. Indeed, by 1994 the transportation sector employed more people than any other sector except services, with manufacturing a close third.

The Ironbound

The northern part of the Ironbound is densely populated. A large number of ethnic restaurants, markets, and small shops line Ferry Street, the major commercial artery. The southern part of the area has residential areas, as well as both heavy and light industry.

In 1990, the Ironbound had a population of nearly 38,000, 13.8% of the population of the City of Newark. Its money income per capita, at $11,599, was almost 25% higher than the average for the city. At the same time private sector employment in the area was 20,800, or 18% of the city's job base.

As can be see in Table 7, the industrial makeup of the Ironbound is more heavily weighted towards manufacturing than either Newark as a whole or Essex County. Besides manufacturing, other major industries represented in the Ironbound currently are in the transportation sector, particularly trucking and truck and container storage, distribution facilities, auto repair, and construction.

Table 7

Comparative Industrial Structure

Ironbound, Newark, and Essex County

% of Total, 1990

Industry	Ironbound	Newark	Essex
Agriculture & Mining	0.2%	0.0%	0.3%
Manufacturing	27.5%	19.5%	16.7%
Construction	8.6%	3.5%	4.0%
Transportation ,	11.5%	21.1%	10.5%
Wholesale Trade	3.8%	6.0%	7.8%
Retail Trade	7.4%	10.0%	15.2%
Finance	10.7%	11.4%	10.5%
Services	30.4%	28.5%	34.9%
Total Private	100.0%	100.0%	100.0%

Source: U.S. Census of Population, 1990.

As shown in Table 8, the structure of the Ironbound's manufacturing sector has changed considerably since 1980. The number of firms in durables goods manufacturing was stable between 1980 and 1990, and then declined by nearly 40% by 1994. The bulk of the loss was in fabricated metals factories, with much of the rest in primary metals and industrial and electrical machinery and equipment. Because two of the closed factories accounted for about 3,000 employees, the percentage loss in employment, at 75% between 1980 and 1994, was greater than the percentage loss of firms.

Table 8

Manufacturing in the Ironbound: 1980, 1990, 1994

Industry	% Firms			% Employees		
	1980	1990	1994	1980	1990	1994
Durables	49.1%	51.9%	45.5%	60.2%	37.7%	30.0%
Lumber	2.4%	3.2%	3.6%	1.2%	2.3%	1.1%
Furniture	2.4%	1.3%	4.5%	1.9%	1.4%	5.5%
Stone, Clay and Glass	2.4%	1.3%	1.8%	1.4%	0.3%	3.2%
Primary Metals	7.8%	7.0%	4.5%	6.7%	5.5%	2.1%
Fabricated Metal	18.6%	24.1%	19.6%	13.1%	14.8%	11.3%
Industrial Machinery	6.0%	4.4%	4.5%	1.3%	2.3%	1.4%
Electrical Equip.	4.8%	3.8%	0.9%	23.2%	6.3%	0.2%
Transportation Equip.	1.2%	0.6%	1.8%	0.5%	0.5%	1.0%
Instruments	1.2%	2.5%	1.8%	1.1%	2.0%	2.1%
Miscellaneous	2.4%	3.8%	2.7%	9.7%	2.4%	2.2%
Nondurables	50.9%	48.1%	54.5%	39.8%	62.3%	70.0%
Food	7.2%	8.2%	6.3%	3.7%	5.7%	14.1%
Textiles	1.2%	1.9%	0.9%	0.7%	1.1%	0.4%
Apparel	7.2%	3.2%	3.6%	4.8%	2.9%	4.8%
Paper Products	5.4%	7.6%	8.0%	7.6%	22.8%	12.2%
Printing	1.2%	1.9%	4.5%	0.1%	0.3%	1.6%
Chemicals	19.2%	14.6%	22.3%	13.7%	20.7%	27.5%
Petroleum	3.6%	3.8%	3.6%	2.0%	3.7%	4.6%
Rubber and Plastics	3.0%	3.8%	1.8%	4.0%	3.1%	1.0%
Leather	3.0%	3.2%	3.6%	3.2%	2.0%	3.8%

Source: MacRAE's State Industrial Directory, 1980, 1991, 1994

The number of firms producing nondurable goods in the Ironbound declined by 10% between 1980 and 1990, and by another 20% between 1990 and 1994. Employment in nondurables has fallen by only 10% since 1980. Although the number of firms in food products and chemicals, the two largest industries now in the Ironbound, has fallen, employment in these two sectors has risen since 1980.

As of 1994, within manufacturing, 70% of employment was in nondurables industries: over 30% in chemicals and petroleum and plastics production, with another 12% in paper goods production, and 14% in food products. In durables goods manufacturing, the largest sector-- fabricated metals sector--had just over 11% of manufacturing employment.

Over the past 20 years, as the number of manufacturing establishments in the Ironbound has declined, the industrial structure of the area has changed. A few large manufacturers like Cornell-Dubilier, Hoechst Celanese, and Ideal Toys have left. Most of the remaining manufacturers employ fewer than 200 people, with average employment of about 56. In an interview, William Chouinard, Executive Director of the Ironbound Association,[1] discussed reasons why businesses have left the area. Besides the environmental compliance costs and uncertainties which are the focus of this report, these include:

- crowding in the area, because of the concentration of businesses and because residential uses have begun to encroach on formerly industrial areas,
- flooding in the Wilson Avenue area,
- decrease in commerce because of the failure to dredge the Newark port area,
- poor road conditions on major arteries, particularly Doremus Avenue, and
- changing market conditions.

However, the Ironbound, with its skilled resident workforce and excellent location, continues to attract new businesses, both commercial and industrial. Chouinard also cited a few other reasons for firms to remain in the area. These include:

- For the chemicals/petroleum and waste, recycling, and auto salvage industries:
  - --The firms are ▒at home▒ here.
  - --Leaving the area would trigger ECRA/ISRA and the need to do environmental investigation and cleanup. That is, leaving might be very costly.
  - --Newark has extensive hazardous materials and fire prevention facilities, and medical facilities capable of handling chemical spills.
- The state encourages siting industrial facilities in areas like the Ironbound in the State Development/Redevelopment Plan.

THE MODEL AND ASSUMPTIONS

The Model

The Regional Science Research Institute input-output model, available through R/ECON™, was used to model the impact of groundwater reclassification on the Essex County economy. In general, an input-output model "shows how the output of each industry is distributed among other industries and sectors of the economy. At the same time it shows the *inputs* to

[1] Telsey, Albert, notes on an interview with William Chouinard, October, 1996.

each industry from other industries and sectors."[1] Once the model is set up for a particular region, it can be used, as it is in this study, to indicate the impact of a change in any industry or sector on all the others. The model will show the full impact, including direct, indirect, and induced effects, of a change in employment or output. The direct impacts are the employment and output changes immediately associated with the change. The indirect impacts are the "labor, services, materials, and other items purchased by the firms which supply the activities which are directly affected. (They) . . . extend further to include the purchases by the firms which supply the firms which supply the direct activity, ad infinitum."[2] The induced effects are the changes in households purchases of goods and services in the region due to changes in employment and wages at both directly and indirectly affected businesses.

The model was modified to take into account parameters applicable to Essex county. We assume that if the state permits groundwater reclassification the money which would otherwise be used for groundwater cleanup would be used for investment and expansion of the businesses in the Ironbound. Those cleanup costs are allocated to the specific industries which already do business in the region.

The Assumptions

R/ECON^{tm} has simulated the impact of groundwater reclassification in the Ironbound on the regional economy by adding the cost of groundwater cleanup to the output of industries which currently have firms in the Ironbound whose groundwater needs remediation. The costs are distributed to industries according to the proportion of acreage needing remediation owned by firms in those industries.

There are three kinds of costs: capital, operation and maintenance, and management. We have treated total capital costs as if they would all occur in one year; operation and maintenance costs as if they would be distributed evenly over a ten year period; and management costs as if they are distributed 40% to the construction period, and 60% to the operation and maintenance period. Thus total capital and management costs are $1.01 billion, and one year of operation and maintenance, including management costs is $0.123 billion in current dollars. Table 9 shows the the industry distribution of sites, their acreage, and imputed costs.

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[1]Miernyk, William H., *The Elements of Input-Output Analysis*, Random House, New York, 1965, p. 8.

[2]Stevens, B.H. et al, *Introductory Input-Output Methods for the Measurement of Regional Impacts with Emphasis on Transportation Facilities*, RSRI Discussion Paper Series, No. 122, December, 1980.

Table 9

	Sites		Acreage Needing Cleanup	% of Sites Acreage	Costs per Industry Based on Acreage	
	Number	Acreage			Capital ($ millions)	O and M
Total Sites	57	678.2	317.0	100%	$1,005.5	$123.4
Non-Durable Manufacturing	33	321.6	150.3	47%	$480.7	$59.0
Food: meat packing	2	14.7	6.9	2%	$21.8	$2.7
Paper: corrugated paper and boxes	2	14.5	6.8	2%	$21.5	$2.6
Chemicals	21	118.4	55.3	17%	$174.5	$21.4
Petroleum: refining	6	174.0	81.3	26%	$256.0	$31.5
Rubber & Plastics	2	4.7	2.2	1%	$7.0	$0.8
Durable Manufacturing	17	95.6	44.7	14%	$140.7	$17.3
Stone, Clay and Glass: cement	1	5.0	2.3	1%	$7.4	$0.9
Primary Metals: nonferrous	5	12.0	5.6	2%	$17.8	$2.2
Primary Metals: scrap metal	1	2.5	1.2	0%	$3.7	$0.5
Fabricated Metals: barrels	4	47.5	22.2	7%	$69.4	$8.6
Fabricated Metals: hammers	1	6.0	2.8	1%	$8.9	$1.1
Fabricated Metals: miscellaneous	1	3.5	1.6	1%	$5.2	$0.6
Electronics: electrical apparatus	2	16.0	7.5	2%	$23.7	$2.9
Transportation Equipment: truck bodies	1	1.0	0.5	0%	$1.5	$0.2
Transportation Equipment: motor vehicle parts	1	2.1	1.0	0%	$3.1	$0.4
Transportation	3	76.7	35.9	11%	$112.7	$13.9
Railroads and related activities	1	70.0	32.7	10%	$102.8	$12.7
Trucking and warehousing	2	6.7	3.1	1%	$9.9	$1.2
Utilities	3	178.9	83.6	26%	$263.2	$32.3
Sewage treatment plants	1	130.0	60.8	19%	$190.7	$23.5
Landfills	2	48.9	22.9	7%	$72.5	$8.8
Retail Trade: auto repair	1	5.4	2.5	1%	$8.0	$1.0

Sources: 2B Environmental,Inc., Georgia Institute of Technology

THE RESULTS

Economic activity in an area can be described in several ways. We can look at employment, wages, income, or output. In studying the impact of a program like groundwater remediation, which is essentially an investment program, we look at the the cost of instituting the program and the output, or benefits, it would provide. Because Newark and the Ironbound are small areas there is no standard dollar measure of its output against which to measure the cost of

groundwater remediation. We have developed measures of the gross regional product for Newark and the Ironbound to provide such standards.

The derivation of regional product for the Ironbound, as well as for Newark and Essex county, is shown in Table 10. Real gross state product for New Jersey in 1990 is multiplied by region to state employment by industry to produce regional product for Essex county, Newark, and the Ironbound. The final line of the table shows that about 11% of the state total output comes from Essex county, about 4.4% from Newark, and 0.8% from the Ironbound.

Table 10

	Real Output	Derived Real Regional Output			% of State's Industry Employment in R		
	1987=100		in 1990			in 1990	
	New Jersey 1990	Essex	Newark	Ironbound	Essex	Newark	Iron
Agriculture	957	0	0	0	3.7%	0.0%	
Mining	113						
Manufacturing	32834	2884	1247	321	8.8%	3.8%	
Contruction	8014	686	223	98	8.6%	2.8%	
Trans, Comm, and Utilities	17952	2548	1905	187	14.2%	10.6%	
Trade	31548	2624	679	85	8.3%	2.2%	
Finance	36889	5210	2088	355	14.1%	5.7%	
Services	36455	4312	1304	251	11.8%	3.6%	
Government	17824	1832	680	123	10.3%	3.8%	
Total	182586	20096	8124	1419	10.3%	3.8%	
Total:Current $	207581	22847	9236	1614			
Regional/State Output		11.0%	4.4%	0.8%			

Sources: US Department of Commerce; NJ Department of Labor

Assuming that there are minimal changes in the relationships between employment in the state and the smaller areas between 1990 and 1997, we derive current output the Ironbound in 1997 of $2.8 billion.(See Table 11)

Table 11

	Regional Output		Regional/State Output
	$1987=100	$Current	
New Jersey	209.5	354.1	
Essex	23.1	39.0	11.0%
Newark	9.3	15.8	4.4%
Ironbound	1.6	2.8	0.8%

Source: NJ state product, R/ECON™ forecast, December 1996.

Thus the capital costs involved in groundwater remediation would be about one third of one year's total output in the Ironbound. The ongoing costs would be about 4% of a year's output.

Newark and the Ironbound

The input-output model we use is calibrated to fit Essex county. However, groundwater remediation would be localized to the Ironbound, and we make the assumption that the impacts of change would be captured in the immediate area. In the impact analysis we assume that groundwater is reclassified instead of remediated, and that the capital expenditures and operation and maintenance costs are channeled into productive investment in the affected industries rather than into cleanup. The results, then, show the impact on the Ironbound and the city of Newark from expansion in the affected industries. The impacts of the ongoing operations and maintenance costs are estimated for one year. They are 12% of the capital costs and impacts, and are not shown in the tables.

Employment

Table 12 shows employment in Newark and the Ironbound in 1995, the last full year for which we have data for Newark, and the impact of investment equal to that of the capital cost of remediation. We have estimated base employment for the Ironbound in 1995 by assuming that employment there has maintained its 1990 relationship to Newark as a whole. The exception is the manufacturing sector. Data derived from Macrae's Industrial Directory implies that manufacturing employment has fallen less steeply.

Table 12

Employment Impact in thousands	Newark 1995	Impact of Investment	% Difference	Ironbound 1995est	Impact of Investment	% Difference
Agriculture & Mining	0.0	0.0		0.0	0.0	21.5%
Manufacturing	18.1	1.8	9.9%	4.7	1.8	37.9%
Construction	2.5	0.3	12.4%	1.1	0.2	14.1%
Transportation & Utilities	28.1	1.8	6.4%	2.8	0.9	32.4%
Wholesale Trade	6.3	0.2	3.8%	0.7	0.1	16.7%
Retail Trade	9.6	0.8	7.9%	1.3	0.4	29.7%
Finance	13.3	0.4	3.2%	2.3	0.2	9.3%
Services	33.6	1.1	3.2%	6.5	0.5	8.2%
Total	111.6	6.4	5.7%	19.3	4.1	21.1%

Source: R/ECON™

The capital expenditure of $1.01 billion would have a direct impact of 3,000 jobs in Newark primarily in the manufacturing and transportation and utilities industries, and an indirect impact of another 3,400 jobs primarily in the construction, finance, trade and services sectors. The impact is a change in total private employment in Newark of 5.7%. If we assume that all of the change in manufacturing employment and half of the employment change in the other industries occurs in the Ironbound, the $1 billion investment would change employment in the Ironbound by 4,100 jobs, or 21%, of its employment base.

Wages

The wage impact of the capital expenditure in Newark is estimated at $260 million, or 6.2% of 1997 wages. Wages in 1997 are estimated by letting 1994 wage rates in Newark, shown in Table 5 above, grow by the inflation rate from 1995 to 1997. The impact on wages is slightly more than the impact on employment, because a large proportion of the employment gains are in higher wage industries. The impact on wages in the Ironbound would be nearly $183 million. The impact of expenditures equal to annual operations and maintenance would be $31.6 million and $22.3 million for Newark and the Ironbound respectively.

Table 13

Wage Impact $millions, $1997	Newark Wages Estimated	Newark Impact of Investment	Newark Impact of Investment %	Ironbound Impact of Investment
Manufacturing	$887.8	$66.6	7.5%	$33.3
Construction	$84.8	$12.2	14.4%	$6.1
Transportation & Utilities	$1,208.0	$111.1	9.2%	$111.1
Wholesale Trade	$235.2	$9.4	4.0%	$4.7
Retail Trade	$183.5	$15.6	8.5%	$7.8
Finance	$715.9	$11.4	1.6%	$5.7
Services	$1,110.2	$27.7	2.5%	$13.9
Total	$4,202.7	$258.8	6.2%	$182.6

Source: R/ECON™

Output

In Table 14, we show estimates of gross regional output in 1997, and the impacts of investment equal to expenditures necessary for groundwater remediation. A capital expenditure of $1.01 billion would have a direct impact on value added of $391 million in Newark. The direct impact is less than the outlay because a large part of the expenditures would go to purchases of goods and services from outside the area. Including both direct and indirect impacts the change in output would be $594 million in Newark, of which $418 million would occur in the Ironbound. Thus output in the Ironbound would change by nearly 15% and output in Newark would change by just under 4%. The impacts of the operating and maintenance expenditures would be 1.8% and 0.5% in the Ironbound and Newark respectively.

Table 14

Output Impact	Derived Regional Output		Impact of Investment		% Impact of Investment	
$millions, $1997	Newark	Ironbound	Newark	Ironbound	Newark	Ironbound
Manufacturing	2416.9	621.7	211.8	211.8	8.8%	34.1%
Construction	431.7	189.9	15.4	7.7	3.6%	4.0%
Transportation & Utilities	3693.5	362.2	242.3	121.1	6.6%	33.4%
Trade	1317.4	164.7	44.7	22.4	3.4%	13.6%
Finance	4047.6	688.6	30.3	15.1	0.7%	2.2%
Services	2527.5	486.5	44.2	22.1	1.7%	4.5%
Government	1318.1	238.4	4.9	2.5	0.4%	1.0%
Total	15752.8	2752.1	594.0	402.9	3.8%	14.6%

Source: R/ECON™

The change in output in the manufacturing and transportation and utilities sectors, the sectors which would be most directly affected by groundwater remediation, is three quarters of the total output impact, while the employment impact on these two sectors accounts for about 54% of the total employment impact. These two sectors are highly productive in Newark and the Ironbound. If they make investments in plant and equipment, as this study assumes, rather than spending money on groundwater remediation, they will be important drivers of growth in the region.

Taxes

The input-output model indicates that the fiscal impact of capital expenditures of $1.01 billion and annual operating and maintenance expenditures of $122.6 million would be an additional $22.7 million in local taxes for the former and $2.8 million for the latter in Newark. Newark imposes a payroll tax of 1% on wages. The impact of reclassification would be a change in the City's payroll tax of $2.6 million. The annual tax impact of operations and maintenance would be $0.3 million. Most of the rest of the change in local taxes would come from new property taxes. With current property taxes for the city of approximately $190 million, the fiscal impact of reclassification would be as much as 10% for the capital phase and 1% for the ongoing phase.

ENVIRONMENTAL PROTECTION

WATER TECHNICAL PROGRAM AND SITE REMEDIATION PROGRAM
Ground Water Quality Standards and Technical Requirements for Site Remediation

Proposed Amendments: N.J.A.C. 7:9-6 and 7:26E

Authorized by: Robert J. Shinn, Jr., Commissioner,
Department of Environmental Protection
Authority: N.J.S.A. 13:1D-1 et seq., 13:1E-1 et seq., 13:1k-6 et seq., 58:10-23.11a et seq., 58:10B-1 et seq., 58:10A-21 et seq., and 58:11A-1 et seq.

DEP Docket Number:
Proposal Number:

A public hearing concerning this proposal will be held on _____, _____, 1997, beginning at 10:00 am at:

Public Hearing Room
New Jersey Department of Environmental Protection
401 East State Street
Trenton, New Jersey

Submit written comments by _____, 1997 to:

Office of Legal Affairs
Department of Environmental Protection
CN 402
Trenton, New Jersey 08625

The Department of Environmental Protection (Department) is initiating procedures to reduce the time and resources necessary to respond to public comments on this proposal. The Department strongly recommends that any commenter who has access to any of the word processing software packages listed below submit comments on this proposal to the Department on paper (three hard copies preferred) as well as on disketies, either 3 1/2 inch (preferred) or 5 1/4 inch. The Department will be able to upload the comments onto its office automation equipment, thereby saving considerable time in not having to retype the comments. The Department will use the paper version of the comments to ensure that the uploading was accomplished successfully. Submission of the disk is not a requirement; the Department will accept all comments submitted in writing prior to the end of the comment period.

The Department prefers WordPerfect 5.1 format; however, other word processing software which are compatible with the Department's office automation equipment includes: MultiMate 4.0; WordPerfect 4.2; WordPerfect 5.0; WordPerfect 6.1; Word for DOS; Display Write RFT; Office Writer; Professional Write 2.0; Work for Windows; WordStar; and ASCII. MacIntosh formats should not be used. Any commenter who wishes to use software other than that listed above is encouraged to contact George Jaegers in the Department at (609) 633-1476 to check compatibility.

Test enhancements such as underlines, bold, etc., are often not converted from other software into the Department's WordPerfect 5.1 documents. Therefore, when suggesting text revisions involving additions/deletions, the revised test should be presented without enhancements as it would appear in the rule.

Comments on the proposal summary should be included with comments on the pertinent section of the rule text, whenever possible, to eliminate duplicate comments and facilitate the Department's task of organizing and responding to comments. Since comments will be sorted electronically, the following formate should be used for each comment:
(tab)citation(tab)COMMENT: Company name followed immediately with the phrase "believes that" (or other similar phrase) and comment text
For example:

1.6(e) COMMENT: ABC Corporation believes that methods for evaluating sites with radioactive contaminants should be specified by the Department.

The agency proposal follows:

Summary

[TO BE PROVIDED]

Social Impact

[TO BE PROVIDED]

Economic Impact

[TO BE PROVIDED]

Environmental Impact

[TO BE PROVIDED]

Executive Order No. 27/P.L. 1995.c.65 Analysis

[TO BE PROVIDED]

Jobs Impact

[TO BE PROVIDED]

Regulatory Flexibility Analysis

[TO BE PROVIDED]

Full text of the proposed amendments follows (additions indicated in bold face **this**: deletions indicated in brackets **[this]**:

7.9-6.5 Ground Water Classification System and Designated Uses

(a) (no change)
(b) (no change)
(c) (no change)
(d) (no change)
(e) Class II ground waters have a designated use of the provision of potable ground waters with conventional water supply treatment, either at their current water quality (Class II-A) or subsequent to enhancement or restoration of the regional water quality so that the water will be of potable quality with conventional water supply treatment (Class II-B). Both existing and potential potable water uses are included in the designated use.

1. (no change)

2. (no change)

3. Class II-B Classification Areas **[Reserved] The following ground water areas are classified as Class II-B in accordance with paragraph (e)2 above and the provisions of N.J.A.C. 7:9-6.7 for all constituents in Table 1:**

(i) The Newark Ironbound Area represented in Figure 6.

7:26E-1.8 Definitions

The following words and terms when used in this chapter, shall have the following meaning unless context clearly indicated otherwise

. .

"Natural ground water remediation" means any form of ground water remediation in which only degradation, retardation, and dispersion mechanisms are used to achieve applicable remediation standards. For active ground water remediation, this definition shall also apply to portions of plumes that are not captured by the active ground water remediation, but are expected to be naturally remediated after separation from the source plume.

. . .

"No further action letter" means a written determination by the Department that based upon an evaluation of the historical use of a particular site, or of an area of concern or areas of concern at that site, as applicable, and any other investigation or action the Department deems necessary, there are no discharged contaminants present at the site, at the area of concern or areas of concern, at any other site to which a discharge originating at the site has migrated, or that any discharged contaminants present at the site or that have migrated from the site have been remediated in accordance with applicable remediation regulations.

. .

7:26E-6.3 Specific remedial action requirements.

(a) (No change)

(b) (No change)

(c) For sites in areas where ground water is classified as Class II-B pursuant to N.J.A.C. 7:9-6.5(e), natural ground water remediation shall be the presumed remedial action.

(i) The Department shall issue a no further action letter (for ground water only) to the person responsible for conducting the remediation if that person:

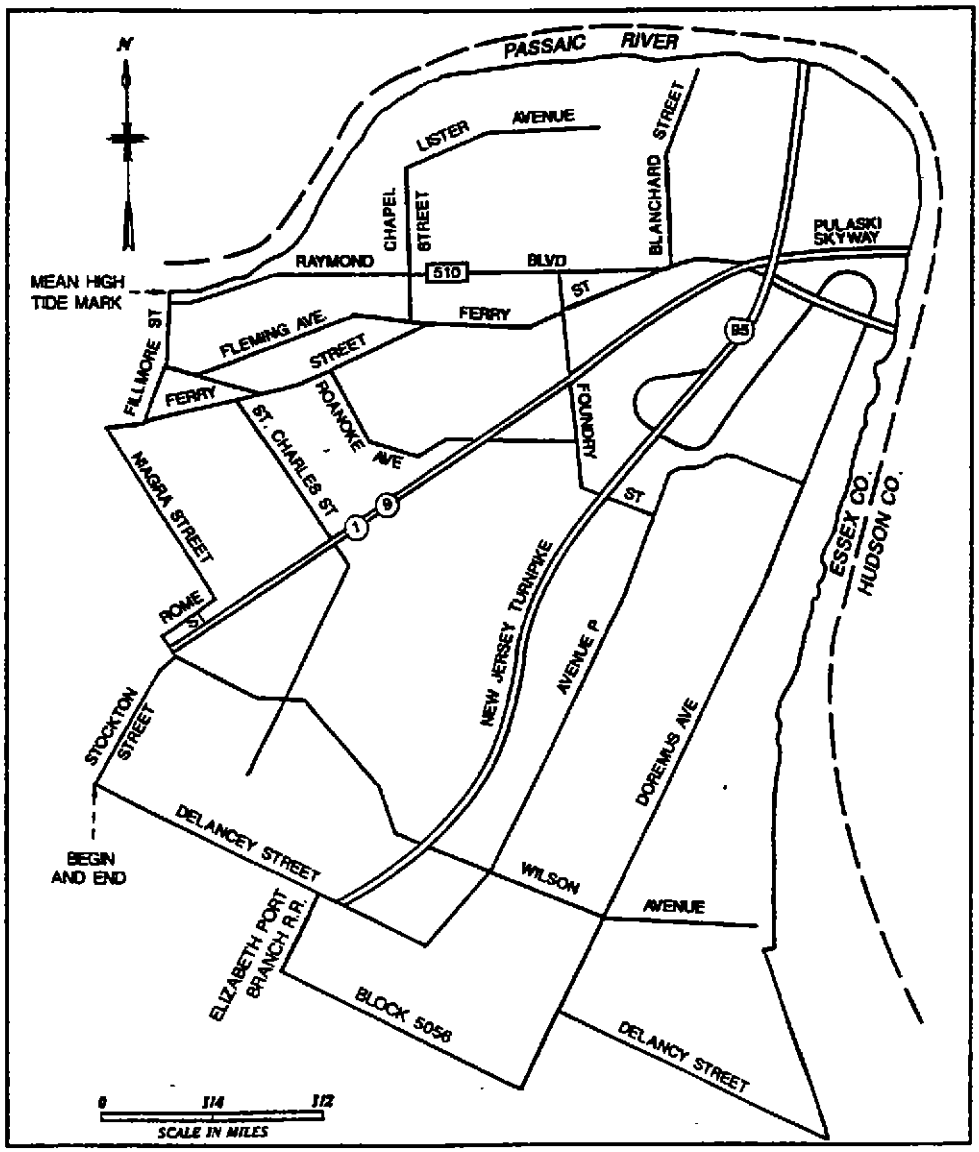
(1) has completed a preliminary investigation and site investigation for the site confirming that ground water is not an area of concern at the site; or

(2) if a remedial investigation of ground water is necessary at the site, it is conducted and no free product is detected.

(ii) If free product is detected at the site, then remedial action to remove or control it shall be undertaken by the person responsible for conducting the remediation. When the free product at the site and emanating from the site, if any, is removed or controlled, then the Department shall issue a no further action letter (for ground water only) to the person responsible for conducting the remediation.

Figure 6

New Jersey Ground Water Classification System
Class II - B
Newark Ironbound Area
Essex County



Horizontal Boundary - [4.2 square mile area]. Beginning at the center line of the intersection of Stockton Street and Delancy Street, then north along the center line of Stockton Street to Wilson Avenue, then west along the center line of Wilson Avenue to Rome Street, then northwest along the center line of Rome Street to Niagra Street, then northwest along the center line of Niagra Street to Ferry Street, then east along the center line of Ferry Street to Fillmore Street, then north along the center line of Fillmore Street to the mean high tide mark of the Passaic River, then easterly along the mean high tide mark of the Passaic River around the horn and south to a point where a line representing the center line of Delancy Street intersects the mean high tide mark of the Passaic River, then westerly along the center line of Delancy Street to Doremus Avenue, then south to the corner of Block 5056, Lot 70, then west along the southern boundary of Block 5056, Lots 70, 72, 86, 84 and 60 to the Elizabeth Port Branch Central Railroad, then north along the center line of the Elizabeth Port Branch Central Railroad to Delancy Street, then north along the center line of Delancy Street to the beginning.

Vertical Boundary - All unconsolidated overburden material and associated water bearing zones above the Passaic (Brunswick Shale) Formation to the ground surface and beneath the Horizontal Boundary. The Passaic (Brunswick Shale) Formation and below is not included in the Class II-B Newark Ironbound Area.

New Jersey Department of Environmental Protection - 1997

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ATSDR, 1993, Toxicological Profile for Nickel.

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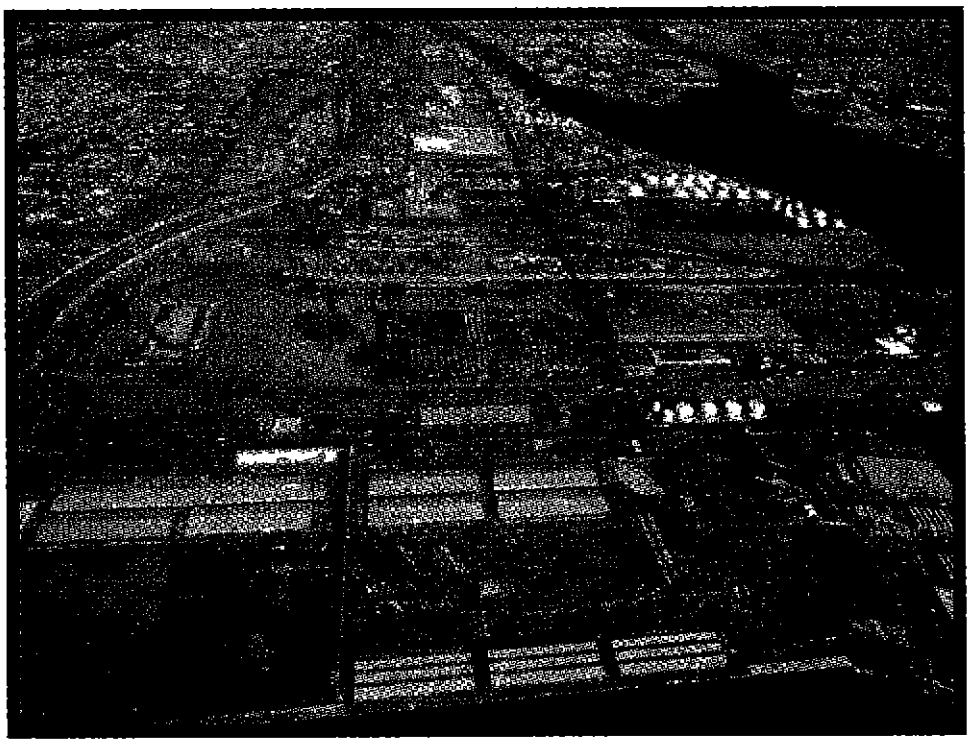
Appendix
Petition to Reclassify Ground Water in the Ironbound Section of Newark

D R A F T



The Legal Center
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(201) 623-6034 Fax (201) 623-9134

Albert I. Telsey - President

March 1997

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of New Jersey

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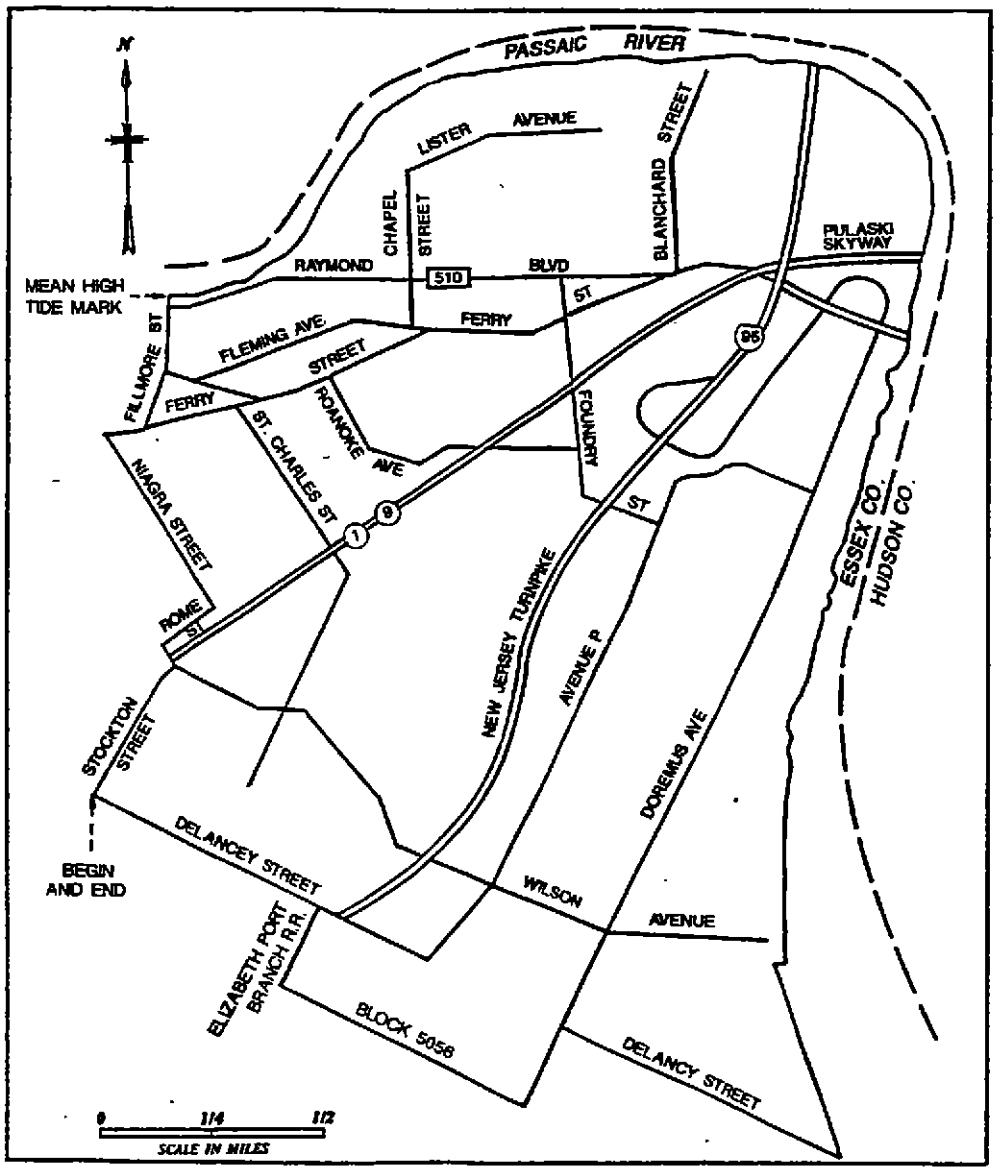
Figure 1-1

New Jersey Ground Water Classification System
Class II - B
Newark Ironbound Area
Essex County



Horizontal Boundary - [4.2 square mile area]. Beginning at the center line of the intersection of Stockton Street and Delancy Street, then north along the center line of Stockton Street to Wilson Avenue, then west along the center line of Wilson Avenue to Rome Street, then northwest along the center line of Rome Street to Niagra Street, then northwest along the center line of Niagra Street to Ferry Street, then east along the center line of Ferry Street to Fillmore Street, then north along the center line of Fillmore Street to the mean high tide mark of the Passaic River, then easterly along the mean high tide mark of the Passaic River around the horn and south to a point where a line representing the center line of Delancy Street intersects the mean high tide mark of the Passaic River, then westerly along the center line of Delancy Street to Doremus Avenue, then south to the corner of Block 5056, Lot 70, then west along the southern boundary of Block 5056, Lots 70, 72, 86, 84 and 60 to the Elizabeth Port Branch Central Railroad, then north along the center line of the Elizabeth Port Branch Central Railroad to Delancy Street, then north along the center line of Delancy Street to the beginning.

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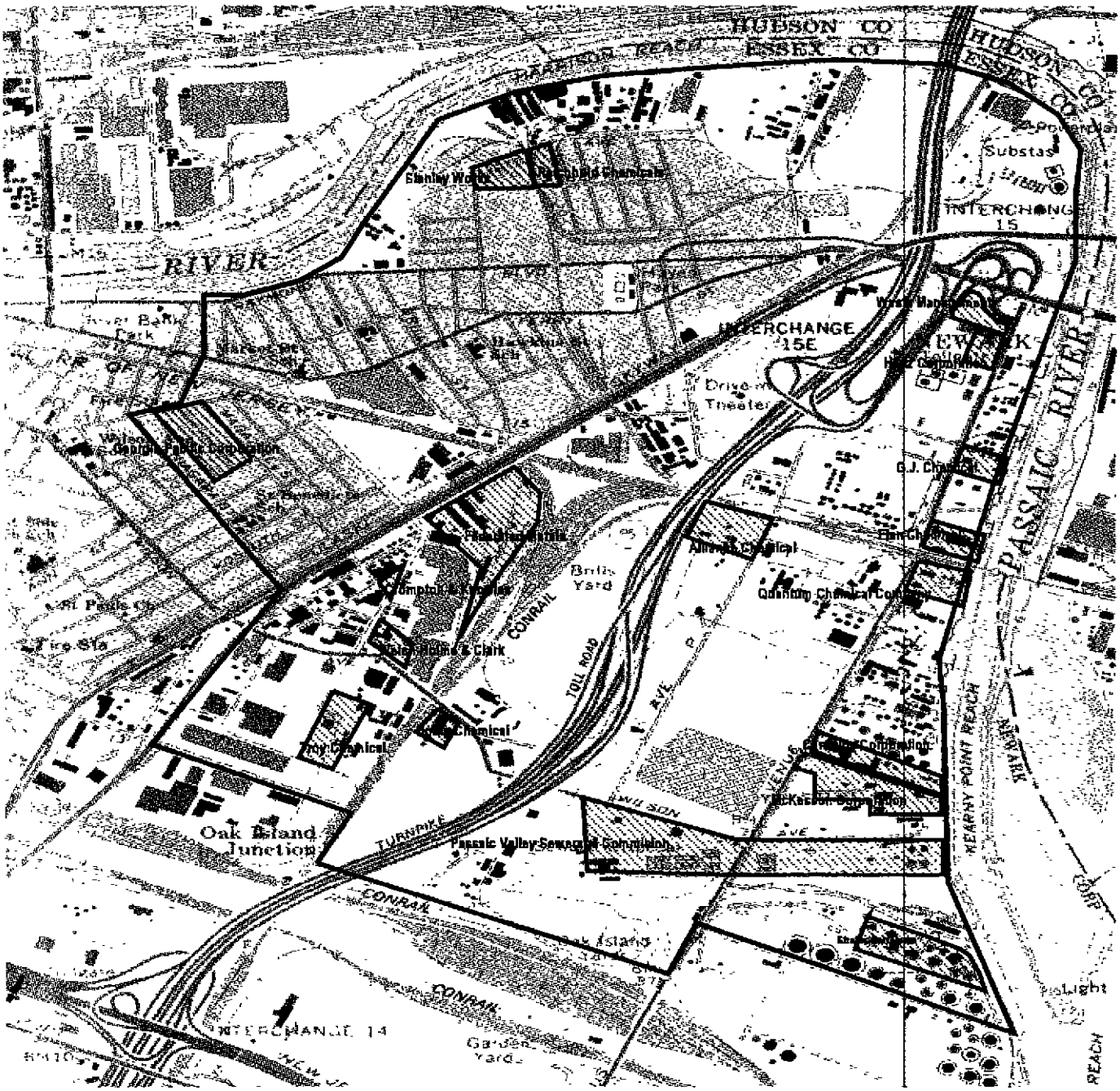
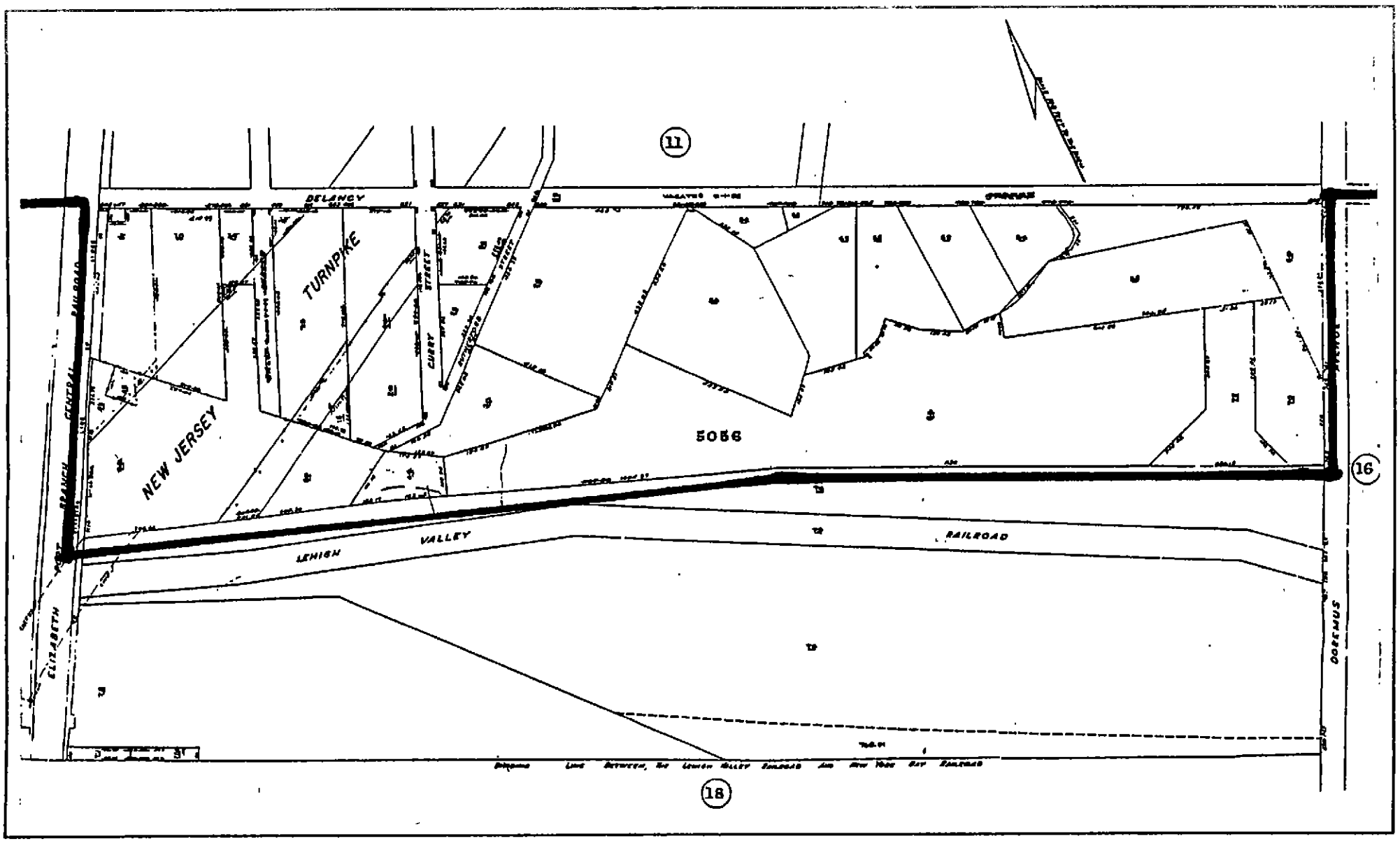
New Jersey Department of Environmental Protection - 1997



* Site boundaries are approximate.

MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Site Boundaries of Petitioners**	Figure 2-1



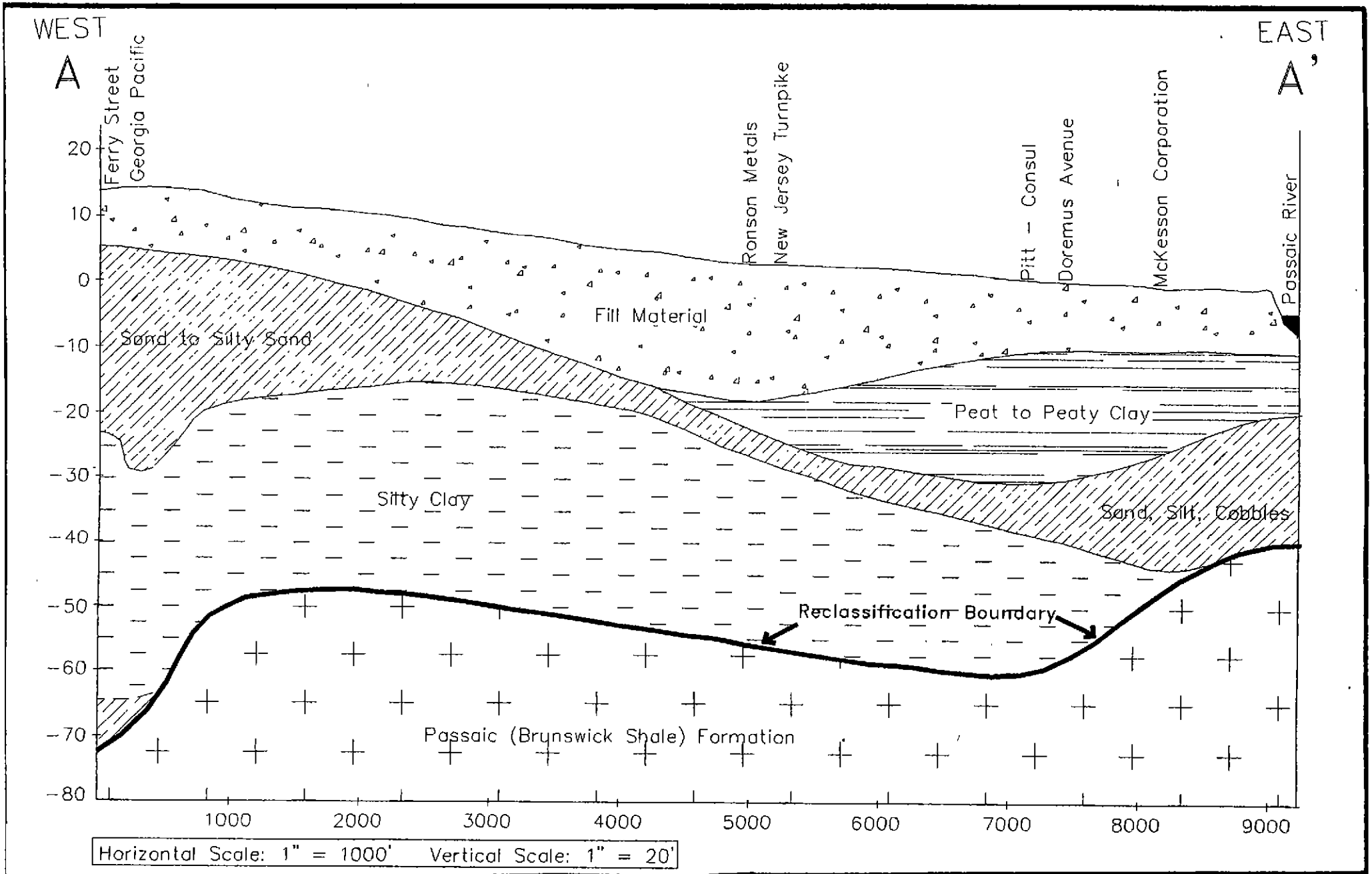
MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Southern Boundary of the Petition Area

MALCOLM PIRNIE, INC.

Figure 2-2



MALCOLM PIRNIE

Technical Justification Document

Newark, New Jersey

Idealized Stratigraphic Cross Section

MALCOLM PIRNIE, INC.

Figure 2-3

FIGURE 2-4

NEWARK SALT MARSCH
TO BE INSERTED IN FINAL PETITION

FIGURE 2-5

1873 MAP OF PETITION AREA
TO BE INSERTED IN FINAL PETITION

FIGURE 2-6

MOSQUITO COMMISSION "TROPHY PHOTO" OF GARBAGE HEAP TO BE INSERTED IN FINAL PETITION

FIGURE 2-7

Universal Caster and Foundry Company

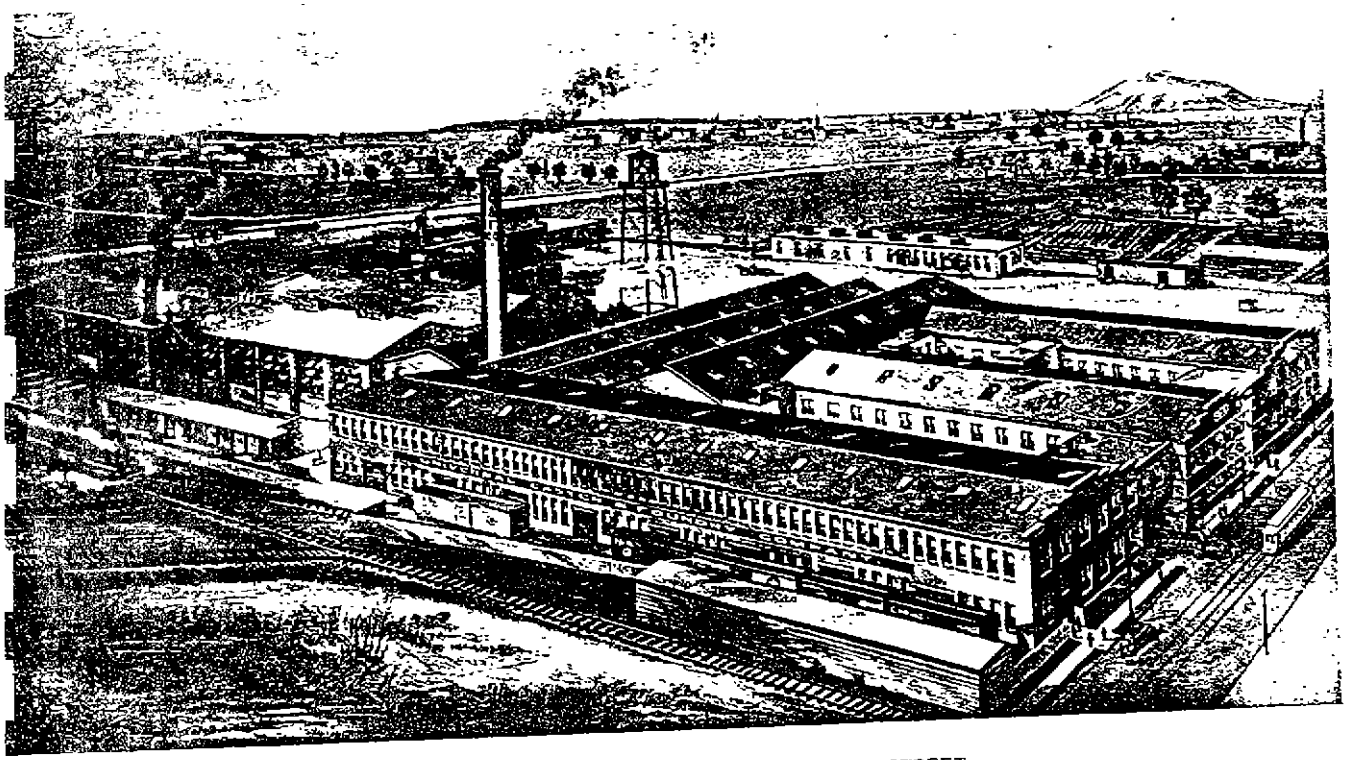
Universal Caster and Foundry Company, located on ry street, is a modern outgrowth of three large con- John Teler, Sons & Company of this city, A. B. Company of Brooklyn and the Standard Caster Company of New York City. All were successful s manufacturing similar products and covering lly the same territories in this and other countries. facilitate the economical handling of business in nufacturing and selling, the owners found it advan- to join forces and formed this company which was papers of incorporation in October, 1903.

then the business has expanded under the able e of its officers, who are themselves men of prac- perience and who have profited by it, so that now, s are so well known, that they find ready sale all dent, Henry Ill; vice-president, A. B. Diss, and secretary and treasurer, Mark Fishel.

Mr. Ill and Mr. Diss both reside in Newark and are closely linked with many prominent and successful interests. They are liberal progressive citizens who are first and always for Newark and are willing supporters of all measures designed for general good.

Mr. Fishel makes his home in New York City, and is also a gentleman of considerable means and influence. The company maintains offices at 1170 Broadway.

In addition to the manufacture of furniture and piano casters, which include every known variety such as steel roller, wood roller, ball bearing, etc., the company does an extensive business in making small gray iron castings, and keeps a large force of skilled mechanics regularly employed.



UNIVERSAL CASTER AND FOUNDRY CO., FERRY STREET.

the whole world, and large quantities are shipped all the United States and the British Dominion at the a, all stock to South America, France and other foreign tries, even to southern sections of Africa.

e pla[illegible] moved to its present quarters, 574 Ferry t, ab[illegible] ago from buildings on Adams and Jack- streets which the company outgrew. The ground owned occupied by the company on Ferry street is about five [illegible] There are five buildings of brick con- [illegible] view of which appears on this page [illegible] equipped throughout with the most im- [illegible] [illegible] for these lines of [illegible] [illegible] labor-saving devices [illegible] class of industry.

The entire pay-roll numbers about five hundred employees.

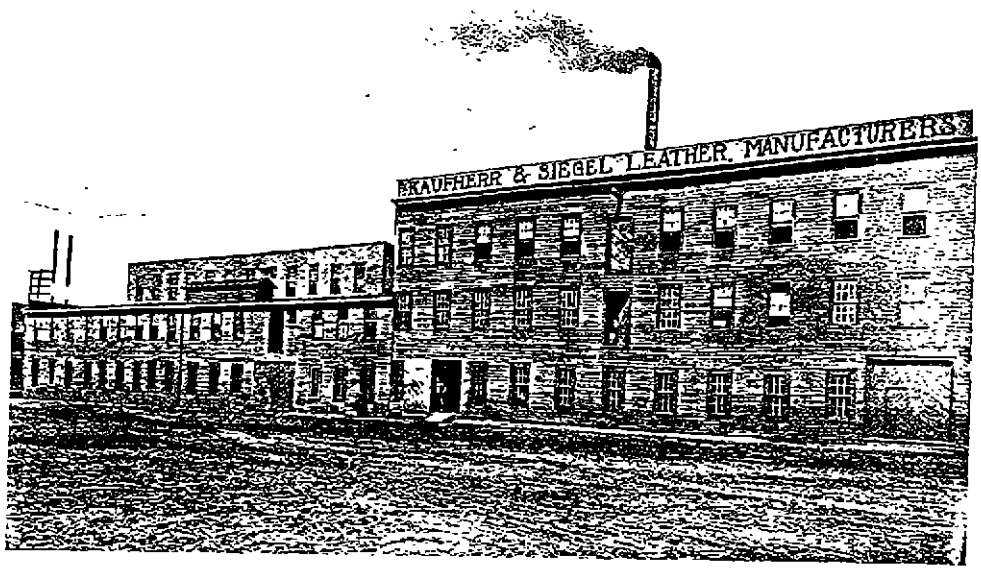
The Universal Caster and Foundry Co. is strictly a high-class concern with a financial rating and a business reputation which might well be envied by any industrial institution. The many years of experience back of the executive head of the concern are an asset not easily acquired and a feature which adds greatly to the influence of the enterprise, and gives it its prestige in the community.

Newark's place among the cities of the Union, from a commercial standpoint, has been gained by the presence here of a large number of such concerns as the one to which this article refers and the fact that there are but eight cities [illegible] Union which exceed our own in the amount of business done is a matter of congratulation over these enterprises [illegible] the capable men who manage them.

Kaufherr & Siegel

THERE are many important and interesting forms of commercial activity in Newark, and its products are shipped all over this and many foreign countries.

One of the successful and steadily growing industries is that conducted by the firm of Kaufherr & Siegel, located at 200, 202 and 204 Magazine street. They instituted this business enterprise in 1908, and there has been no change in proprietorship. The gentlemen composing this partnership are I. J. Kaufherr and H. Siegel, residents of Newark, property owners and members of various local organizations. They are estimable gentlemen and public spirited citizens.



KAUFHERR & SIEGEL, 200 TO 204 MAGAZINE STREET.

Their manufacturing plant on Magazine street is housed in four buildings, on one-half acre of ground is utilized. They have 40,000 square feet of floor space, well equipped and arranged with consideration as to best results with least friction among employees.

The products manufactured are calf, goat, and sheep linings, skivers and buffings, and these are turned out in a finished condition and sold to the general trade. Bag, pocketbook, belt and hat leathers are among the goods made, and so necessary a line of products is sure to find a ready market.

The accompanying cut gives a clear and accurate idea of the company's plant, but only a visit would give a definite idea of its busy and prosperous condition. Sixty persons are given employment regularly, all of whom are men.

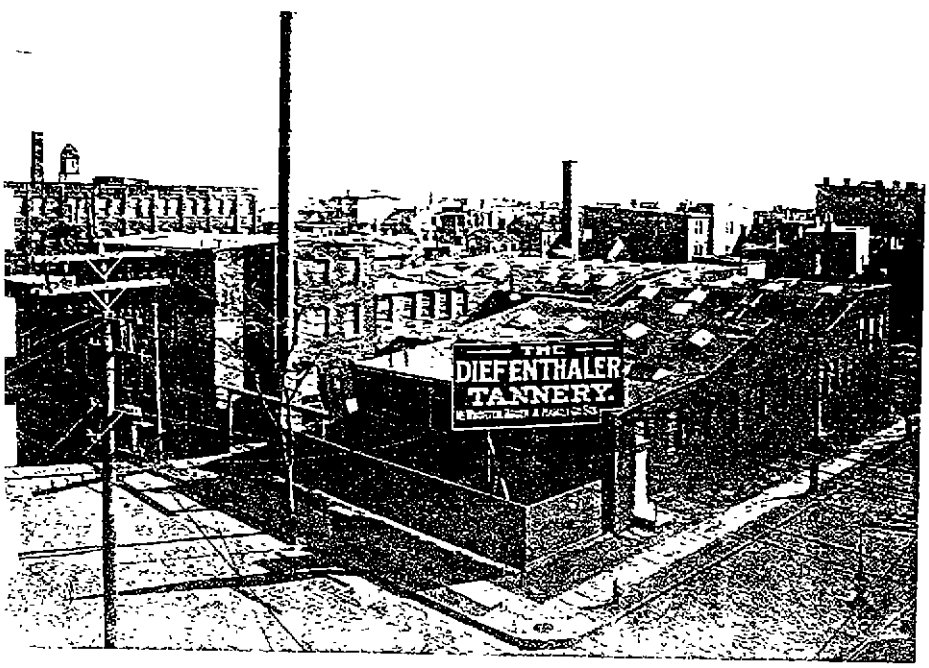
John V. Diefenthaler

ONE of the prosperous business men of Newark, who has gained his present enviable position through good judgment and honest business methods, is John Diefenthaler, of Hamilton, Bruen and McWhorter streets. He is a man in the prime of life, and, after considerable experience in handling leather, decided, four years ago, to start in business as a leather manufacturer. He has had no occasion to regret this step, and though he has had competition on all sides to meet, he has conducted the enterprise in such a manner as to win success, and that with fair treatment to every one with whom he has had dealings.

The buildings on Hamilton street cover about one-half a city block, four of the buildings being two stories high, one three stories, and three one story, making eight buildings in all—totaling a combined floor space of large capacity.

There are about fifty persons employed in various capacities in and about the works, and they are a desirable class of workmen. The buildings are well arranged, and equipped, and a large stock of leather is always found on hand.

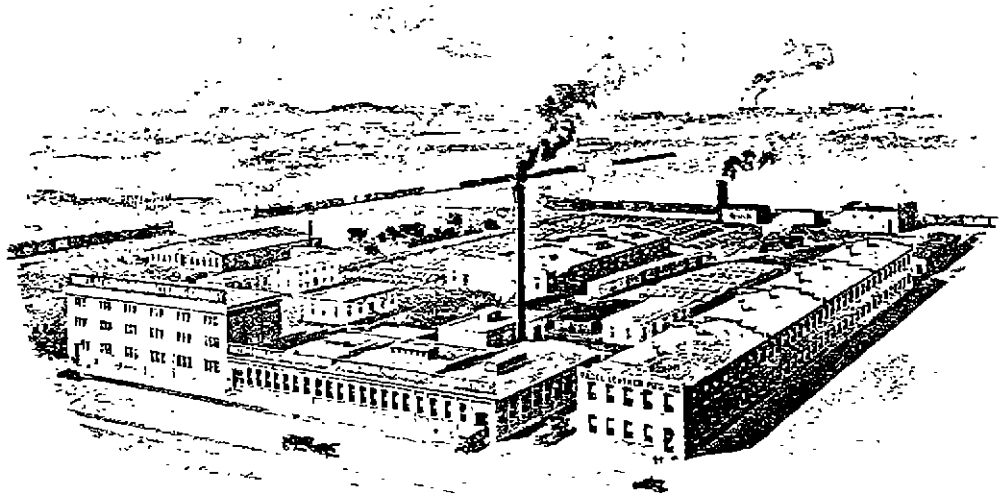
The special lines given attention to are leather for automobiles, carriages and furniture, and some beautifully finished pieces come from this shop. These products are marketed in many cities in widely separated sections of the United States and while quite a large proportion of the output is exported to Canada, more finds its way over the ocean to the British Isles and various cities on the Continent.



JOHN V. DIEFENTHALER, NEW, PORTER, HAMILTON AND BRUEN STREETS.

Radel Leather Mfg. Company

THE prosperous and fast growing enterprise known as the Radel Leather Manufacturing Co., is an outgrowth of the Radel & Mentz Leather Co., which was established in 1904 and taken over by the present company in 1907. The capital stock of the present company is $250,000. The officers of the company, and the men whose executive ability and financial resources have brought the company to its present splendid condition are: President, Frank J Radel; vice-president, Owen E. Fox; treasurer, John J. Radel, and secretary, Jos. F. Meyers. One of the company's stockholders whose aid has been of great importance is Mr. Conrad H. Koellhoffer, well known in Newark business and social circles.



RADEL LEATHER MANUFACTURING CO., HAMBURG PL. ROAD.

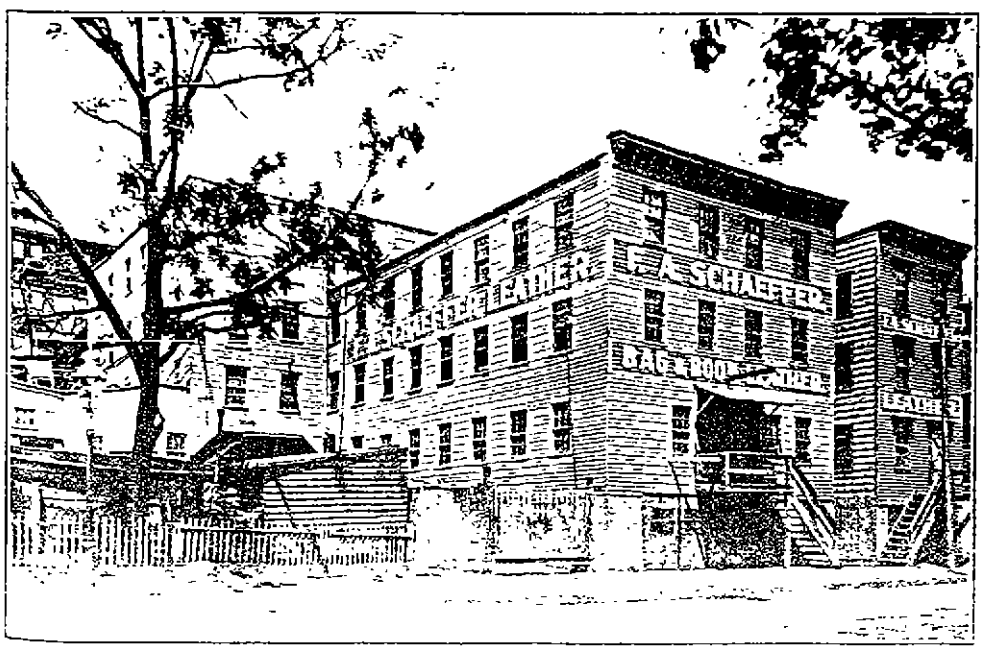
The location of the company's plant is on Hamburg place road, where there are ten buildings in use, and a four story concrete building now under construction. The company's main office is located at the plant, with a branch office in Chicago, Ill., where orders from its numerous customers in the West are received, and through its efforts are due the extension of the business in that section of the country.

The company's products are principally automobile, carriage and furniture upholstering leather, which they are shipping to almost every State in the Union, as well as supplying large demands from many European countries. When the plant is running to its capacity, the company's employes number about one hundred.

F. A. Schaeffer

MANY sister cities look with envious eyes at Newark and marvel at her rapid and substantial growth. There is no doubt that while this city has many natural advantages which cause her to grow, one important element in this success is the progressive and hospitable spirit of the city's manufacturers and merchants.

One of the prosperous and well known manufacturers is Frank Adam Schaeffer, whose plant occupies the premises at 55, 57, 59, 61, 63 and 65 Bergen street. This enterprise has been established some years, and the books show a commendable gain in the volume of business transacted. Mr. Schaeffer is a manufacturer of leather—dull dongola, shoe, alligator and morocco leather being the specialties. Buffings, bookbinders' bag and pocketbook leather, also raw hides for trunks, artificial limbs and mechanical purposes, are all in his line, and these various products, for which there is a remarkable demand, are distributed over a wide territory.



F. A. SCHAEFFER, [illegible]

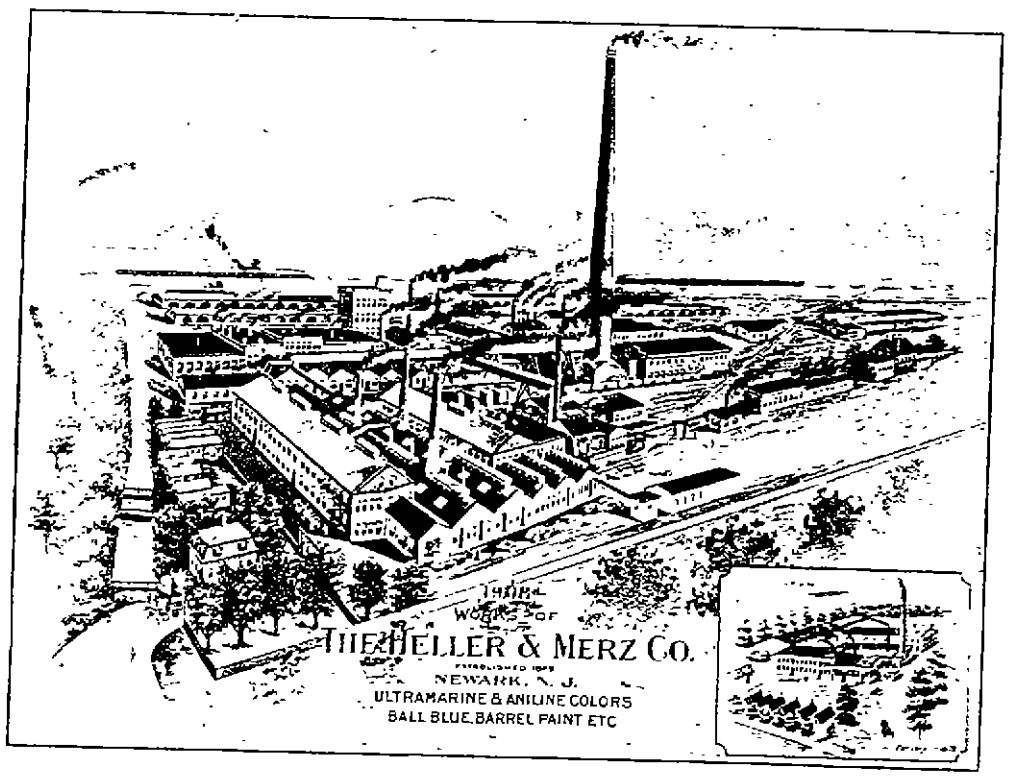
There are five floors in the building utilized in the business, affording a total of 25,000 square feet, and the plant is well equipped for turning out first-class products at as low cost as is consistent with proper compensation of employees. There are some highly skilled workmen among those employed, and the full list of those persons engaged in various capacities here, shows the names of nearly one hundred.

The establishment is well rated, the name of the house being synonymous with first class leather, fair dealing, prompt settlement of accounts and other evidences of a well conducted business.

The Heller & Merz Co.

THE Heller & Merz Company was founded in 1869 as a partnership by Frederick Heller and Henry Merz for the manufacture of Ultramarine and became an incorporated company in 1888. The manufacture of Ultramarine was commenced in 1869 in a small factory at River street, Newark, N. J., the plant consisting of but two furnaces and six mills. In a short time the demands outgrew the capacity of this plant and it became necessary to find larger quarters. This was the first successful Ultramarine factory in the United States. As early as 1850, several attempts to manufacture Ultramarine had been made by others, but these were unsuccessful and operations were soon discontinued. In 1872 ten acres of meadow land on the outskirts of Newark were purchased, and the erection of the new factory begun. For many years this was the only one of its kind in the country and it has since grown to be one of the largest in the world.

In 1881 the company took up the manufacture of Coal Tar Dyes, which necessitated the building of a separate factory, the processes being entirely different from those involved in the production of Ultramarine.



THE HELLER & MERZ CO., HAMBURG ROAD.

For this purpose more land adjoining the original tract was purchased and new buildings were erected. The works now occupy thirty-two acres of land, of which twelve acres are under roof. The buildings, 70 in number, vary from one to four stories in height, and are easily accessible to one another. The power plant has a capacity of 1,200 horse power. The company operates its own machine shops, carpenter shop and cooperage. A railroad siding of its own, half a mile in length, facilitates the receipts of raw materials used in the processes of manufacture and the shipping of finished products. There are six chemical laboratories which are devoted to the examination of raw materials, finished products and to research work. The laboratories are in charge of the superintendents of the various departments and their assistants. In the color industry it is necessary that finished products be tested by chemical analysis, also by a practical application to the processes in which they are to be used.

Ultramarine is used in the manufacture of paint, paper, printing inks, in calico printing and finishing and for laundry purposes. The Coal Tar colors have even a wider application, being used to dye all kinds of textiles, cotton, wool, jute, silk, etc., paper, leather, as well as in the manufacture of pigment colors and stains.

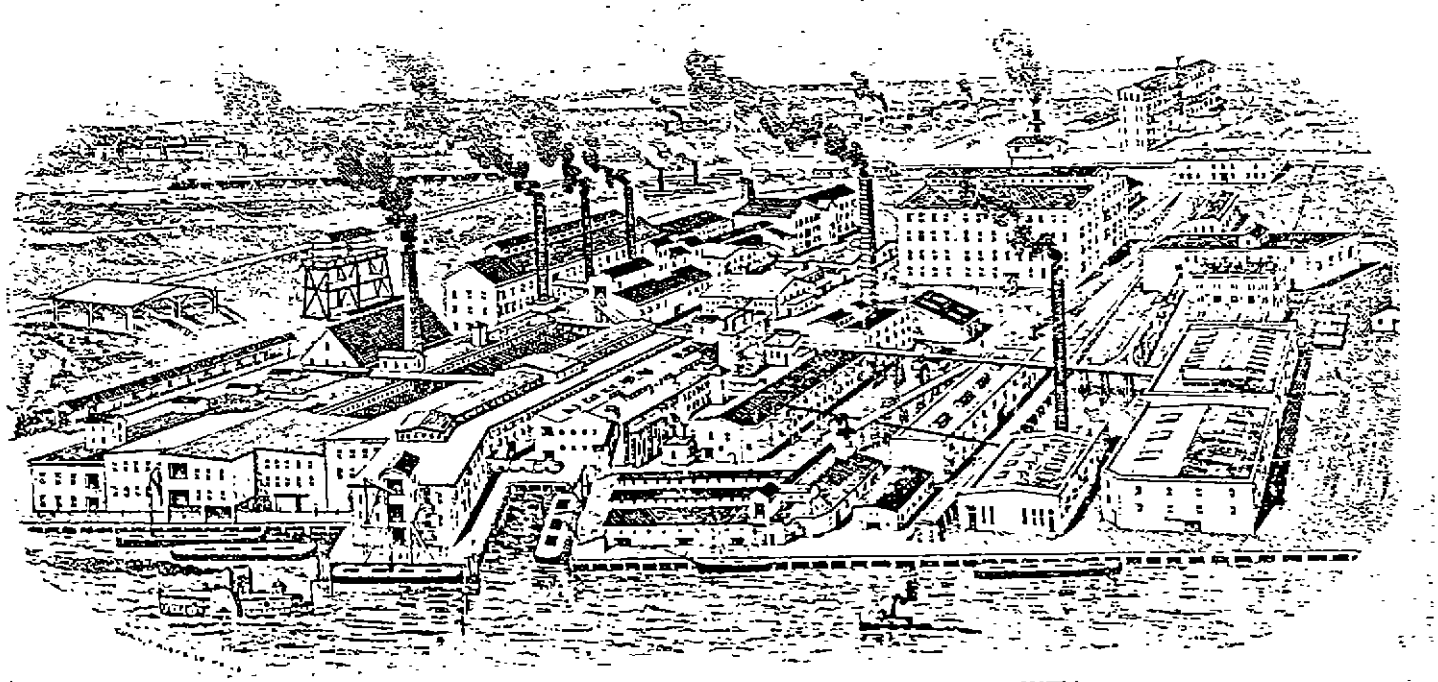
The varied application of the products of this company necessitates a special equipment of apparatus for testing. Amongst this special equipment is found a set of printing ink rolls for the grinding of printing inks, a press for printing the ink so made, a calico press for the printing of textiles, and a complete paper machine probably the smallest successfully operated in the world. This small machine will make about five pounds of paper, which is equivalent to a sheet 12 inches wide, and about 250 to 500 feet long, depending on the thickness of the sheet. For years paper makers have come to Newark just to see this small paper mill and to satisfy themselves that it really existed and would really make paper.

To study the practical application of colors to leather, the laboratories are equipped with miniature "ovens" in which the processes of coloring leather as practiced in the tanneries is closely imitated.

In conclusion it may be well to state that the steady prosperity and popularity of this old-established house are due not alone to the excellence of its output, but to the progressive methods in use by the management, in fair compensation to employees, in prompt and accurate shipment of goods ordered to patrons, and straightforward business dealings. In short, dependability has been a marked feature in the institution, and one that has played a prominent part in winning the great success achieved by the company, since its inception. This company has always invited inspection into the quality of the goods it manufactures and solicits inquiries upon any subject pertaining to the business by those who are interested.

Listers Agricultural Chemical Works

NEWARK, like many other progressive American cities, has kept pace with the great development and commercial advancement which are characteristic of the age, and in many respects has outrun those cities which were formerly its leaders in trade. Her business men are among the most enterprising, progressive and far-sighted in the country and in almost every line of trade have built up patronage which redounds to their credit.



LISTERS AGRICULTURAL CHEMICAL WORKS, LISTER AVENUE.

An establishment which has, through its products and its representatives, done as much as almost any enterprise in the city to spread the name and fame of Newark over a wide territory, is that of The Listers Agricultural Chemical Works. As long ago as 1850, this now extensive business had its rather modest beginning. It was founded by Alfred and Edwin Lister, and for many years traded under the name of Lister Brothers. Subsequently, about 1885, an incorporated company was formed, with a capitalization of $600,000, and the business title was changed to Listers Agricultural Chemical Works, under which name it has grown to its present magnitude.



JOHN F. KEHOE.

The company is engaged in the manufacture of bone fertilizers, bone black, glue, grease, etc., and it is no exaggeration to say these products are known and sold all over the civilized world. The company possessing long experience and thorough knowledge of the business, is placing upon the markets of this and other countries, a class of fertilizers which have been proven by actual tests and chemical analyses to be unsurpassed in general field results. This well-known fact has proved a valuable asset to the company in its business career, and it is not a matter of surprise that an increasing volume of business is yearly transacted.



HARRY B. CARPENTER.

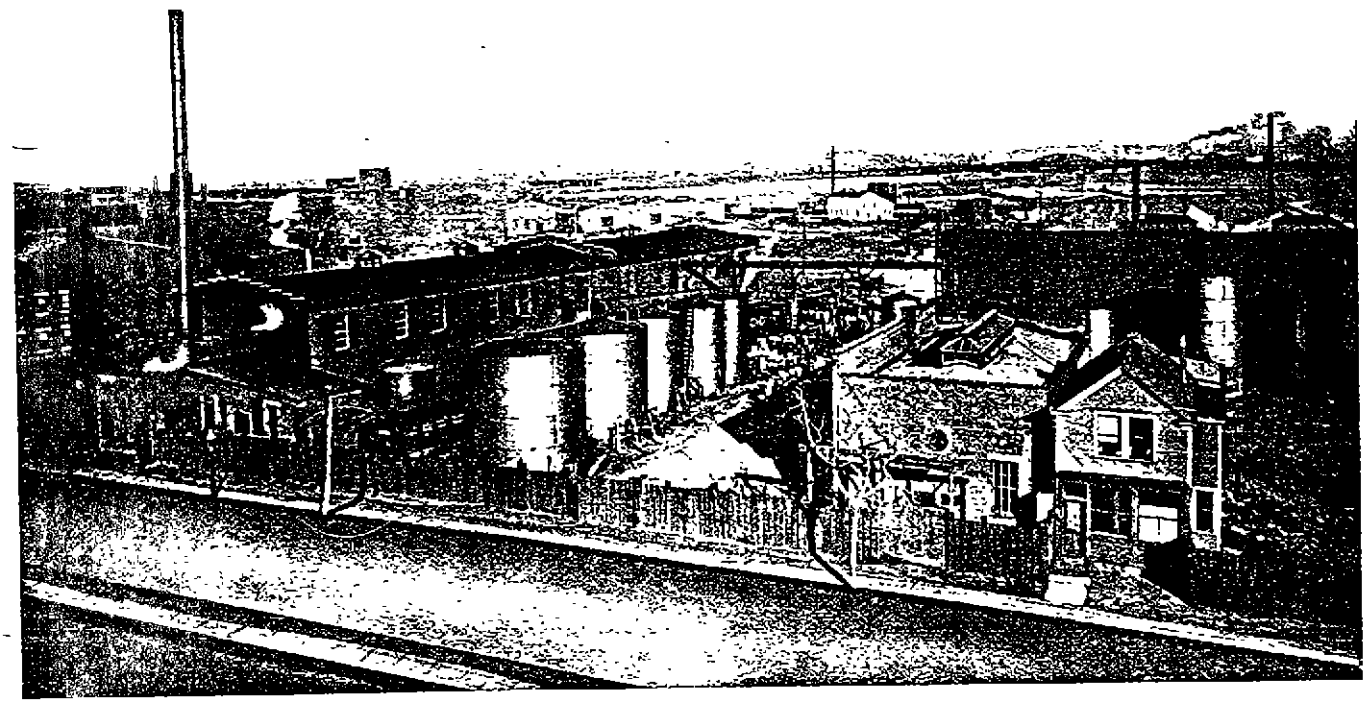
The company's plant on Lister avenue covers eighteen acres, advantageously situated, and is equipped with the best machinery. Four hundred and fifty persons are employed.

The officers of the company are President John F. Kehoe and Secretary-Treasurer Harry B. Carpenter.

Fiske Brothers Refining Co.

EWARK has long been famous for her progress and for the success of her long established business enterprises. [illegible] she has just cause for congratulation along this line is certain. An industry that has grown with the city in importance until, after forty-two years, it fills a place among the most important manufacturing enterprises of our city is the Fiske Brothers Refining Co. This business dates from its inception in 1870, when, in a very modest beginning, a co-partnership was formed between Messrs. Geo. N. Weston and Thos. P. Fiske, in New York City, where they opened a place as oil merchants and refiners. The first important change to occur was in 1879, when Mr. Alfred Teetsel joined them and established a lubricating grease department. Seven years later, in 1886, Mr. Weston retired from the business, his interest being purchased by Mr. Frederic B. Fiske, a brother of Mr. Thos. P. Fiske, who had been connected with the firm for several years. The growth of the business was steady, and to take advantage of larger opportunities opening before them, an incorporated company was formed in 1890, papers of incorporation being filed under the laws of the State of New York. The company was known as "Fiske Brothers Grease Co.," and it was at this time they established a factory at Newark, located at Lister avenue and Esther street, where, with the addition of a few months they began active operations for a more extended business. In 1898 the company increased its capital, consolidating both interests, and assumed its present title "Fiske Brothers Refining Company," Mr. Thomas P. Fiske being president, Mr. Frederic B. Fiske, vice-president, and Mr. Alfred Teetsel, secretary and general manager. Mr Thomas P. Fiske served the company as president, until 1899 and upon retiring, this office was filled by Mr. Frederic B. Fiske. In 1894 Mr. Alfred Teetsel was stricken down with severe illness and passed away. His son, Mr. Wm. M. Teetsel, succeeded him as general manager, Mr. George C. Field was elected to the position of secretary, and Mr. George P. Fiske to the position of vice-president. In 1909, Mr. H. W. Hazelton succeeded Mr. Field as secretary. Mr. Hazelton severed his connection with the business in 1911, and was succeeded by Mr. F. J. Snyder, the present incumbent.

Mr. Frederic B. Fiske, the president, is a resident of Brooklyn, N. Y., where he is prominently connected with many social and banking interests. He is a director of the



FISKE BROTHERS REFINING CO., LISTER AVENUE.

Dime Savings Bank of Brooklyn, and also of the Market & Fulton National Bank of New York, and many other corporations. The general manager of the company, Mr. Wm. M. Teetsel, resides in Jersey City, where he is highly esteemed. He has been an active member of the Newark Board of Trade for the last five years.

In order to better handle the company's still increasing business, a sales department was organized in 1909 and Mr. L. H. Atkinson was given the position of sales manager, which office he still holds. He was elected a director of the company in December, 1911.

The plant of the company is located at the intersection of Lister avenue and Lockwood street, occupying property to the extent of several acres. Upon this property have been erected five buildings, all of modern equipment, for the manufacture and handling of lubricating oils and greases.

The Newark Cork Works

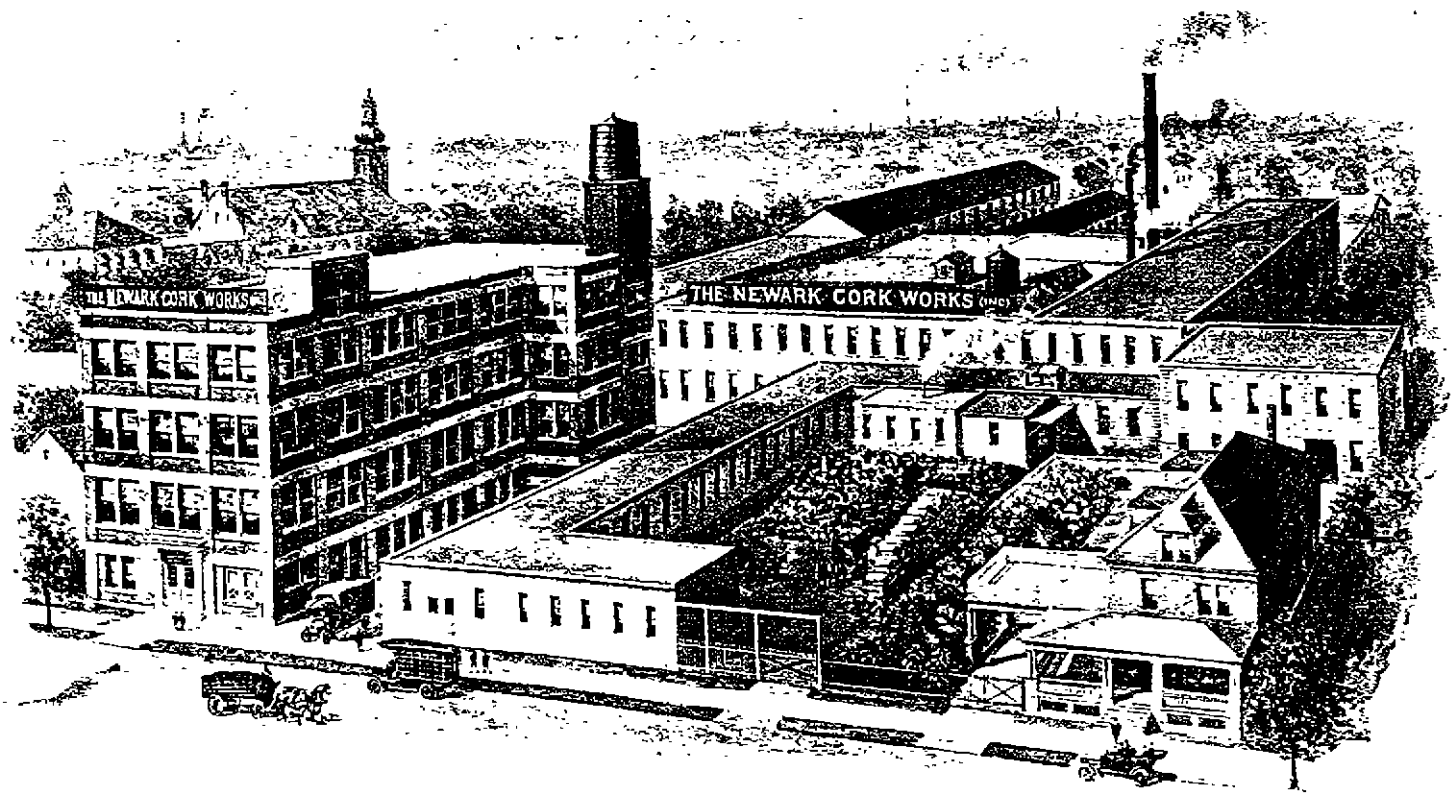
ONE of the most important features in the daily business life of any large community is to be found in the strength and solidity of its various manufacturing industries —these enterprises which furnish a means of livelihood to the brain and brawn of the city or town, and which distribute their products to the benefit of people in many sections of the country. In this respect Newark is exceptionally fortunate, possessing as it does, so many stanch and thoroughly reliable manufacturing industries.

Prominent among these is the Newark Cork Works, a concern of which it is merely a recognized fact to state, that it is New Jersey's leading cork importer and manufacturer. Some years ago this business was started in a rather small way and has been so capably managed as to market its output easily and steadily increase its field of activity.

interests. Mr. Biertuempfel has been an alderman for years, serving on the Public Buildings Committee, Municipal Committee and Legislative Committee, and has charge of Centre Market for which enterprise he is always planning big things and is very popular there.

The Newark Cork Works on Barbara and Komorn streets, occupy a two-story building with 100 feet frontage on Barbara street and 175 feet on Komorn street, with a depth of 200 feet. Plans, however, are now under way for the erection of a four-story building of modern type, thoroughly fireproof, which shall contain newest automatic machinery, most of it invented and patented by Albert H. Biertuempfel.

This company was the originator of reasonable prices for highest grades of cork and over 80% of the highest grade prescription and wine corks consumed in this State are manu-



THE NEWARK CORK WORKS, BARBARA ST. TO KOMORN ST

The business was inaugurated by Arnold and Albert H. Biertuempfel, under the name of Biertuempfel Bros., its original location being on Bremen street, and all cutting of corks at that time being done by hand. In 1904, to meet the demands of a rapidly growing business an incorporated company was formed, and the capital stock has twice been changed since then, and at the present time, has reached $200,000. The president of the company is Richard A. Hensler, and the secretary and treasurer is Albert H. Biertuempfel, who also has the active management of the business. These gentlemen are Newark residents, men of push and business ability, financial strength and progressive ideas, and thoroughly representative of the city's best industrial

factured and sold by the Newark Cork Works. The company makes now 1,200 kinds of corks and many cork specialties, also utilizing all their cork waste into a marketable product of packing of various kinds. The output of their regular lines is from seven to eight million per week. A special feature has been developed in the making of stoppers for soda and beer bottles, as many as 18,000 of these being turned out in an hour by a certain machine automatically.

In conjunction with these lines, Mr. Biertuempfel has now incorporated another branch of the business under the name of "The United Corrugated Paper Packing Co.," which is to take care of the making of bottle wrappers, crating and partitions for the shipping of bottles.

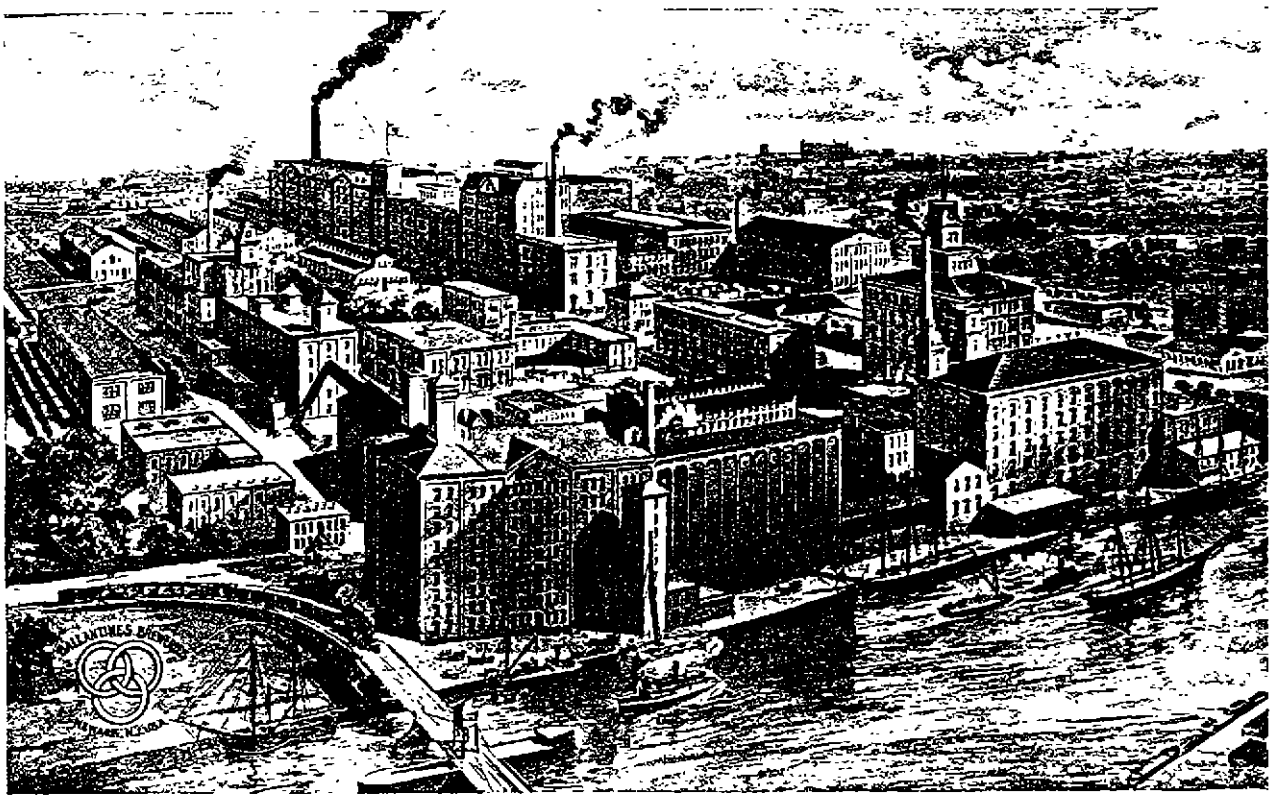
P. Ballantine & Sons

THE THREE RINGS are known the world over as the trade-mark of P. Ballantine & Sons, Brewers and Maltsters, Newark, N. J., U. S. A. This trade-mark was adopted in 1879 and was suggested by the chief characteristics of the product of their breweries—purity, strength, flavor.

The nucleus of the great business of the Ballantine Breweries was formed in Albany, N. Y., in 1833 by the late Peter Ballantine, who removed to Newark in 1840. The lager beer brewery was started in 1879. To meet the needs of the rapidly growing business, the corporation of P. Ballantine & Sons, embracing the ale, lager beer and malting business, was formed in 1883. Since then the annual output has increased steadily until it now amounts to over half a million barrels yearly. Several years ago the manufacture of Ballantine cereal syrup for the use of bakers was inaugurated, which product is used throughout America and has met with constantly increasing success.

The ale brewery, malting, elevator and cereal syrup buildings of the Ballantine plant are situated on Front, Fulton, Rector streets and the Passaic river; the lager beer brewery and bottlery are located on Freeman, Christie, Oxford, East Ferry and Bowery streets, Newark. All these buildings cover twelve acres of ground, are equipped with the most modern and model machinery, and contain great storage capacity necessary for the enormous output and insuring the thorough ripening of the Ballantine products. The entire brewing and bottling plant is subject to the supervision of the United States government.

As Ballantine resources are ample, as Ballantine capacity is enormous, and as Ballantine Ales and Beers are never made from anything but the very choicest grain, barley-malt and hops, the purity of the Ballantine products is beyond the veriest shadow of doubt. Expert brewers constantly supervise every process, and absolute cleanliness is observed in every operation. All Ballantine's Ales and Beers are thoroughly matured and fully ripened in order to perfect their condition and retain the distinctive flavors at their very best. No preservatives are ever used in any one of the Ballantine products. None is needed.



COMBINED VIEWS OF THE BALLANTINE BREWERIES, NEWARK, N. J.

There is no necessity for argument as to the superiority of brewery bottling over that done elsewhere. Ballantine's Ales and Beers are all bottled at the brewery in a specially designed bottling house, equipped with the best modern machinery. The beer is conveyed to this house in bright copper pipes, under the supervision of U. S. Government officials, and is stored in glass-lined steel tanks. The latest bottling machinery thoroughly cleanses, sterilizes, fills and seals the bottles without the possibility of contamination. The beer does not once come into contact with the air in its passage from the brewery storage vats through the pipe line and the bottling machinery into the bottles in which it is hermetically sealed. Purity of product is thus absolutely assured. Every sealed bottle of Ballantine's Beer conforms in all respects to the requirements of the United States Pure Food Law. Finally, handsome labels and careful packing complete the attractive presentation of this perfectly made and valuable product.

The Joseph Hensler Brewing Company

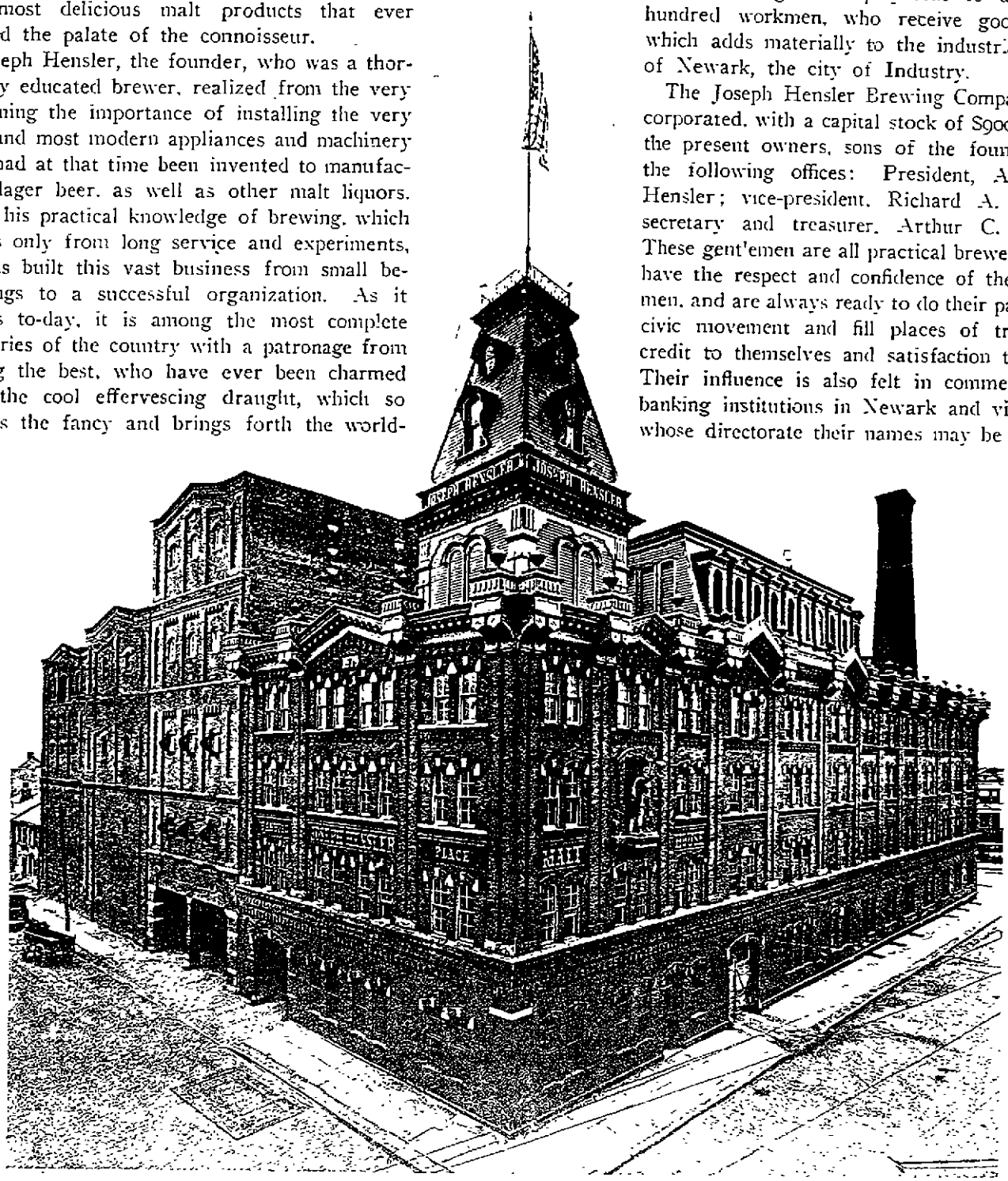
FOR half a century the name of Hensler has been a familiar one in connection with the brewery business in the city of Newark; as will be seen by a reference to the brewing industry record, this brewery will be found to stand out very prominently as having its full share of the business in manufacturing the mild exhilarating beverage, which will be found upon the tables of the best families in Newark and vicinity. The accompanying illustration shows the plant at Hamburg place, Alyea street and Hensler street, from which has gone forth some of the most delicious malt products that ever tickled the palate of the connoisseur.

Joseph Hensler, the founder, who was a thoroughly educated brewer, realized from the very beginning the importance of installing the very best and most modern appliances and machinery that had at that time been invented to manufacture lager beer, as well as other malt liquors. With his practical knowledge of brewing, which comes only from long service and experiments, he has built this vast business from small beginnings to a successful organization. As it stands to-day, it is among the most complete breweries of the country with a patronage from among the best, who have ever been charmed with the cool effervescing draught, which so pleases the fancy and brings forth the world-wide recommendation of those who know.

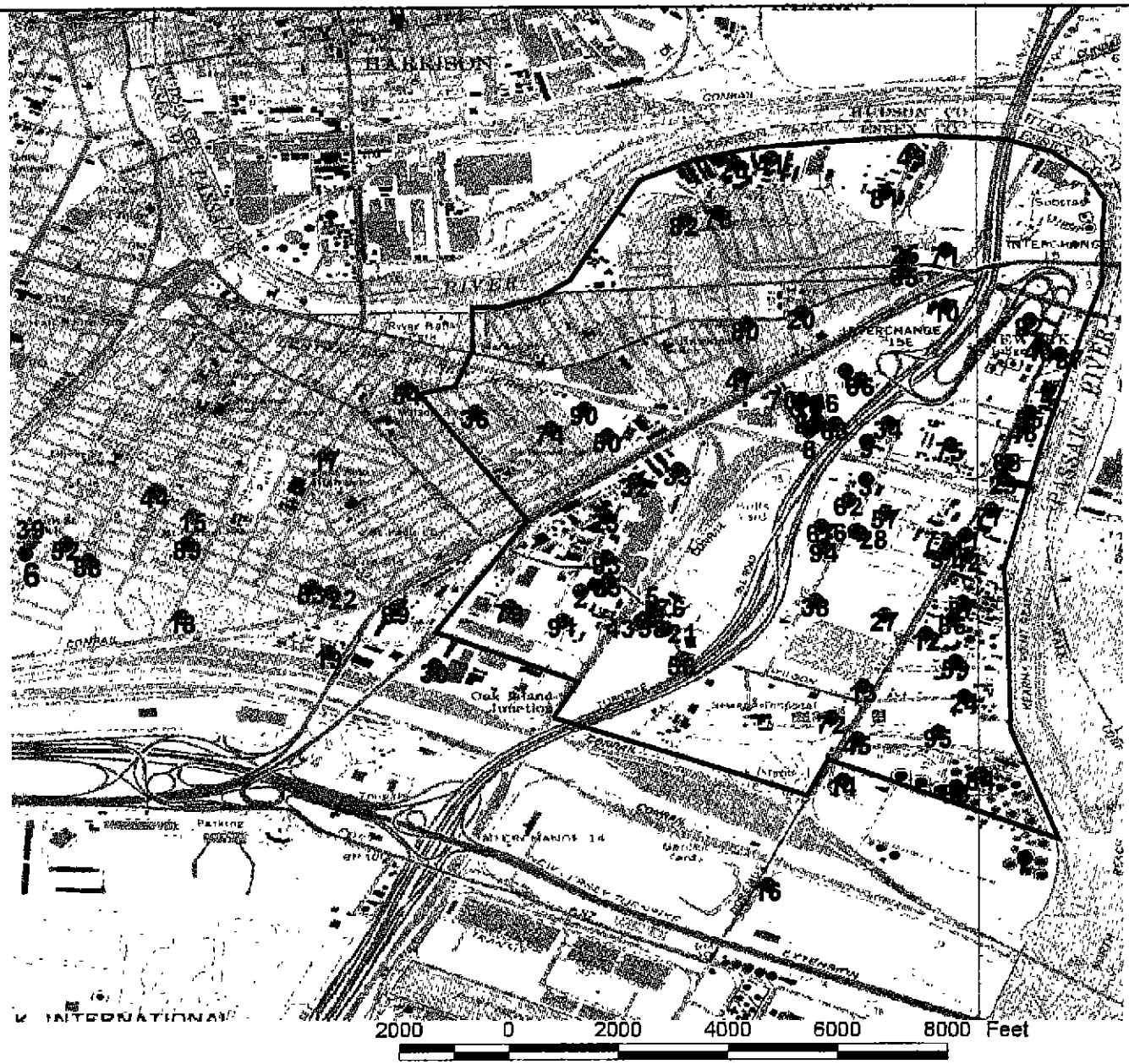
The immense vaults, which are kept at a low temperature by the latest improved ice or frost bearing machines are kept full of Lager beer from whence, when in the best stage of its ripened age it is taken forth to dispensers and consumers, in crates, in kegs and in barrels on the immense trucks owned by the company.

This brewery is composed of six buildings that range from two to six stories, has an annual output of almost 200,000 barrels and gives employment to about two hundred workmen, who receive good wages, which adds materially to the industrial growth of Newark, the city of Industry.

The Joseph Hensler Brewing Company is incorporated, with a capital stock of $900,000, and the present owners, sons of the founder, hold the following offices: President, Adolph F. Hensler; vice-president, Richard A. Hensler; secretary and treasurer, Arthur C. Hensler. These gent'emen are all practical brewers. They have the respect and confidence of their fellow men, and are always ready to do their part in any civic movement and fill places of trust with credit to themselves and satisfaction to others. Their influence is also felt in commercial and banking institutions in Newark and vicinity, in whose directorate their names may be found.



THE JOSEPH HENSLER BREWING COMPANY, HAMBURG PLACE, ALYEA AND HENSLER STREETS.



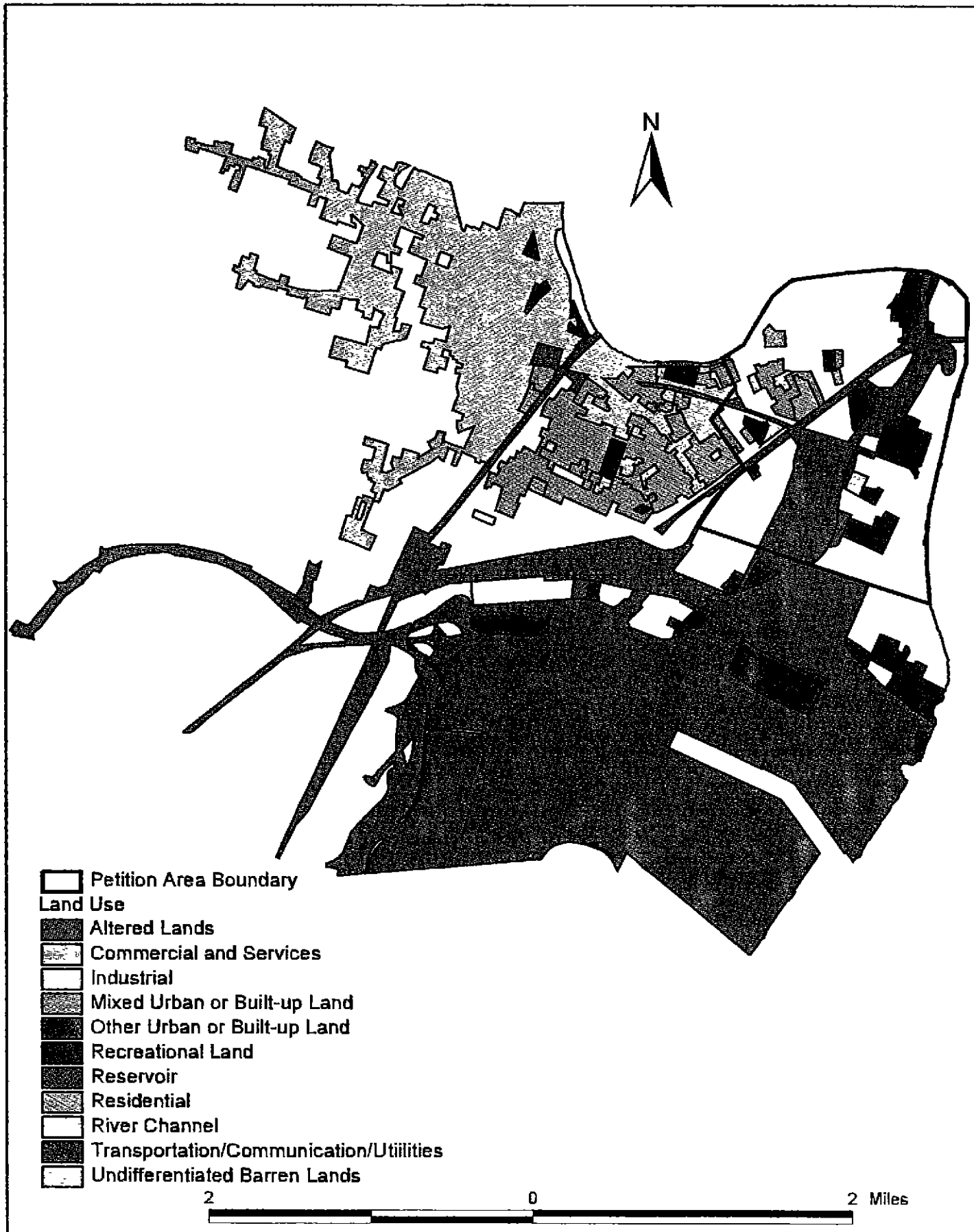
* Site locations are approximate.
* Site numbers correspond to numbers in Table 3-2.
* JF Henry Chemical not shown on map.

MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Locations of Sites Within and Adjacent to the Petition Area that Have Been or are Being Investigated

Figure 3-1



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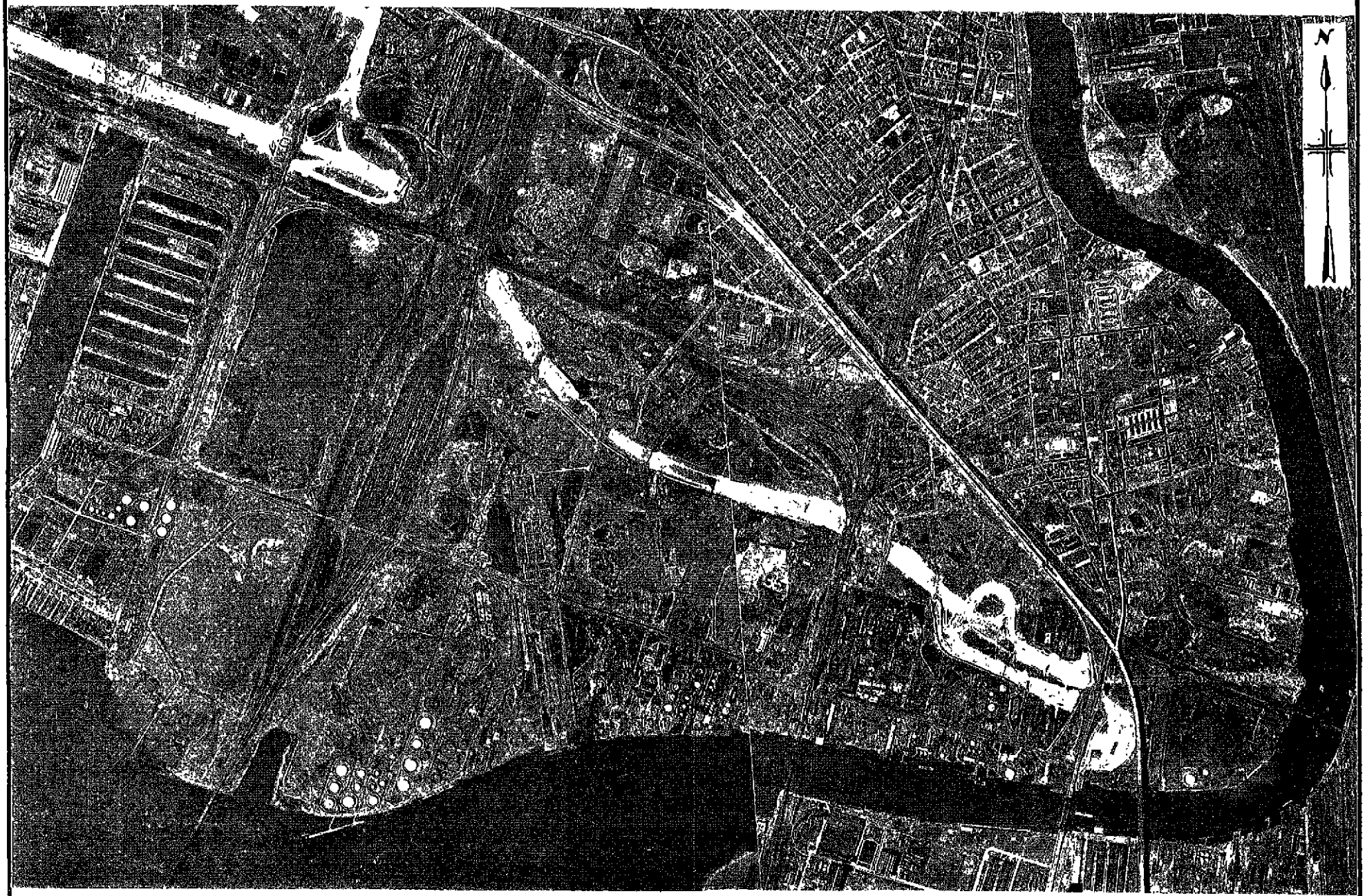
Newark, New Jersey

Land Use / Land Cover of the Petition Area

Figure 4-1



SCALE: 1" = 1667'

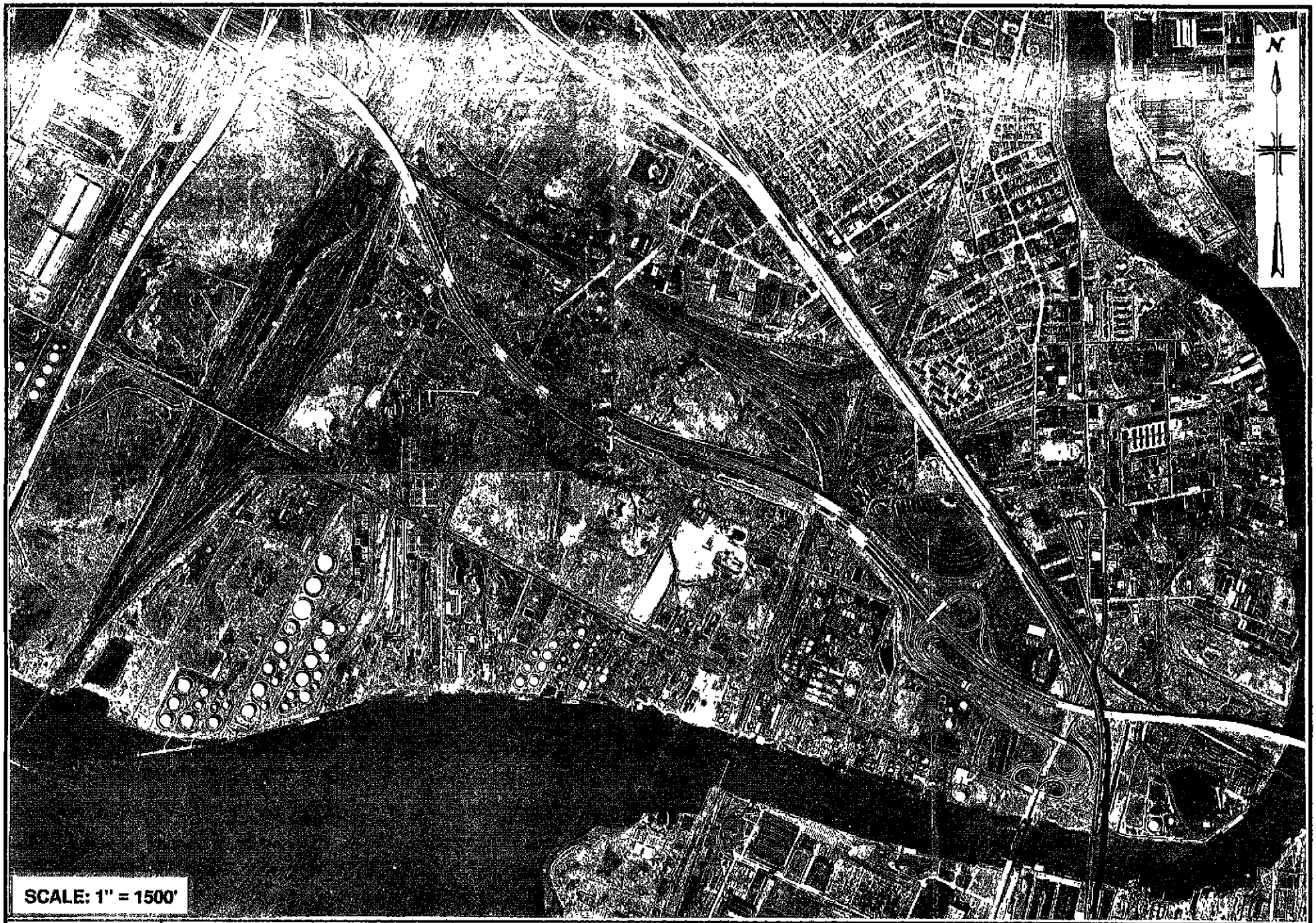
MALCOLM PIRNIE

TECHNICAL JUSTIFICATION DOCUMENT
NEWARK, NEW JERSEY

AERIAL PHOTOGRAPH - 1951

MALCOLM PIRNIE, INC.

FIGURE 4-2



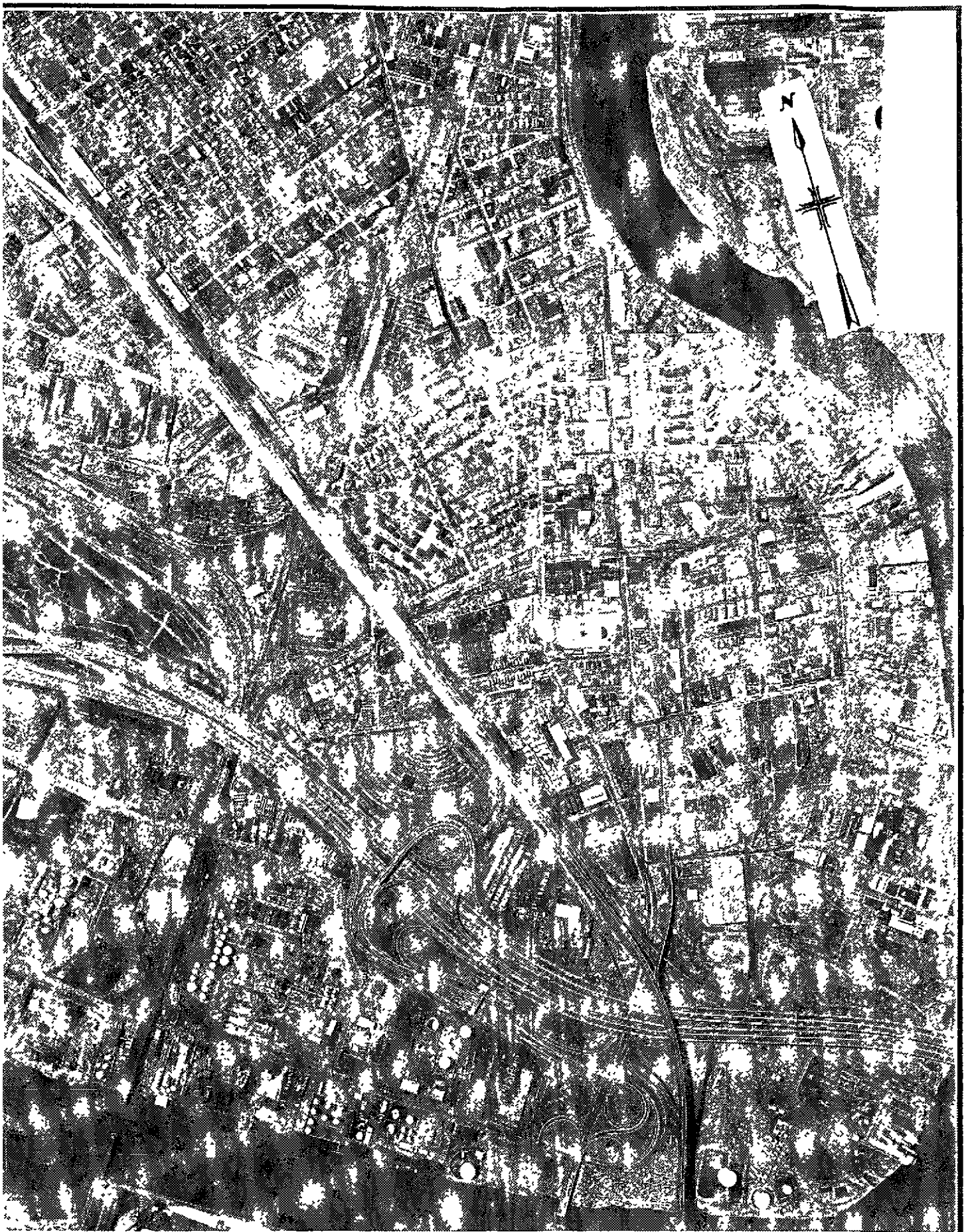
MALCOLM PIRNIE

TECHNICAL JUSTIFICATION DOCUMENT
NEWARK, NEW JERSEY

AERIAL PHOTOGRAPH 1961

MALCOLM PIRNIE, INC.

FIGURE 4-3



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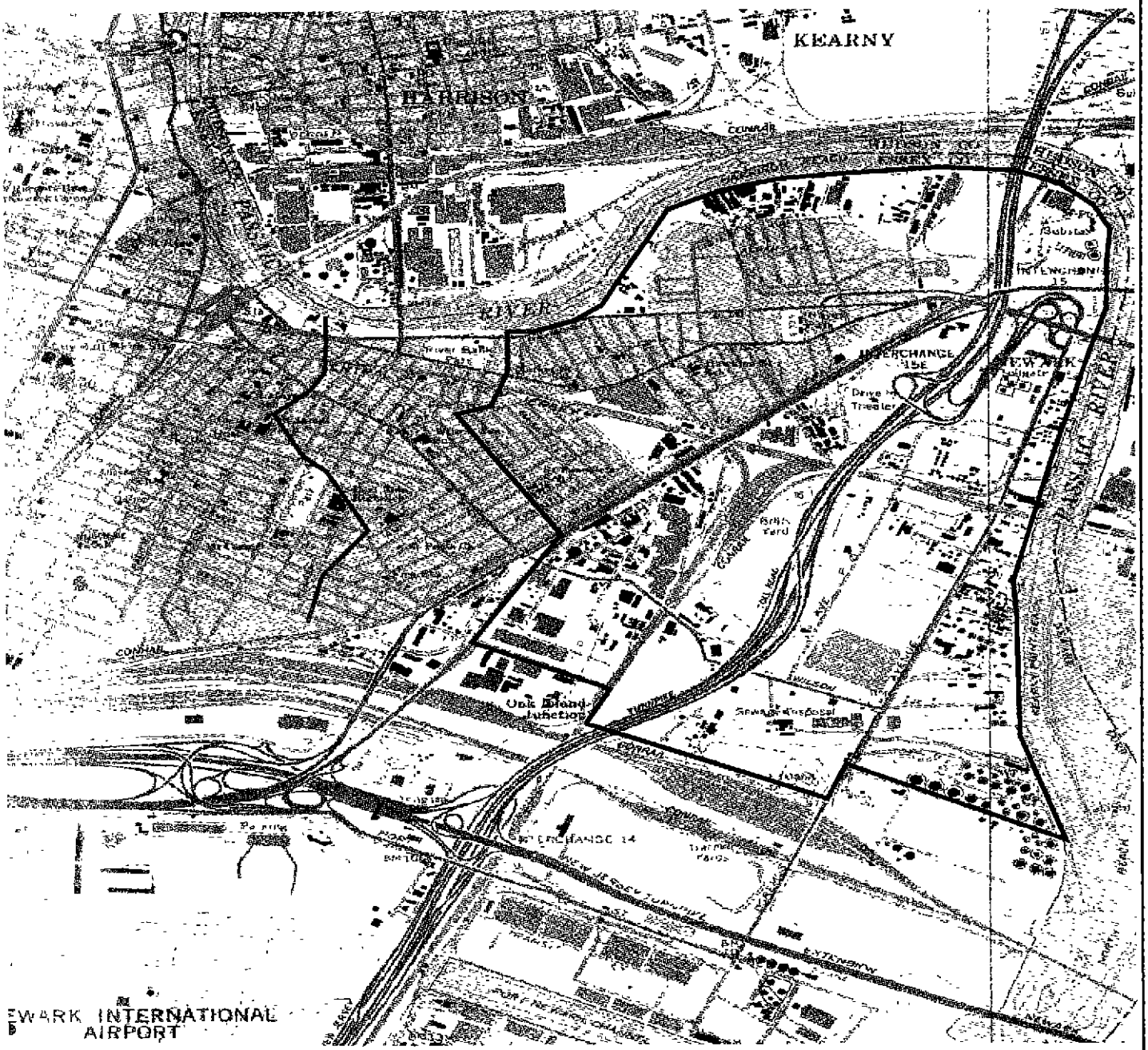
GRAPH 1979

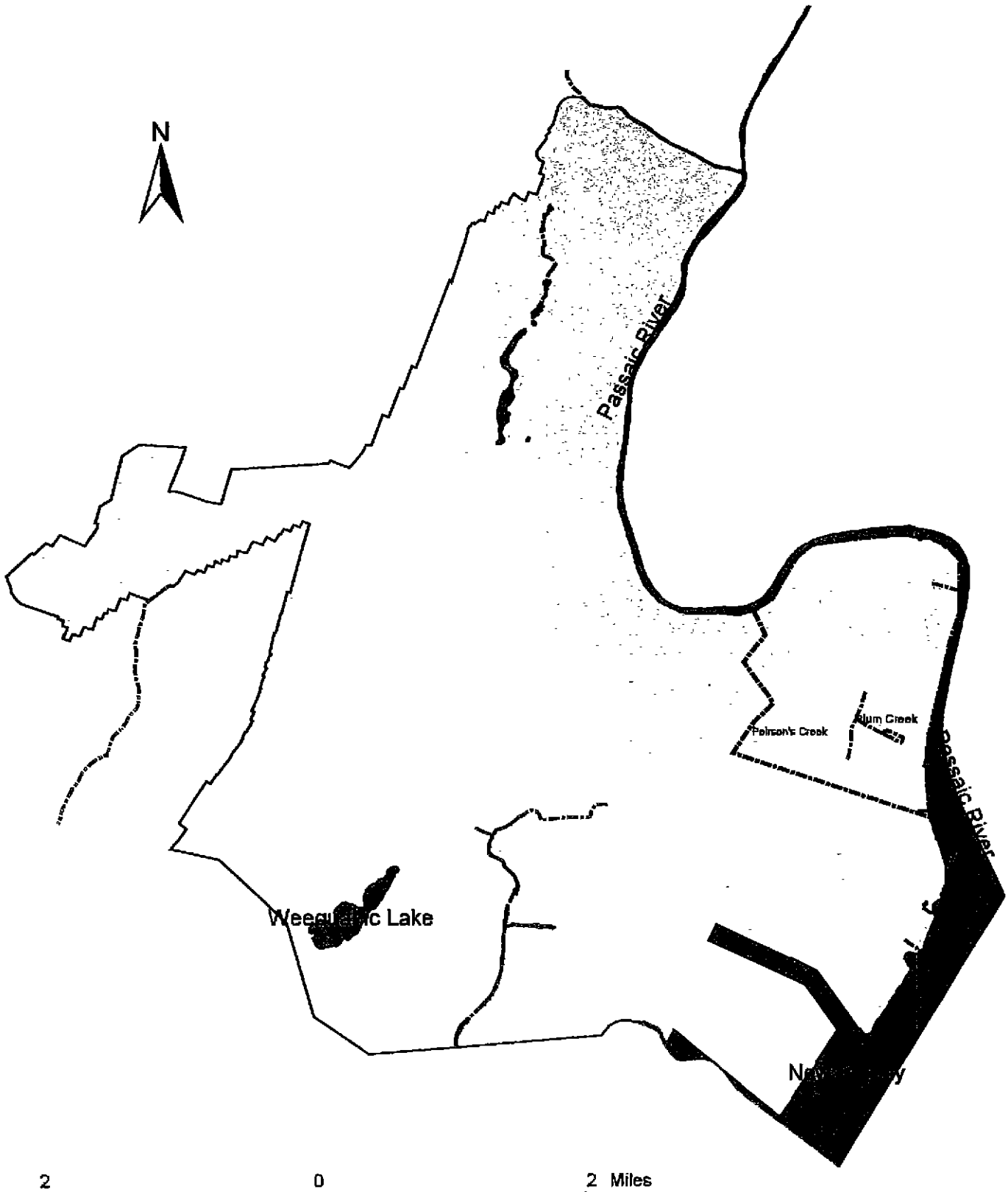
MALCOLM PIRNIE, INC.

FIGURE 4-4



*Location of well approximate.

MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Newark Refrigeration Warehouse Well**	**Figure 4-5**

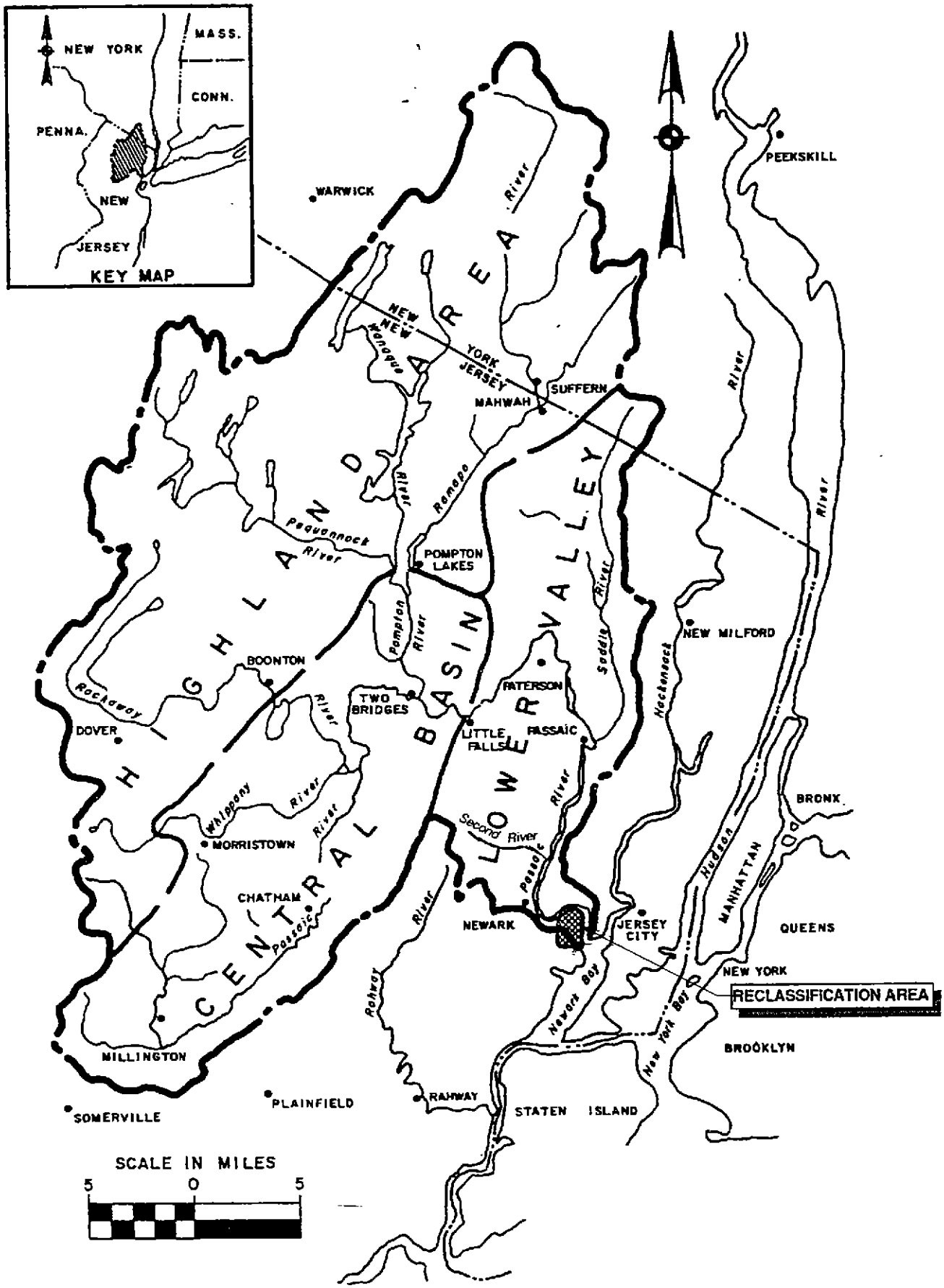


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Surface Water Bodies in the Petition Area

Figure 4-6



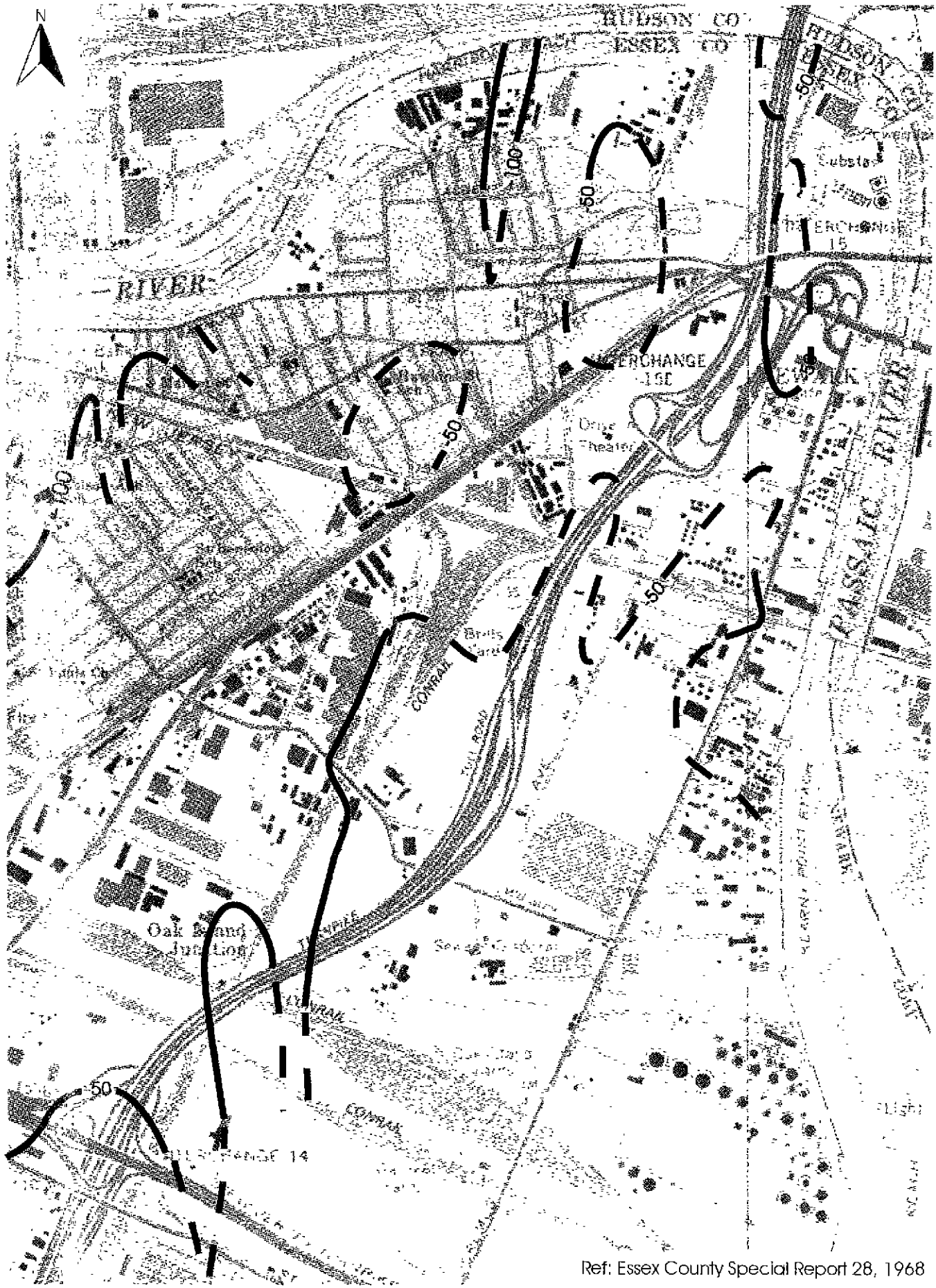
MALCOLM PIRNIE

TECHNICAL JUSTIFICATION DOCUMENT
NEWARK, NEW JERSEY

PASSAIC RIVER AND TRIBUTARIES

MALCOLM PIRNIE, INC.

Figure 4-7



MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey BEDROCK TOPOGRAPHY	FIGURE 5-1

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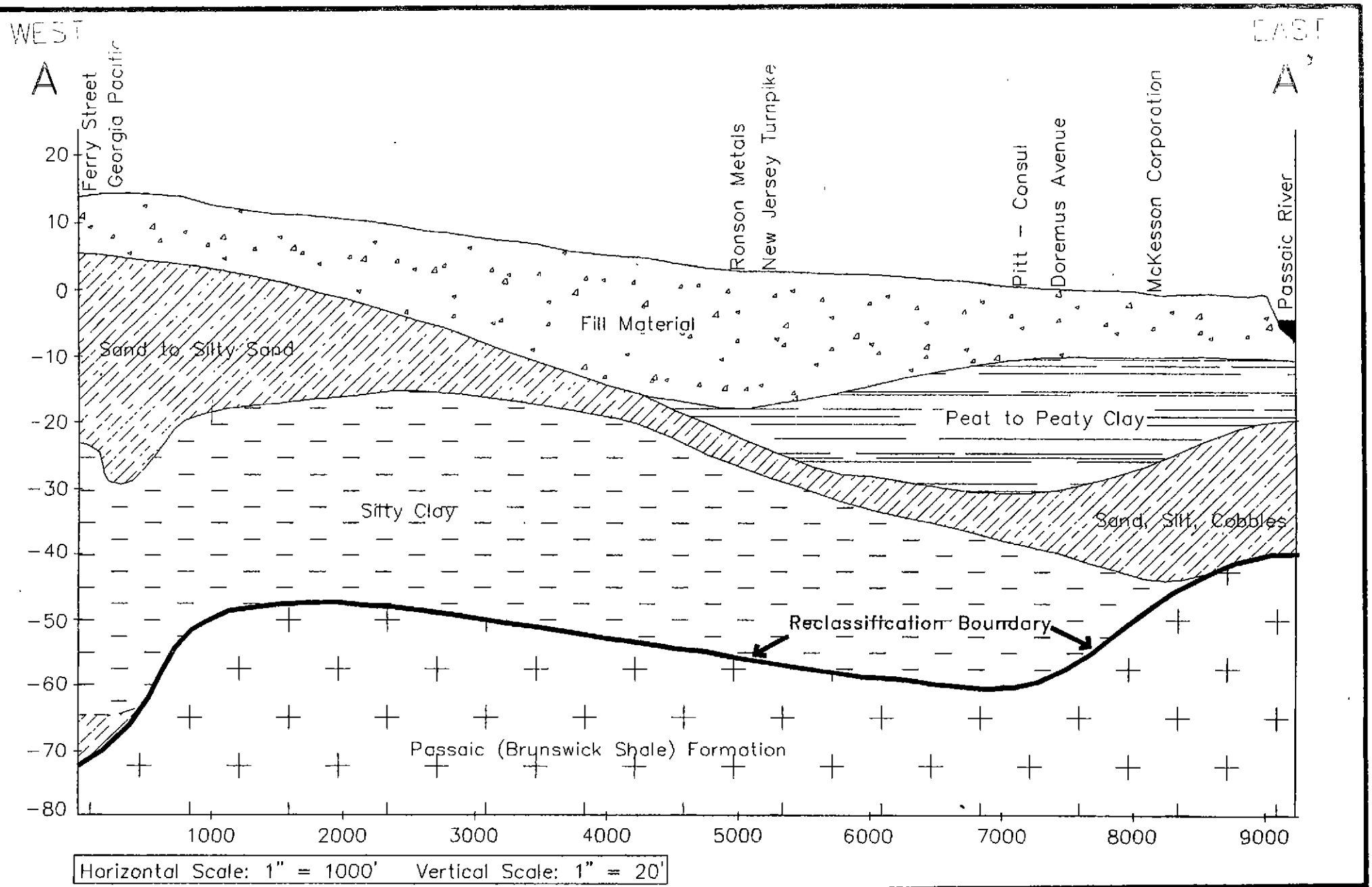


MALCOLM PIRNIE

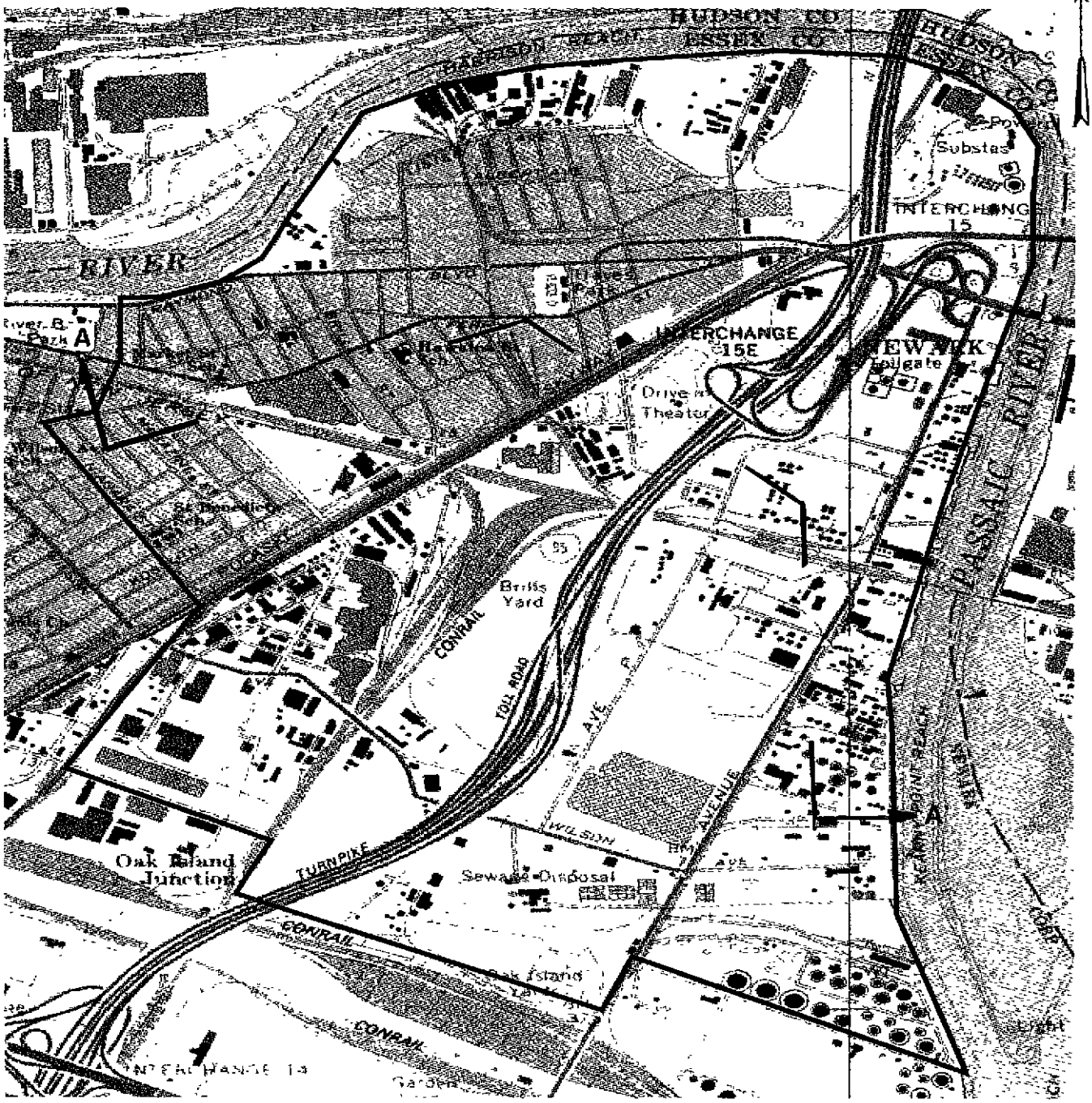
Technical Justification Document

Newark, New Jersey

Idealized Stratigraphic Cross Section

MALCOLM PIRNIE, INC.

Figure 5-2



MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Cross Section A - A'

MALCOLM PIRNIE, INC.

Figure 5-3

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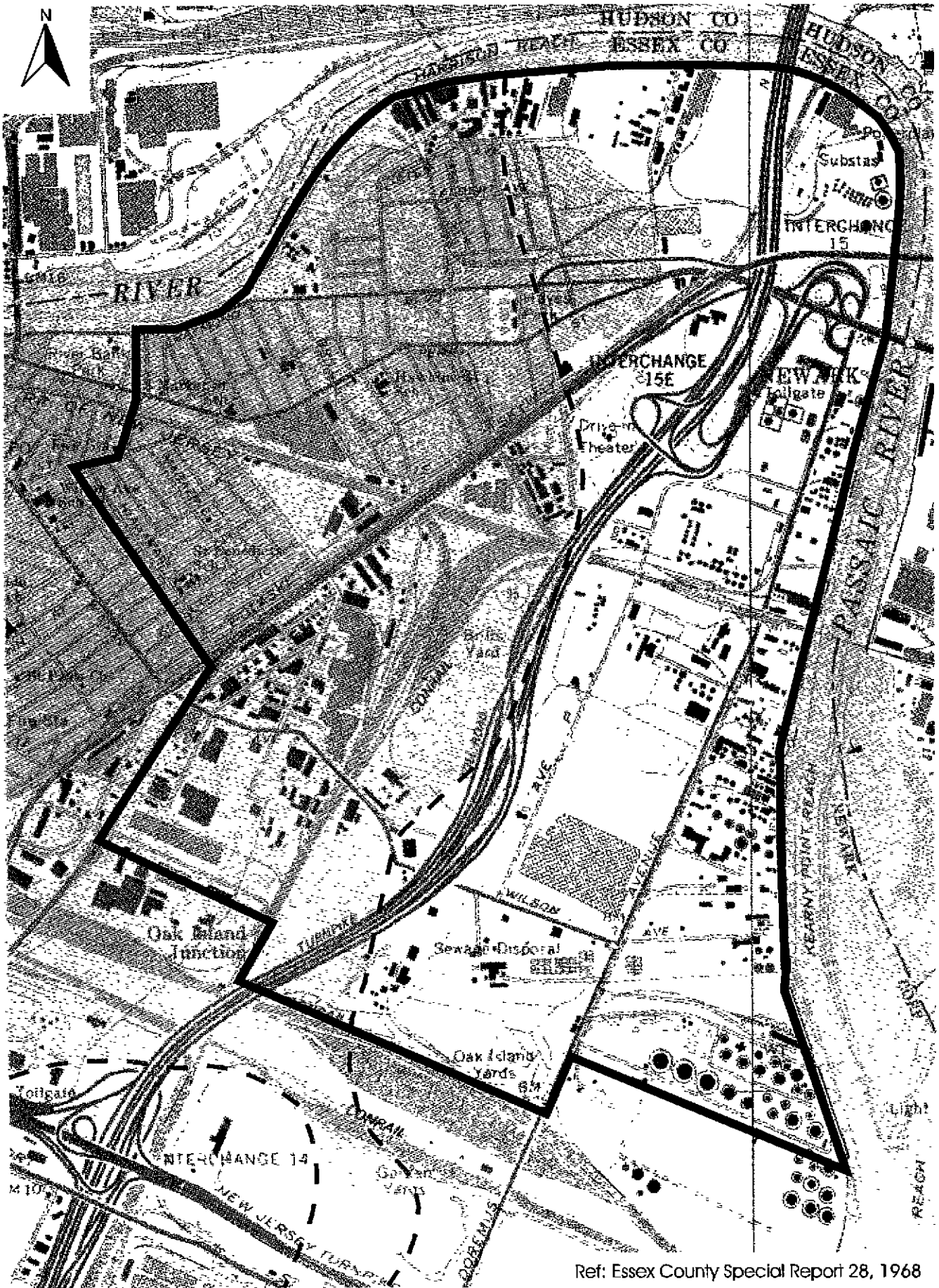
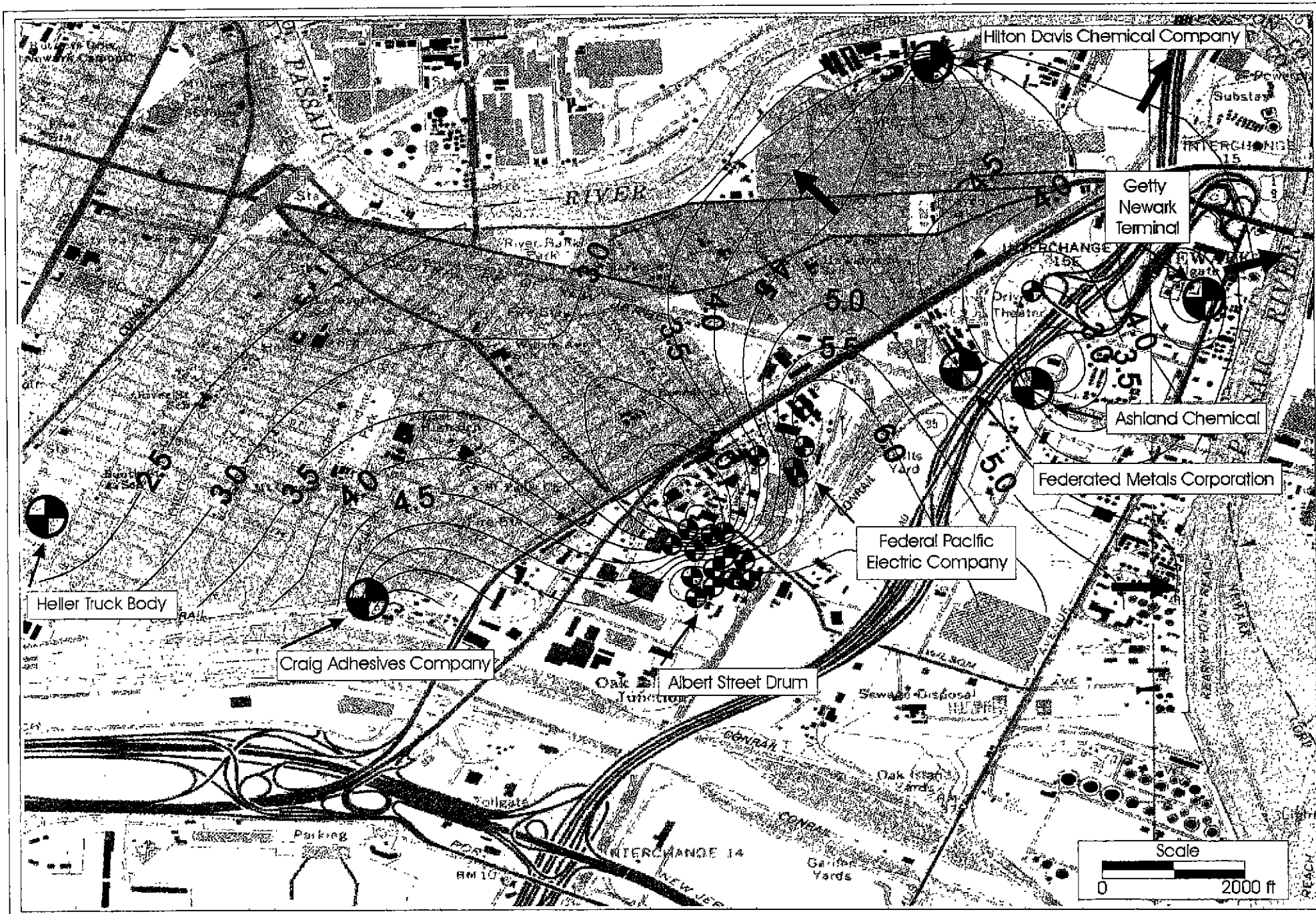


MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey LOCATION OF STRATIFIED DRIFT DEPOSITS	Figure 5-4

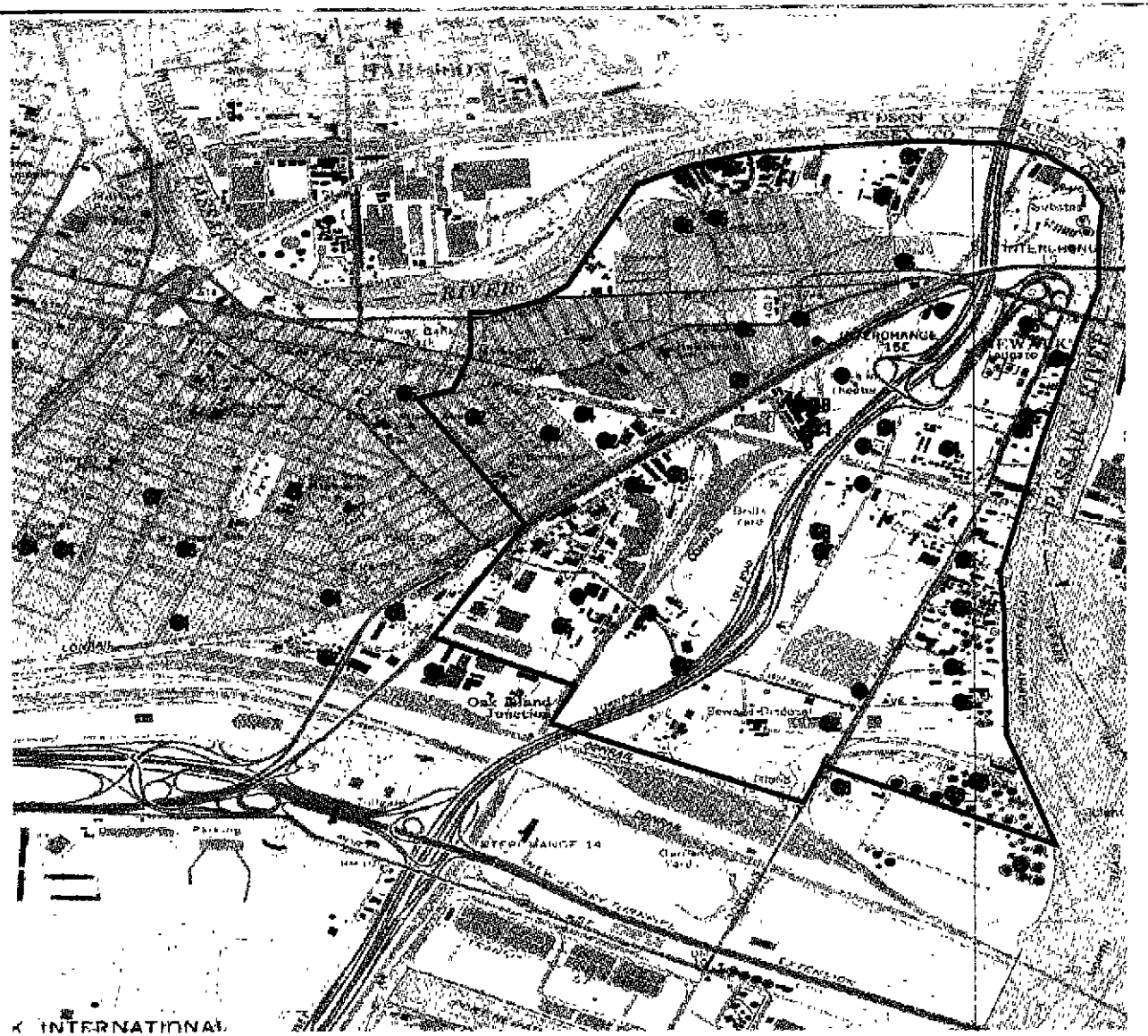


MALCOLM PIRNIE

Groundwater Elevation and Flow Directions

MALCOLM PIRNIE, INC.

Figure 5-5



*Site locations are approximate.
*Site Numbers correspond to numbers in Table 6-1.
*JF Henry Chemical not shown on map.

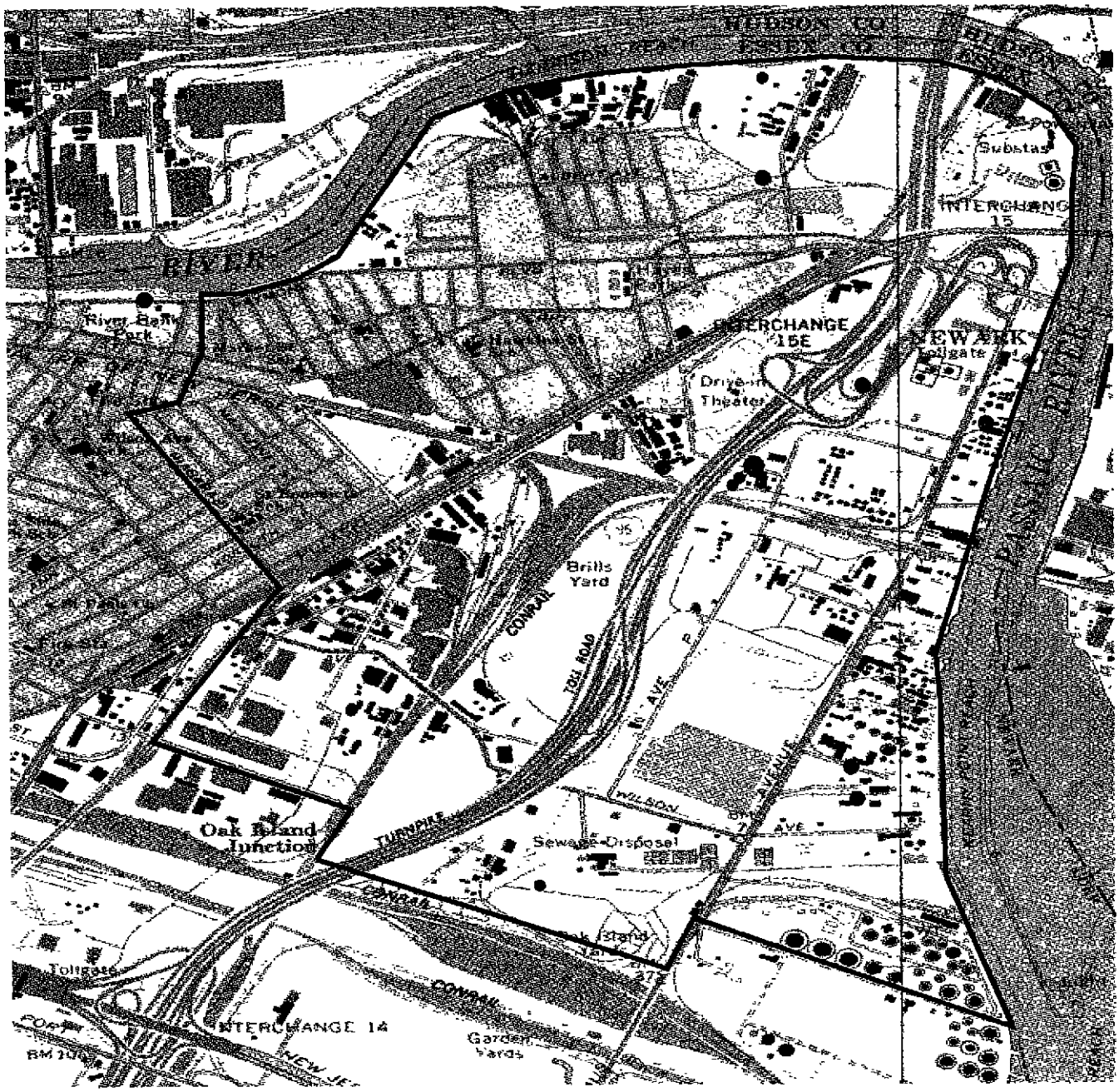
2000 0 2000 4000 6000 8000 10000 12000 Feet

MALCOLM PIRNIE

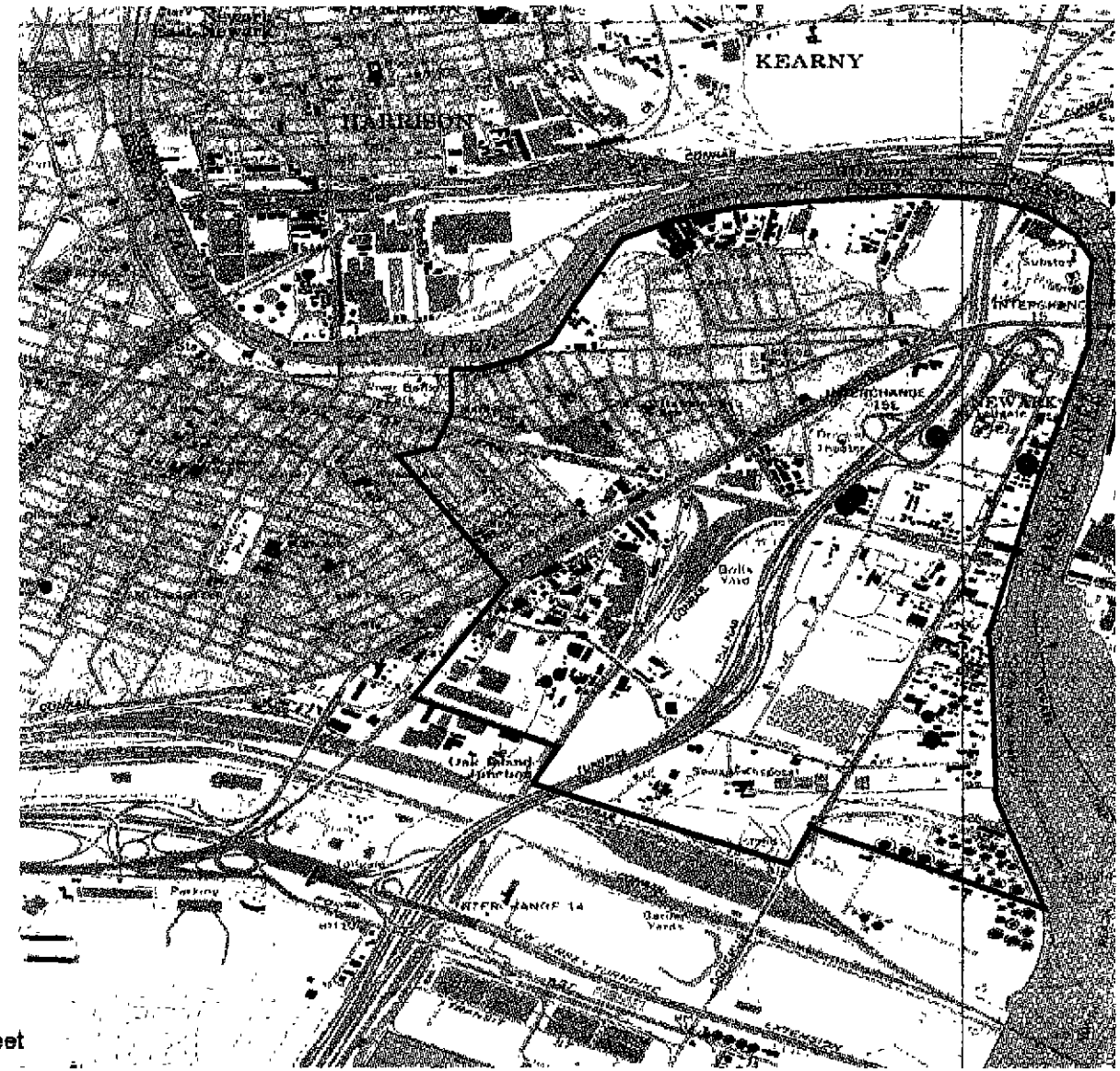
Technical Justification Document
Newark, New Jersey

Locations of 57 Sites With Groundwater Data

Figure 6-1



MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Location of Wells Containing 1,1-Dichloroethane**	Figure 6-2

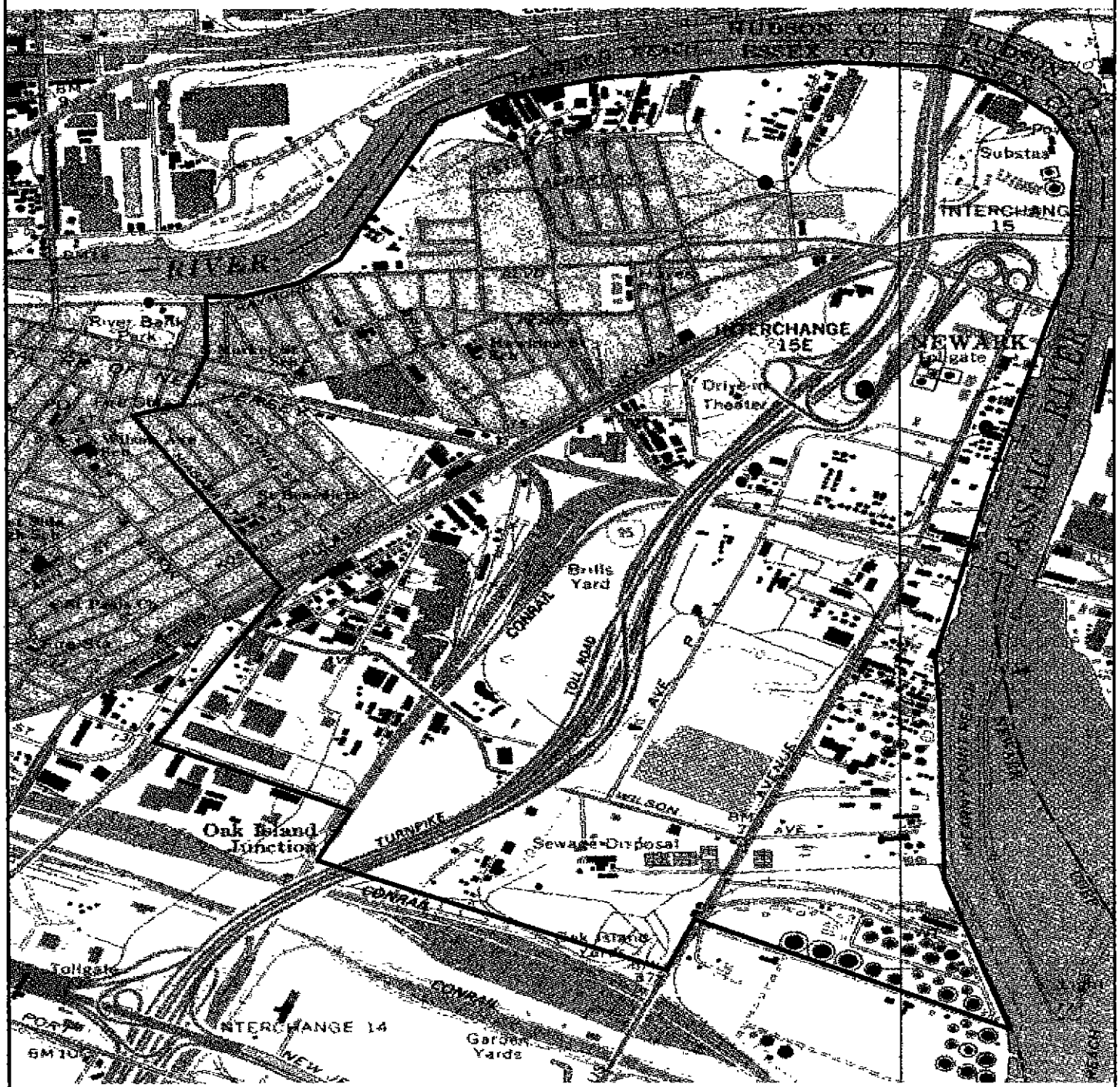


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing 1,2-Dichloroethane

Figure 6-3

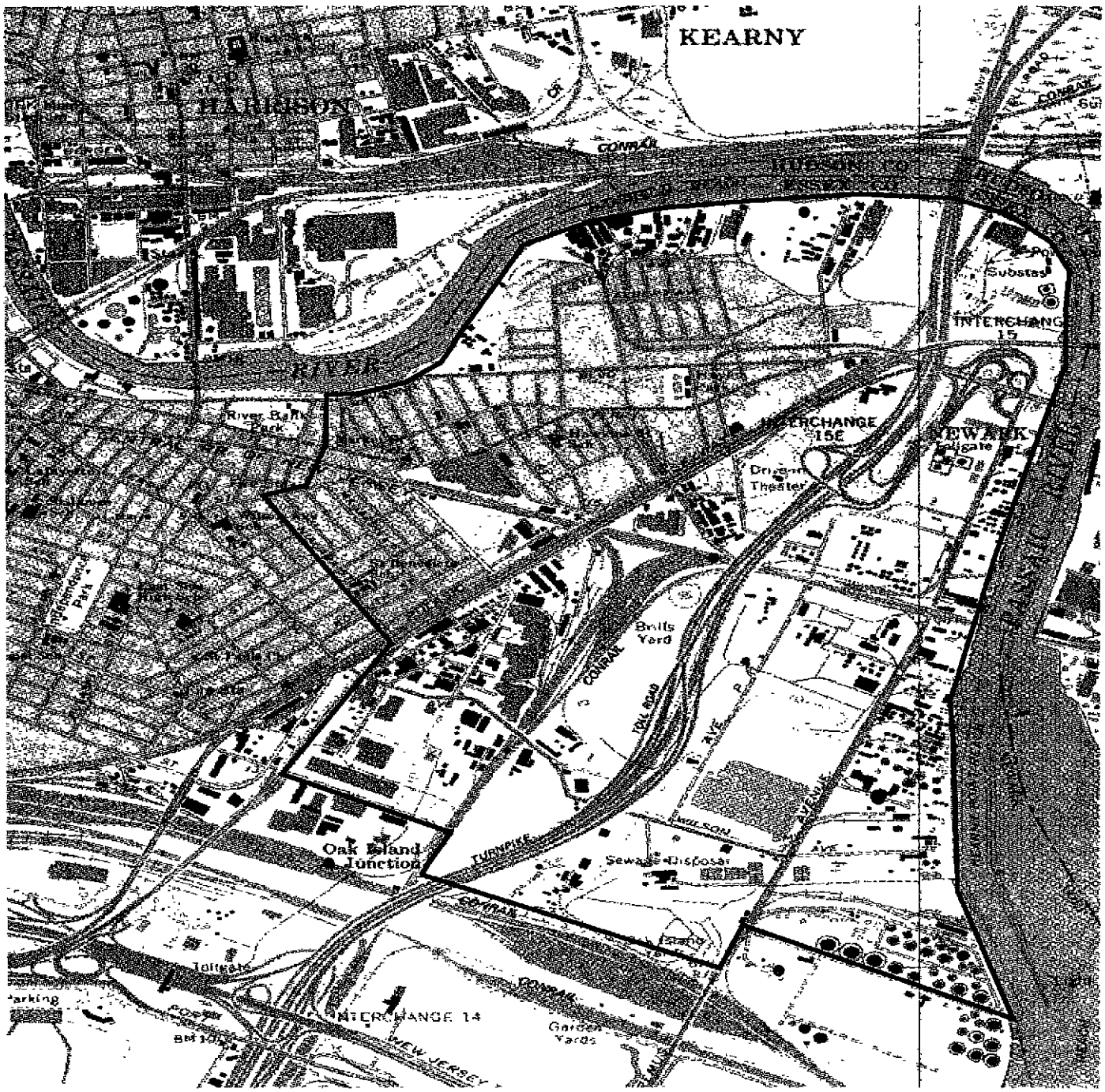


MALCOLM PIRNIE

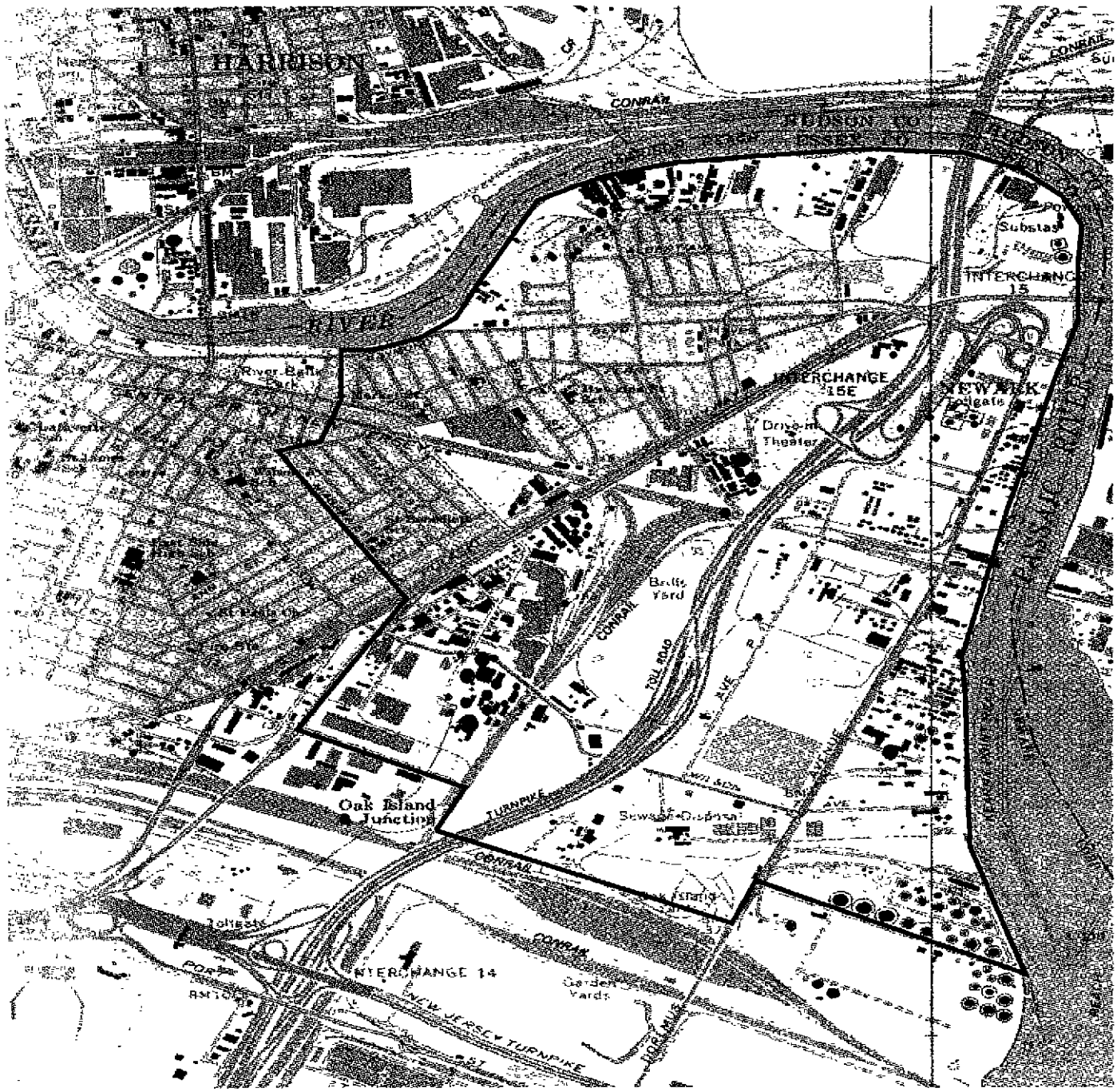
Technical Justification Document
Newark, New Jersey

Location of Wells Containing 1,1,1-Trichloroethane

Figure 6-4



MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Location of Wells Containing Total Antimony**	**Figure 6-5**

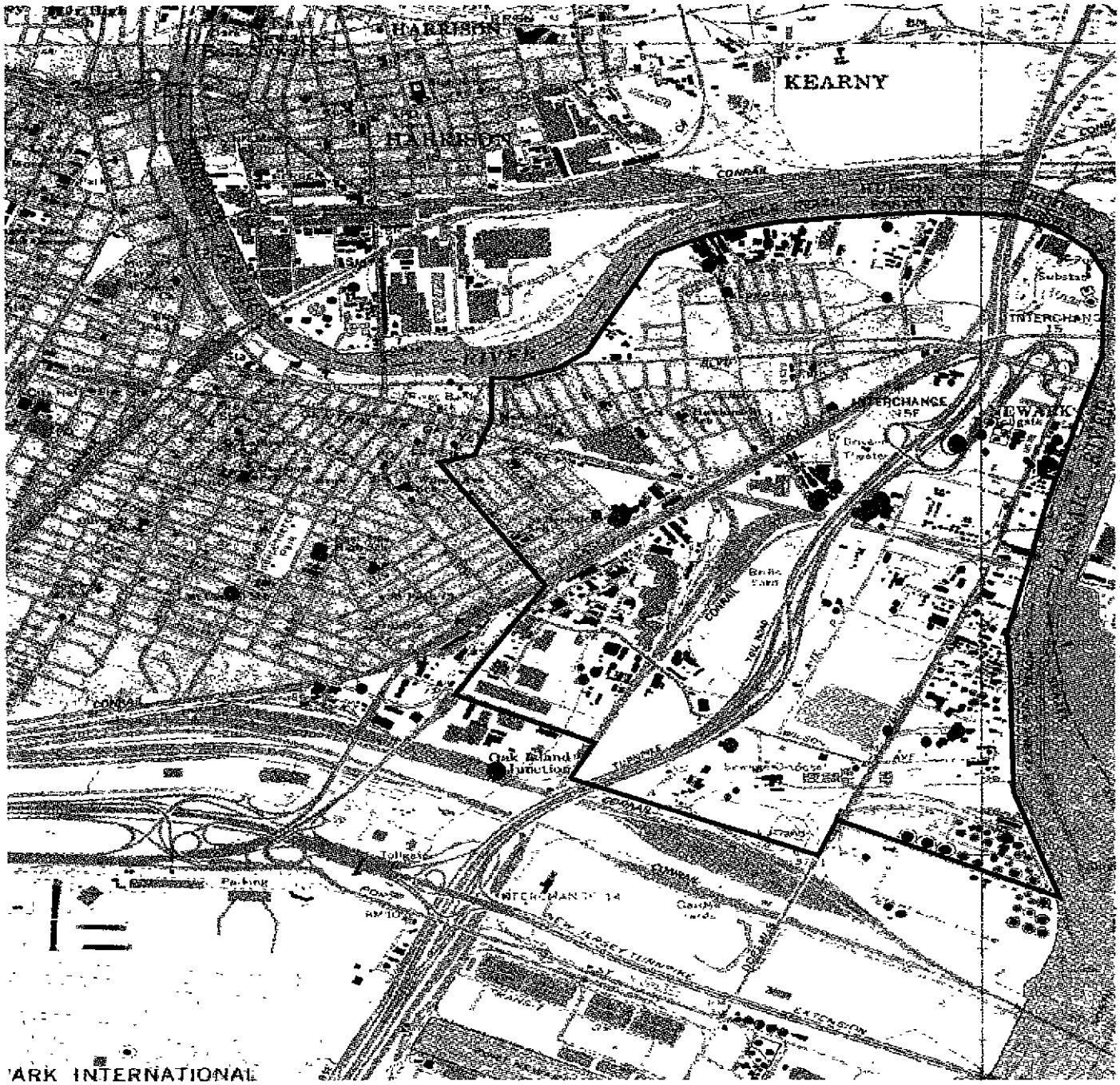


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Arsenic

Figure 6-6

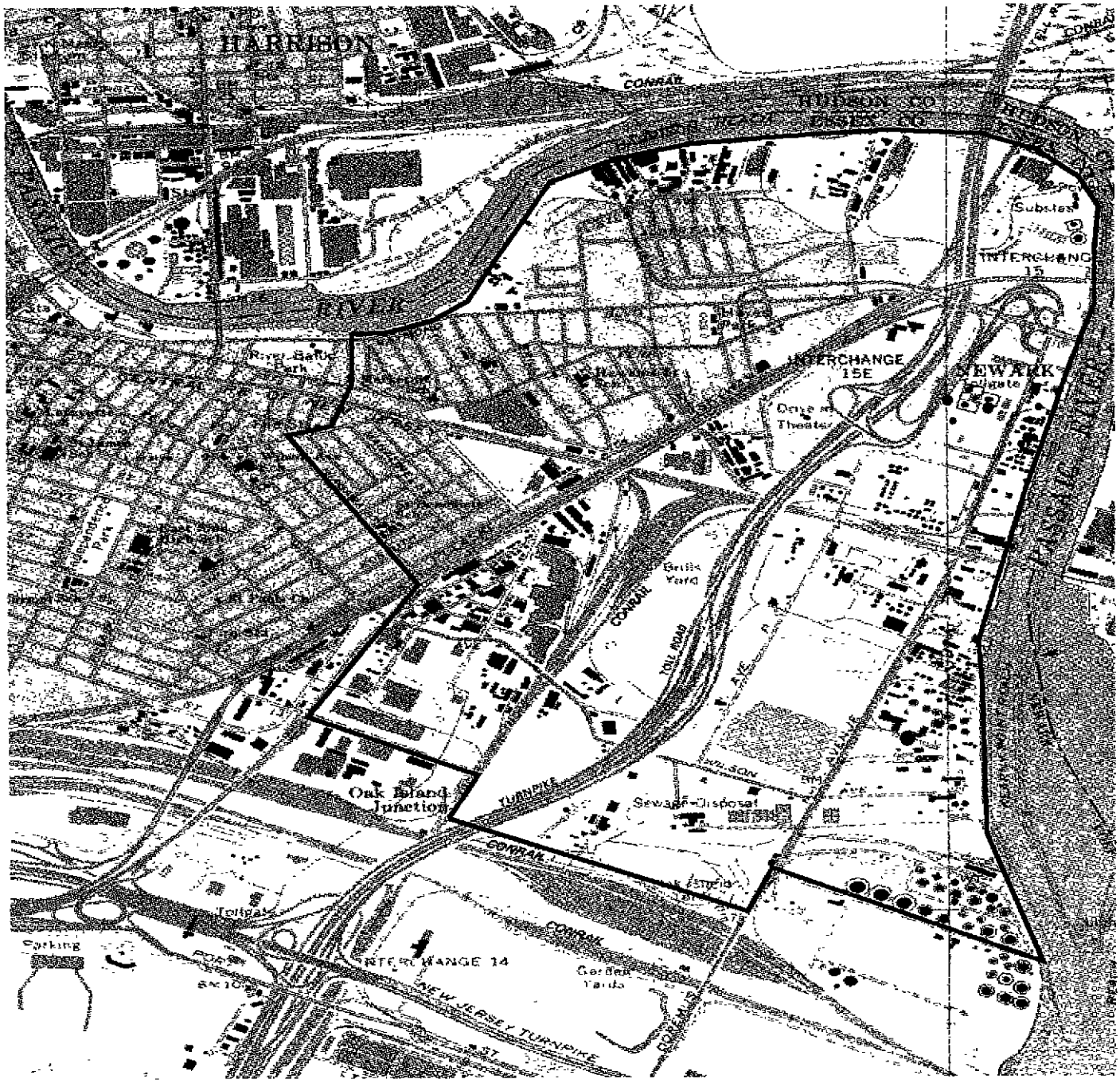


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Benzene

Figure 6-7

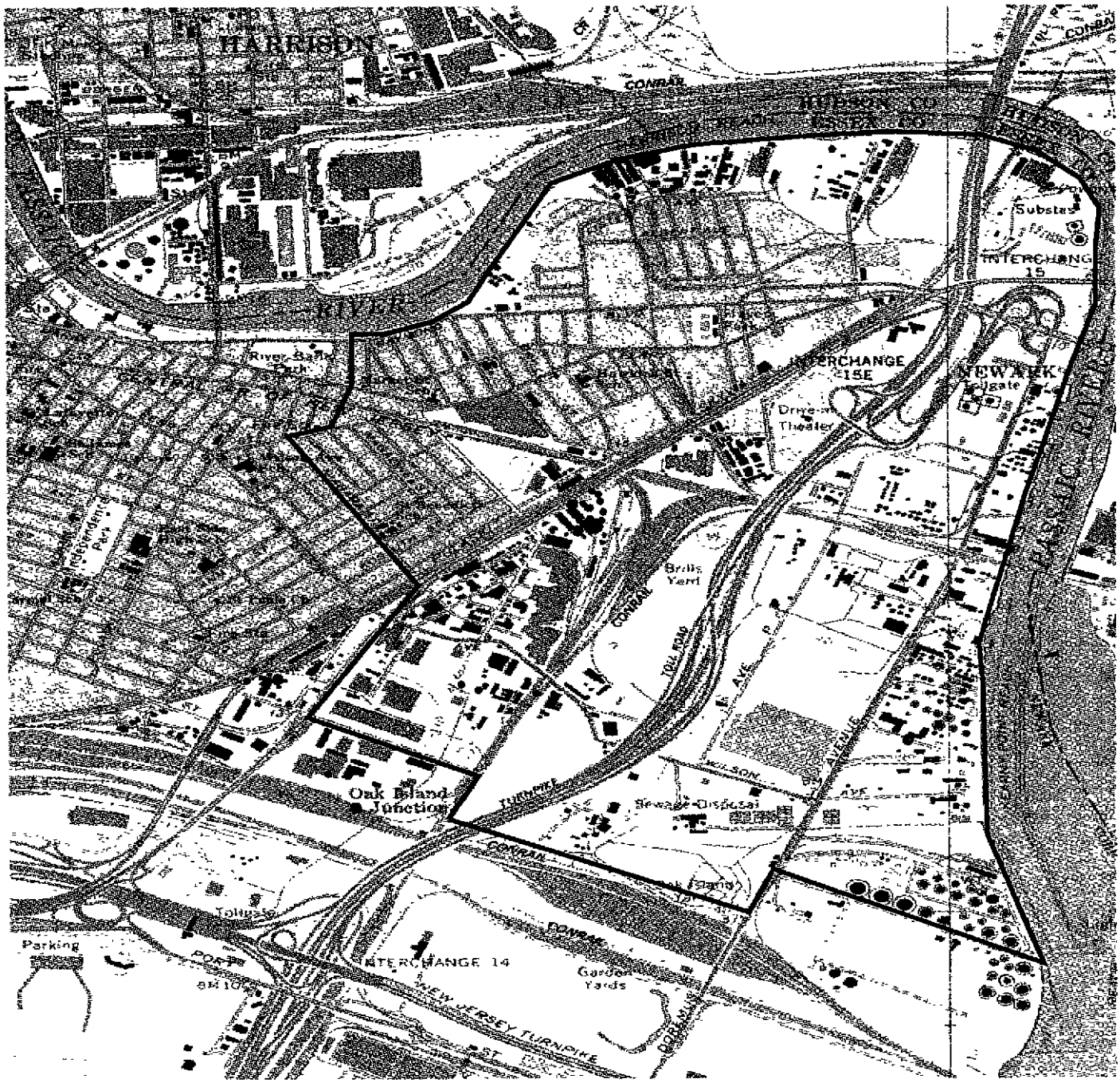


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Bis(2-ethylhexyl)phthalate

Figure 6-8

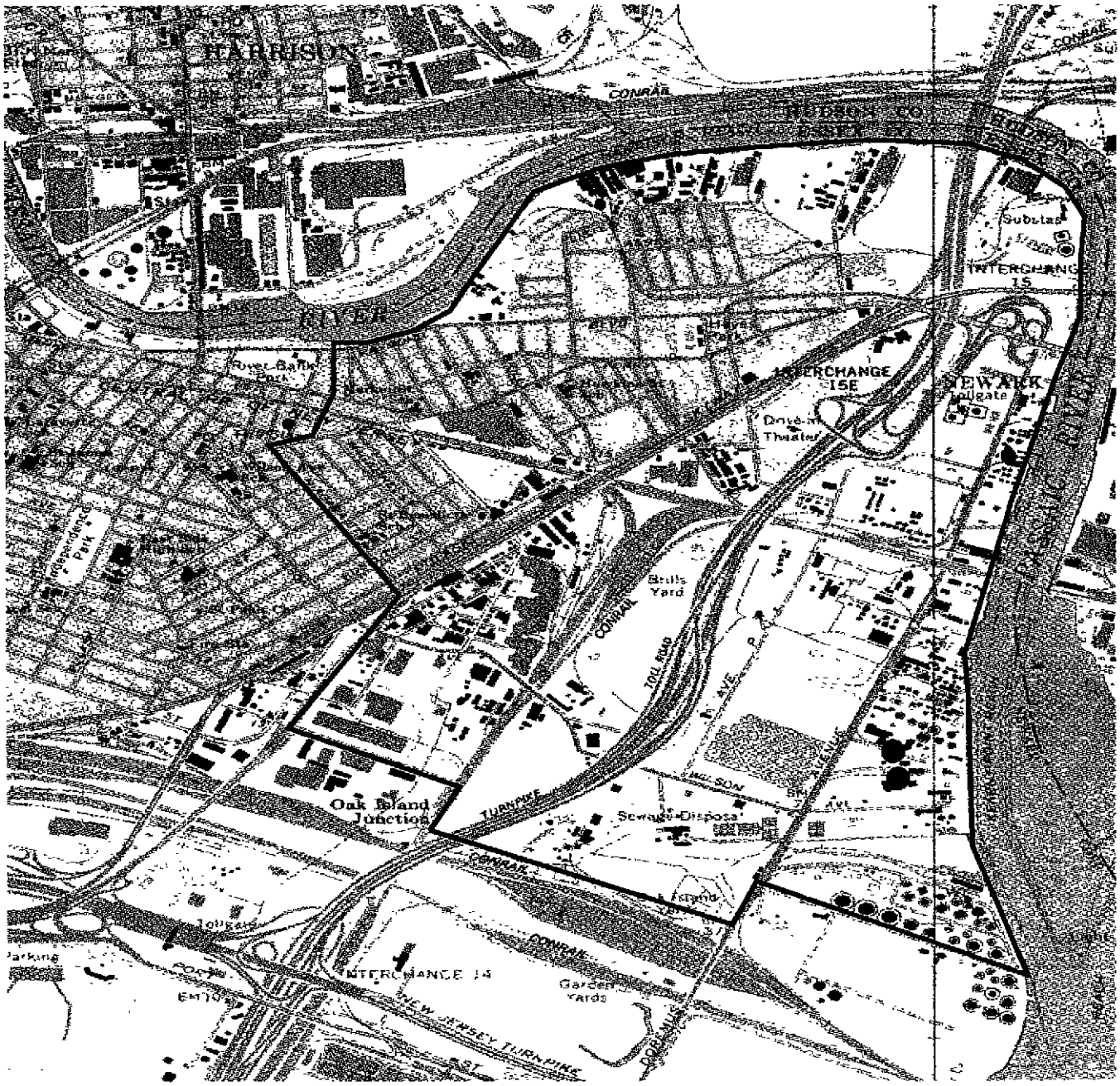


MALCOLM PIRNIE

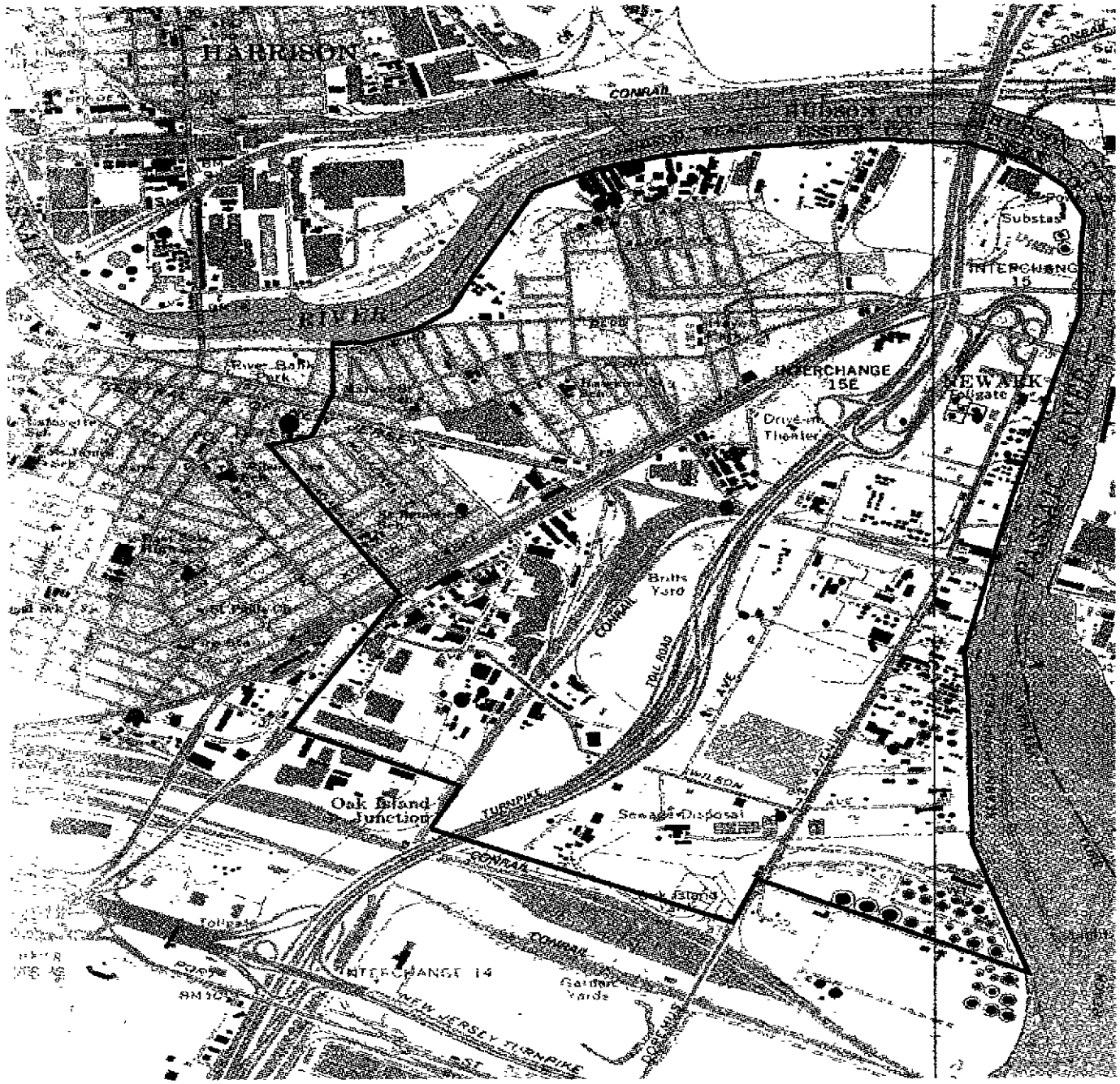
Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Cadmium

Figure 6-9



MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Location of Wells Containing Chloroform**	**Figure 6-10**



Petition Boundary

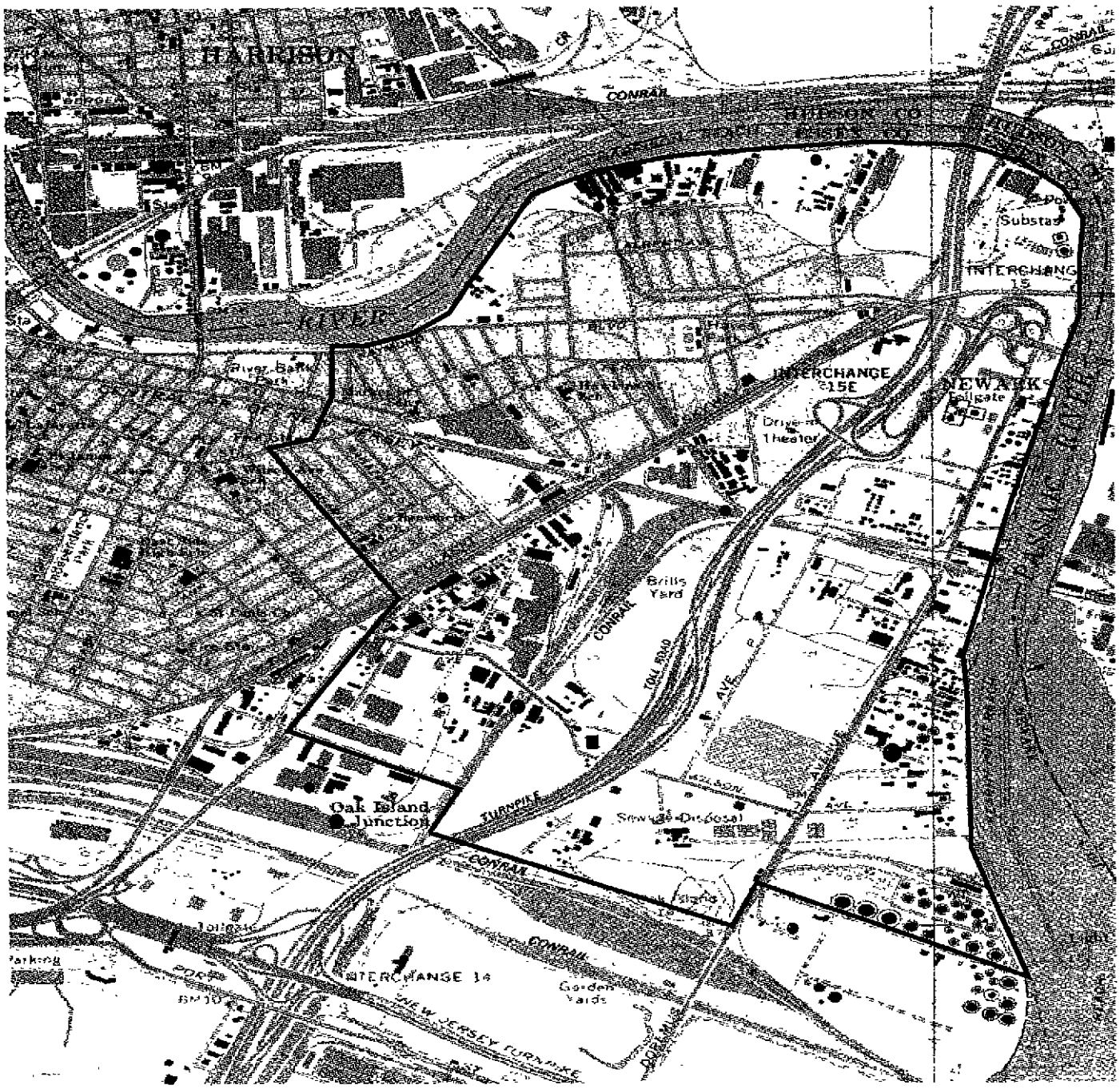
Chlorobenzene

- 0-100 ppb
- 101-1000
- 1001-10000
- >10000

N

2000 0 2000 4000 6000 8000 10000 12000 Feet

MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Location of Wells Containing Chlorobenzene**	**Figure 6-11**

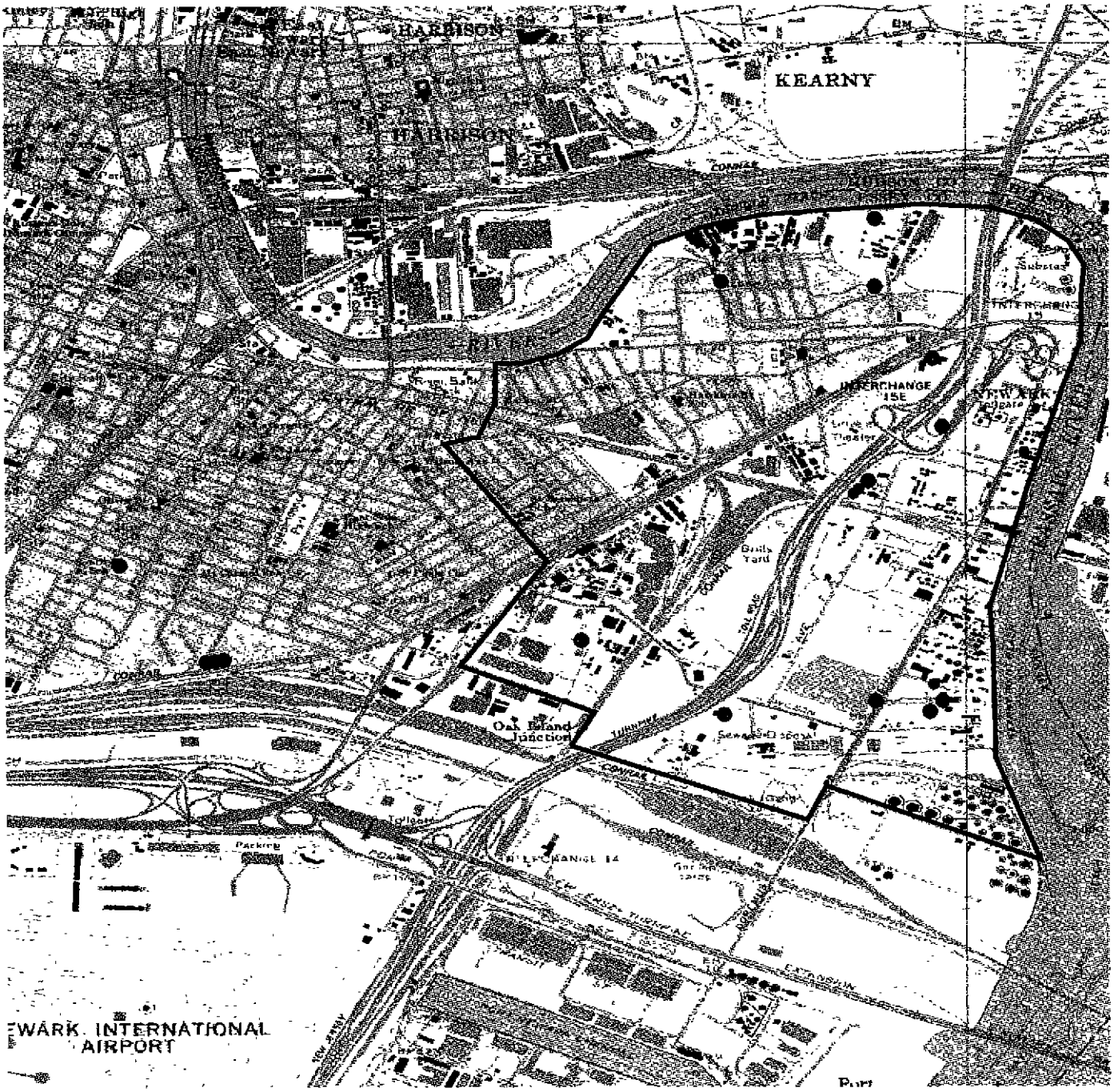


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Chromium

Figure 6-12

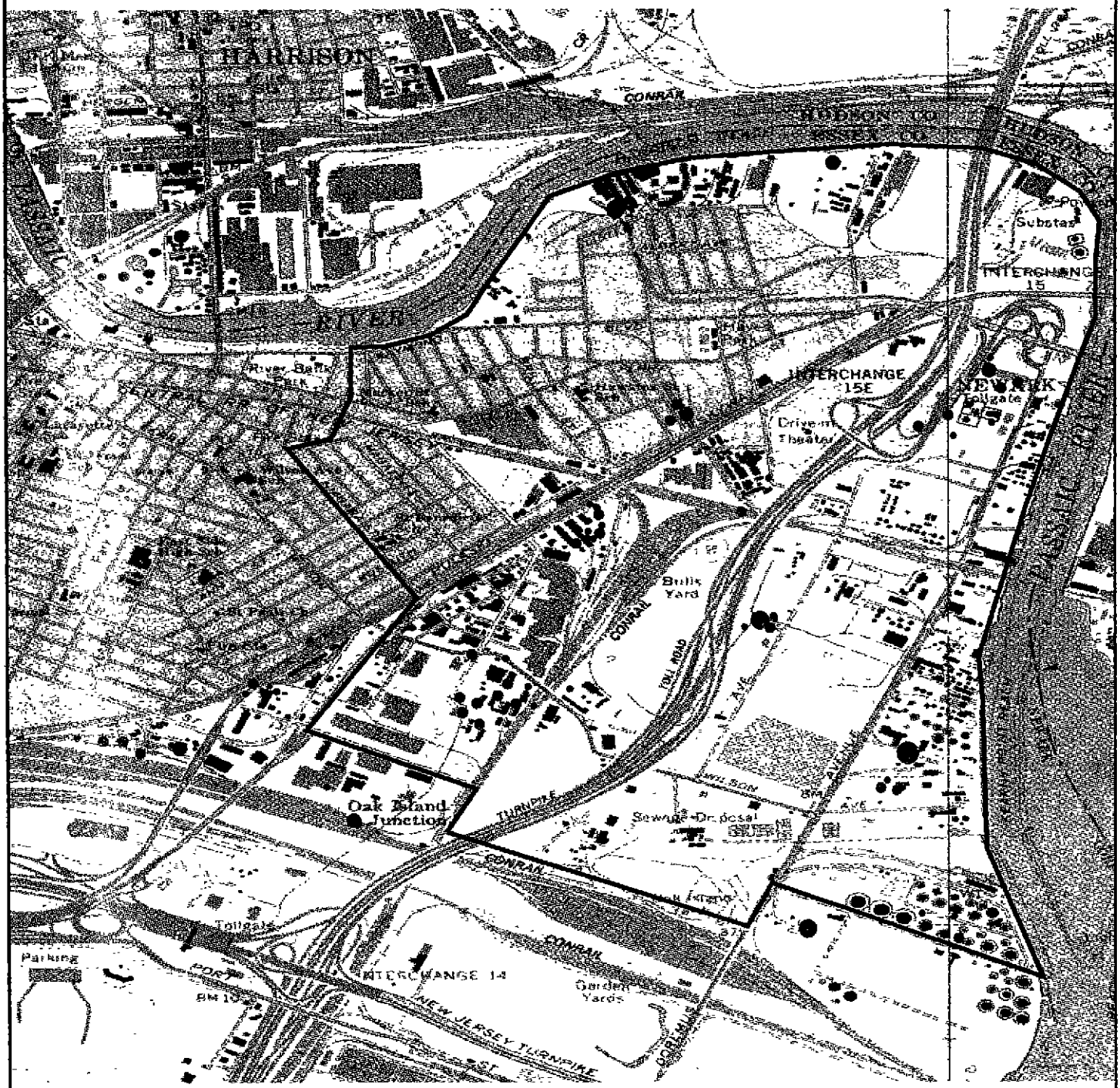


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Ethylbenzene

Figure 6-13

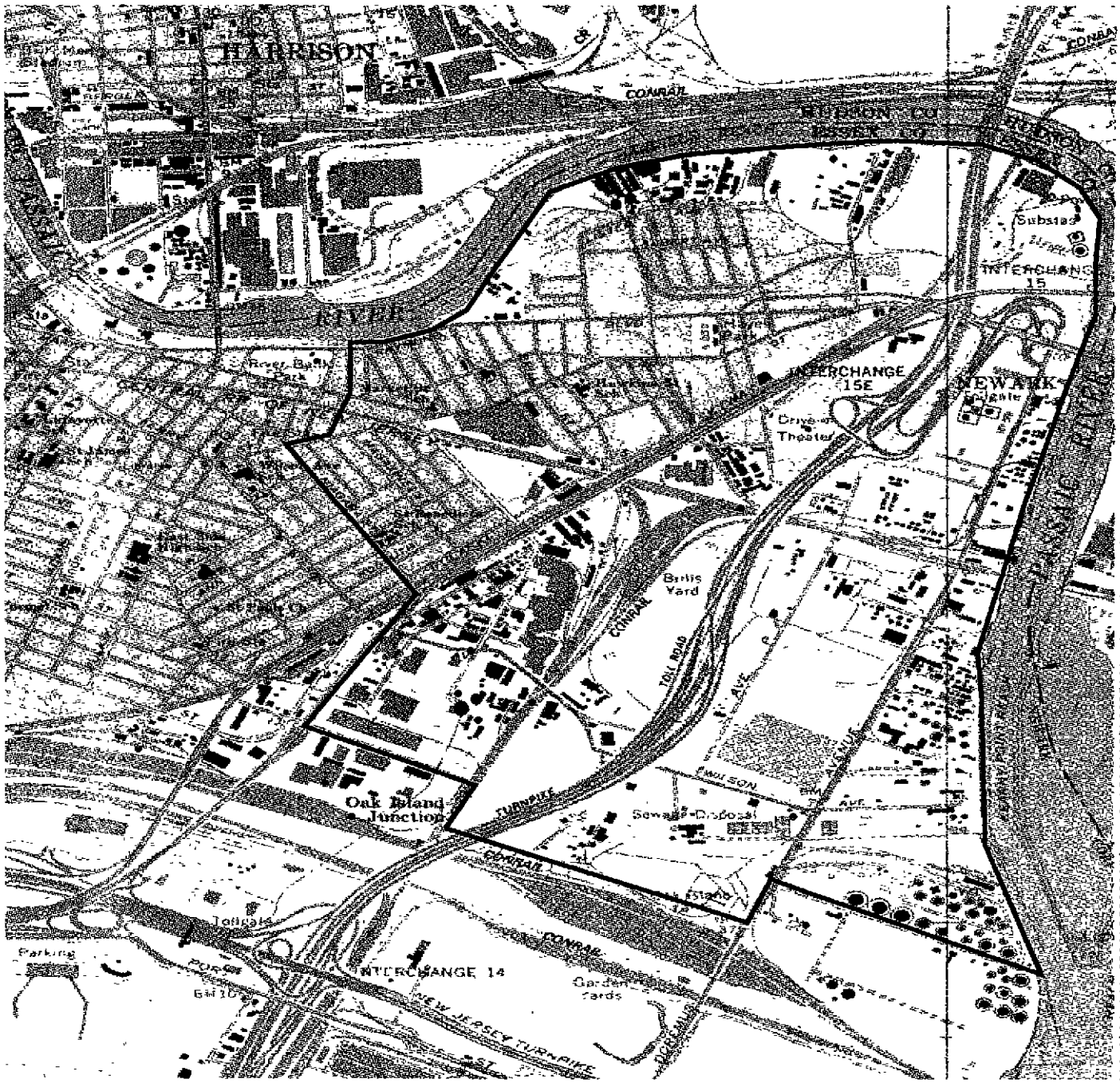


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Lead

Figure 6-14

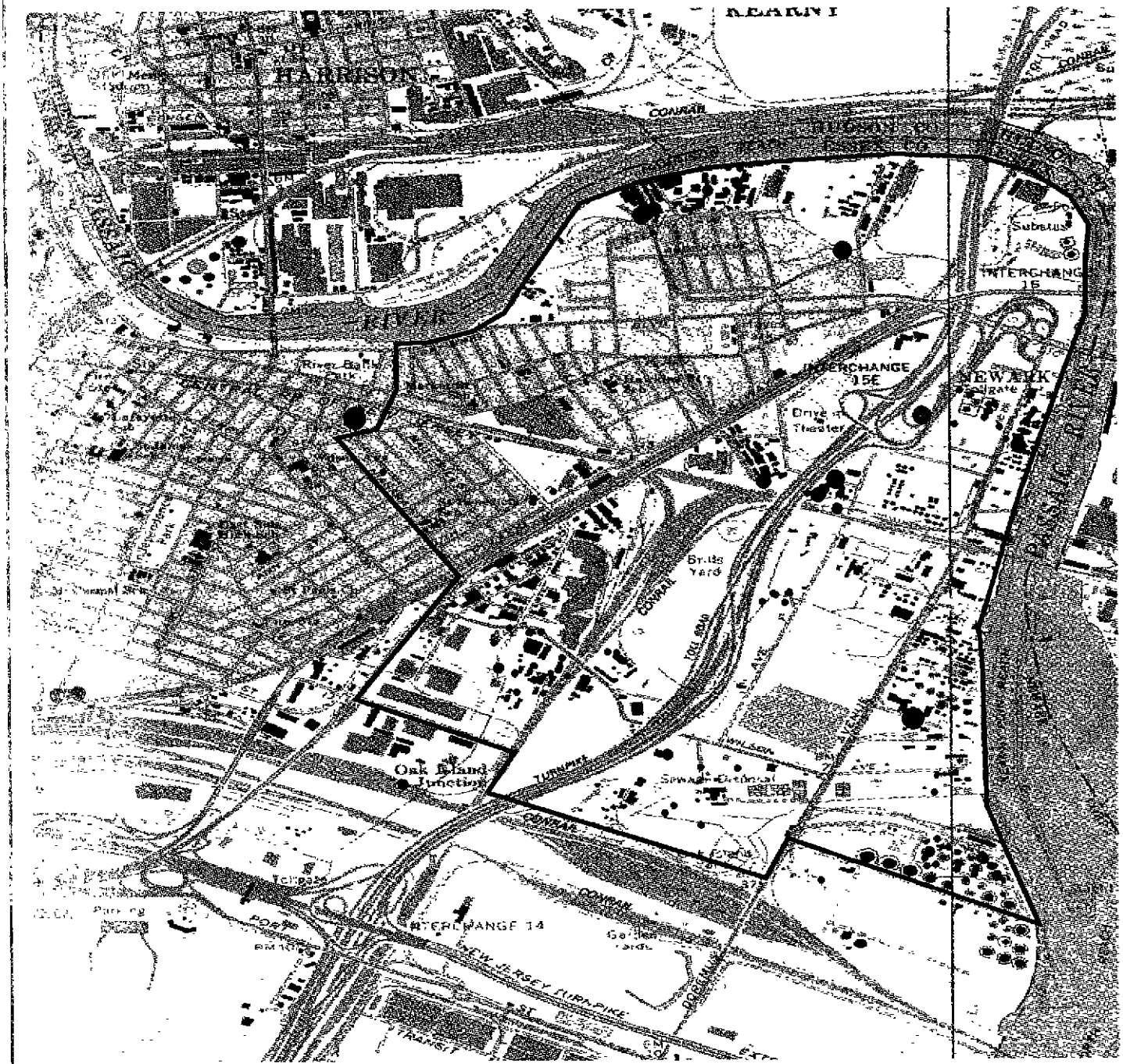


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Mercury

Figure 6-15

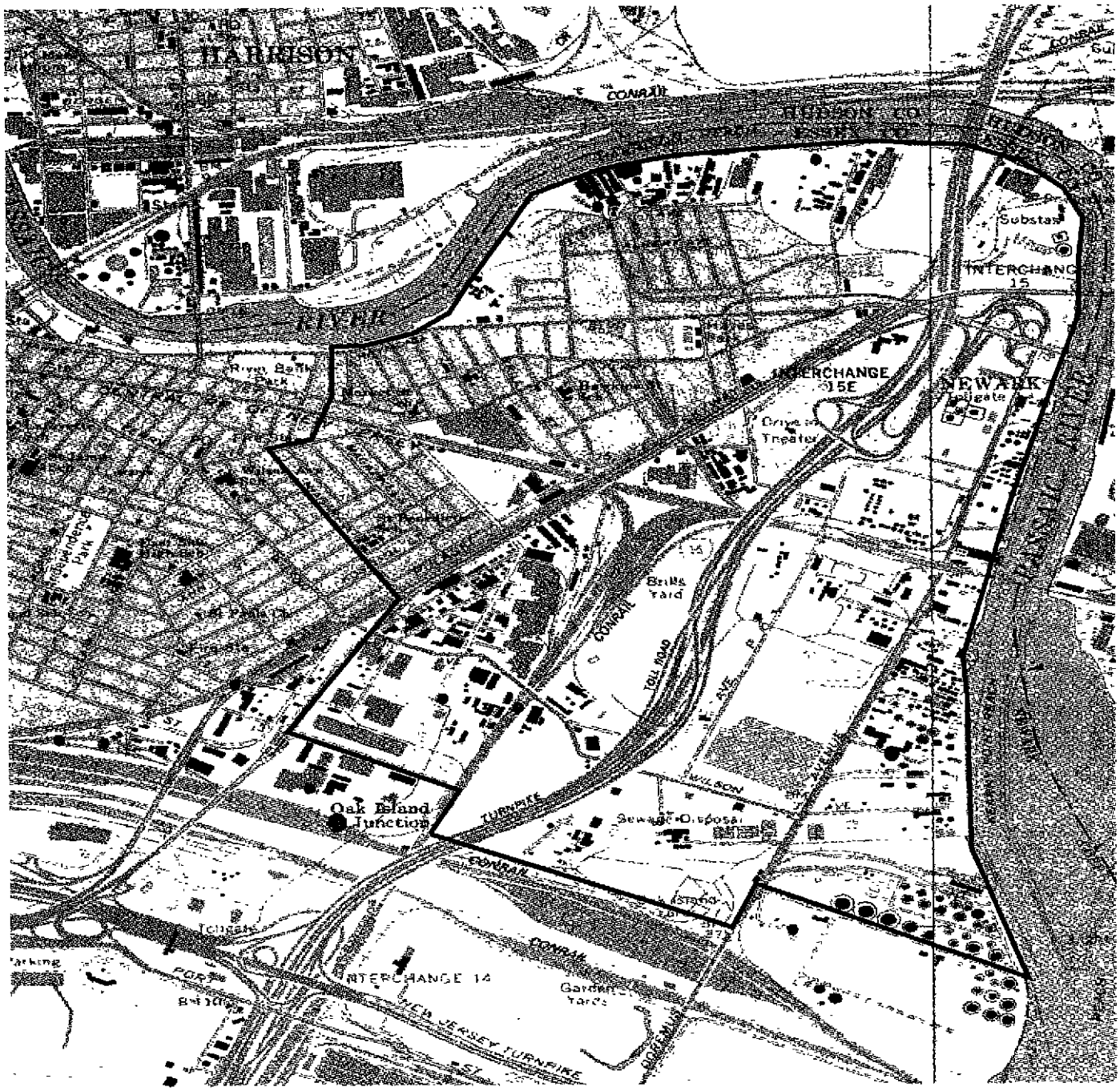


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Methylene Chloride

Figure 6-16

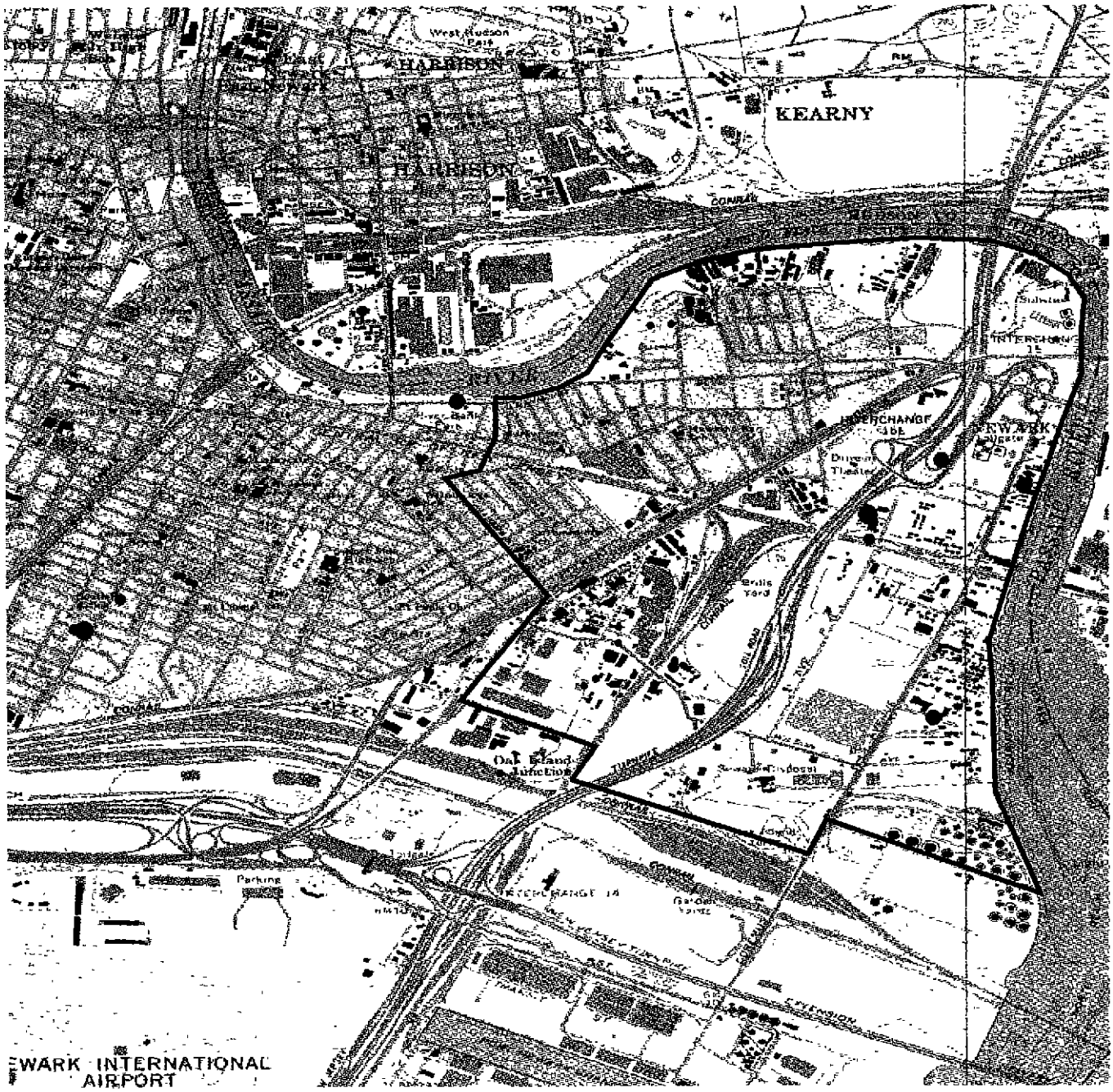


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Total Nickel

Figure 6-17



N

Petition Boundary

Tetrachloroethene

- 0-100 ppb
- 101-1000
- 1001-10000
- >10000

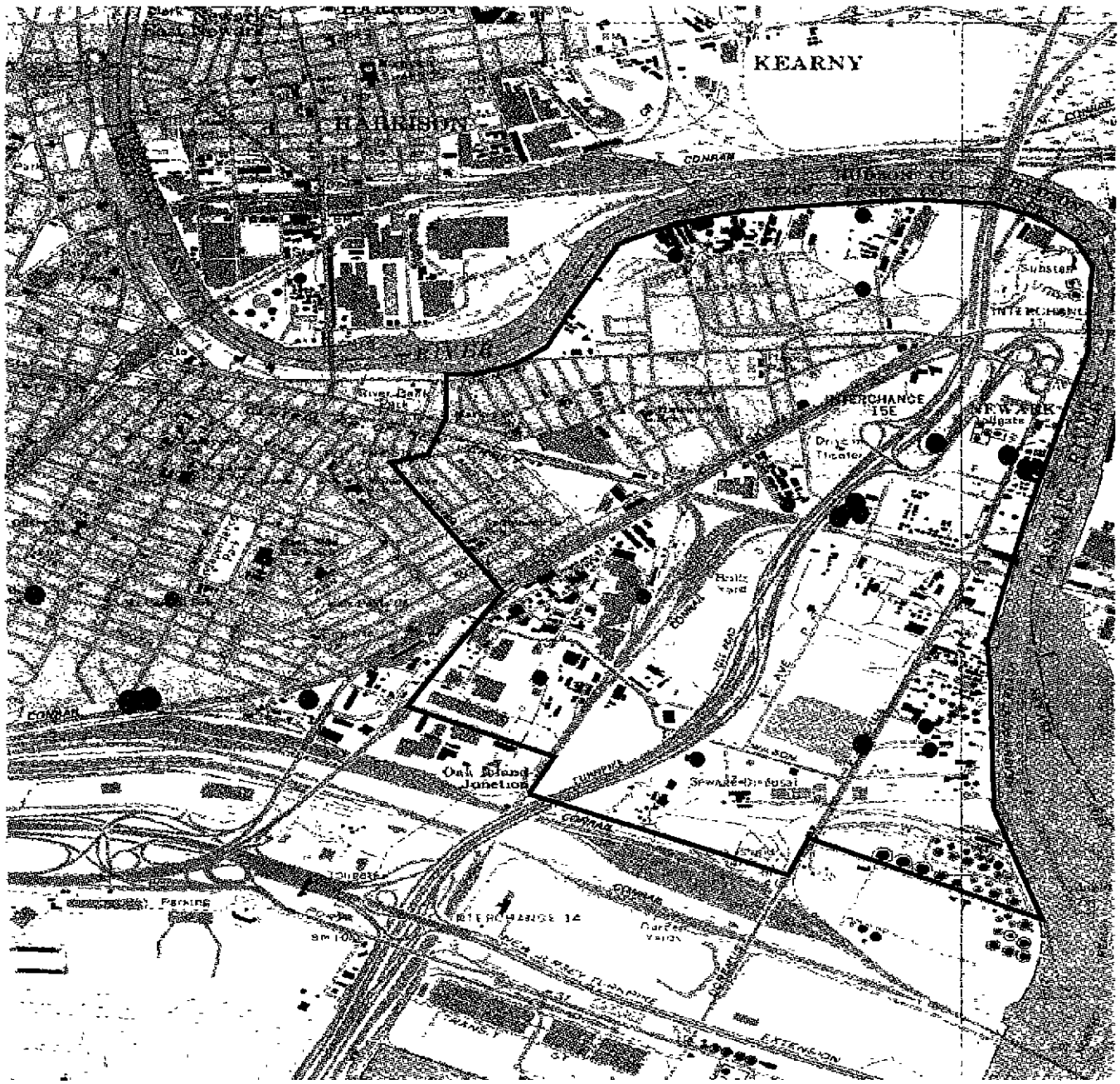
2000 0 2000 4000 6000 8000 10000 12000 14000 Feet

MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Tetrachloroethene

Figure 6-18

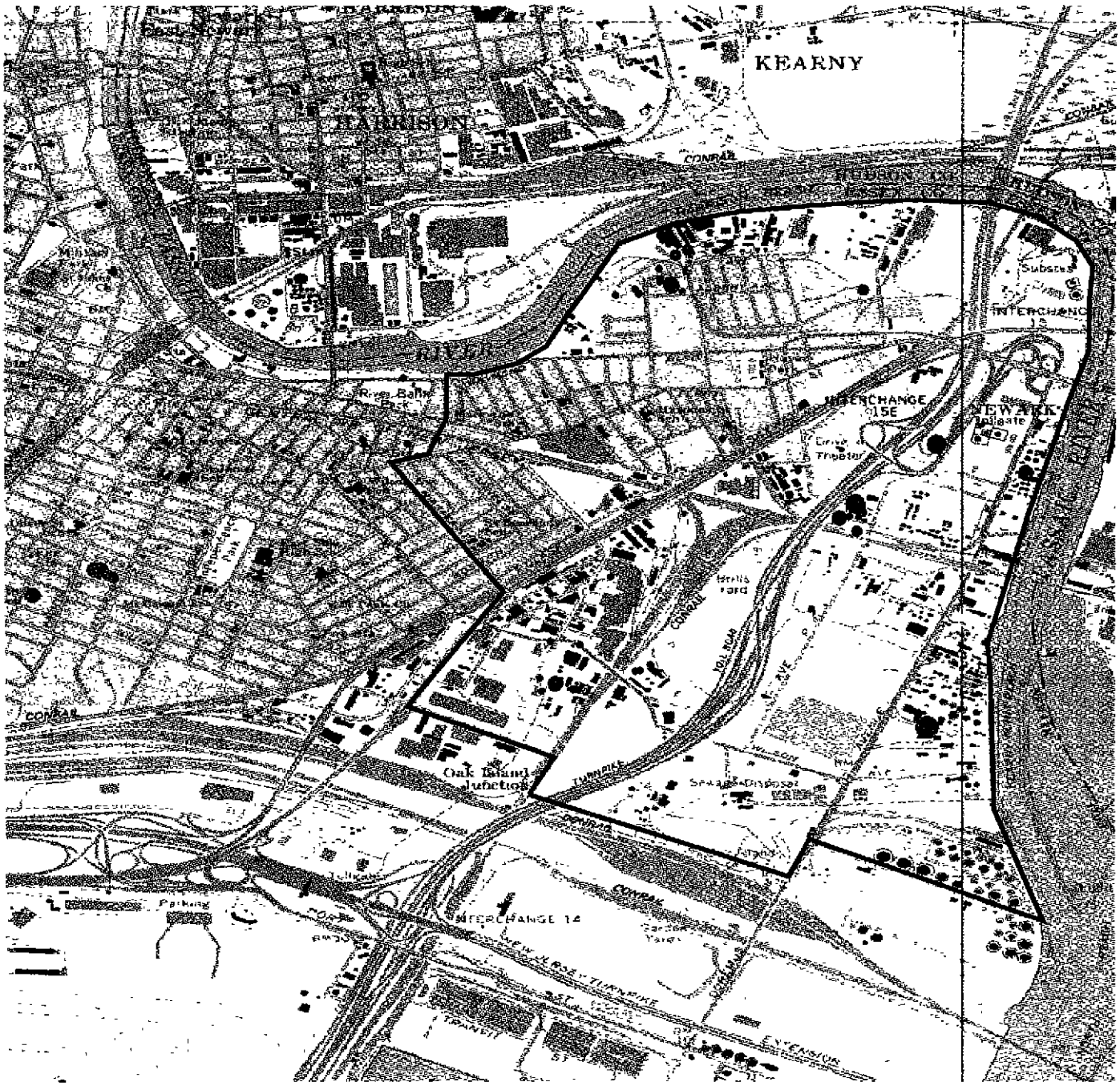


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Toluene

Figure 6-19

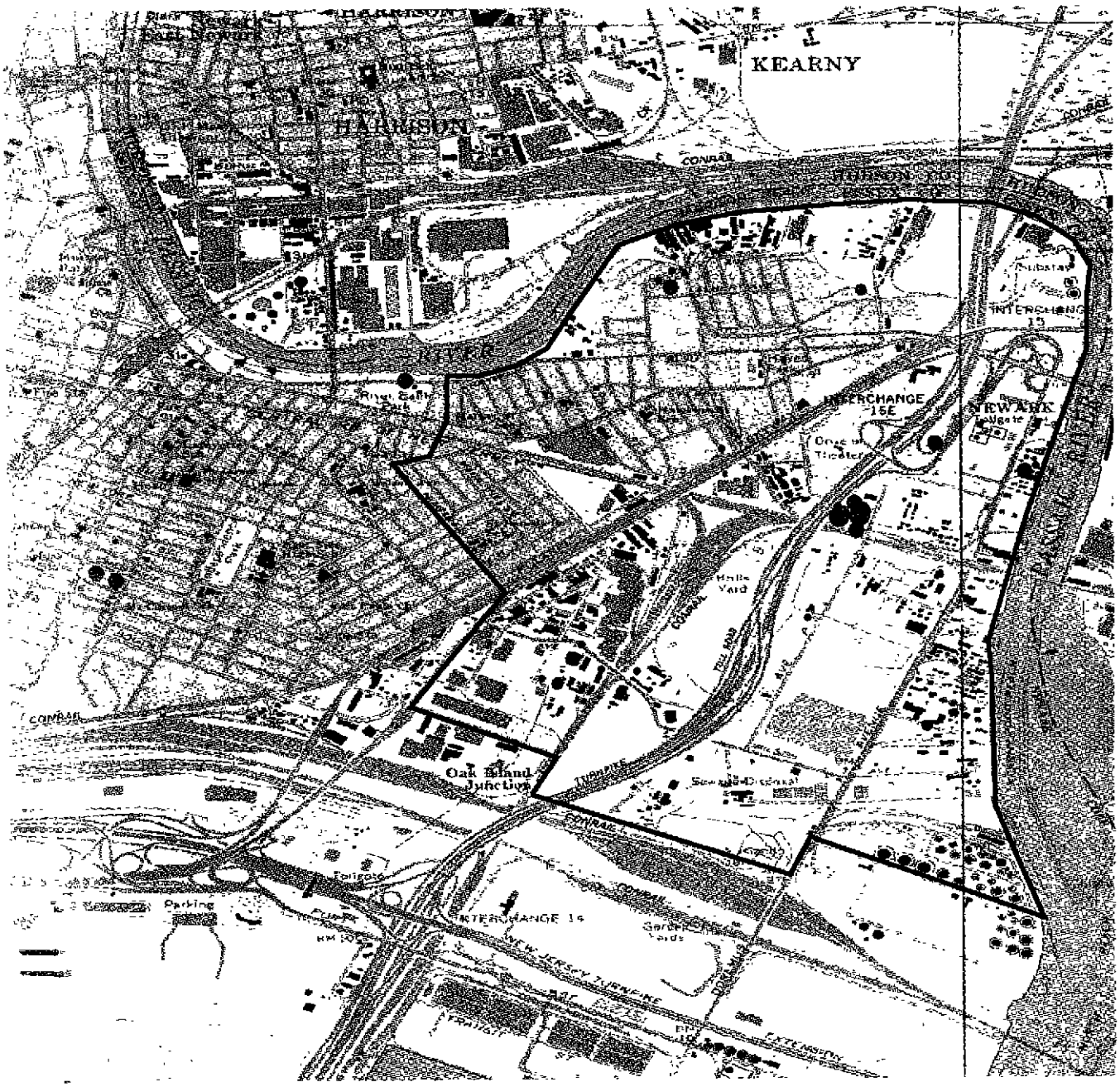


MALCOLM PIRNIE

Technical Justification Document
Newark, New Jersey

Location of Wells Containing Trichloroethene

Figure 6-20

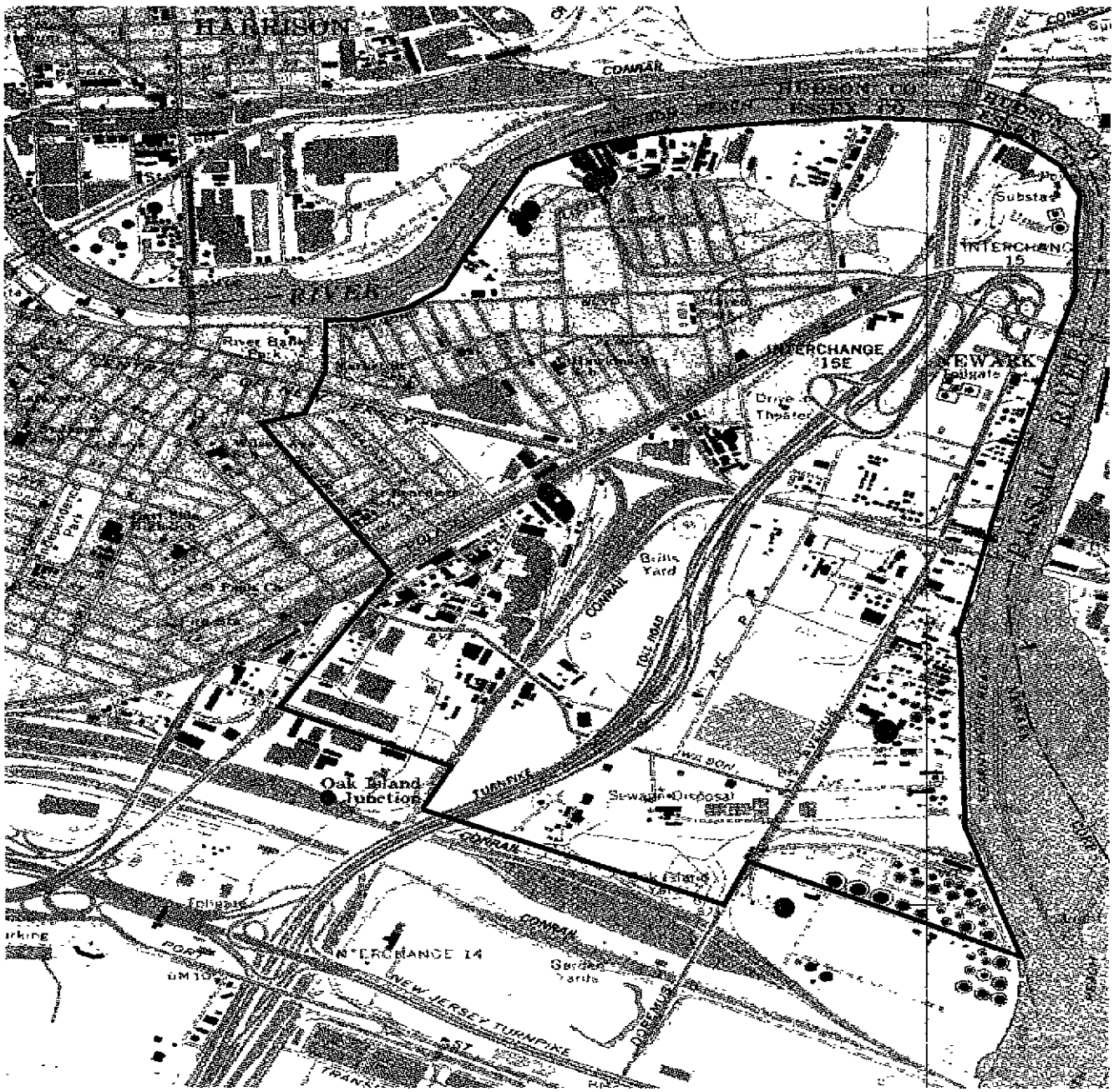


MALCOLM PIRNIE

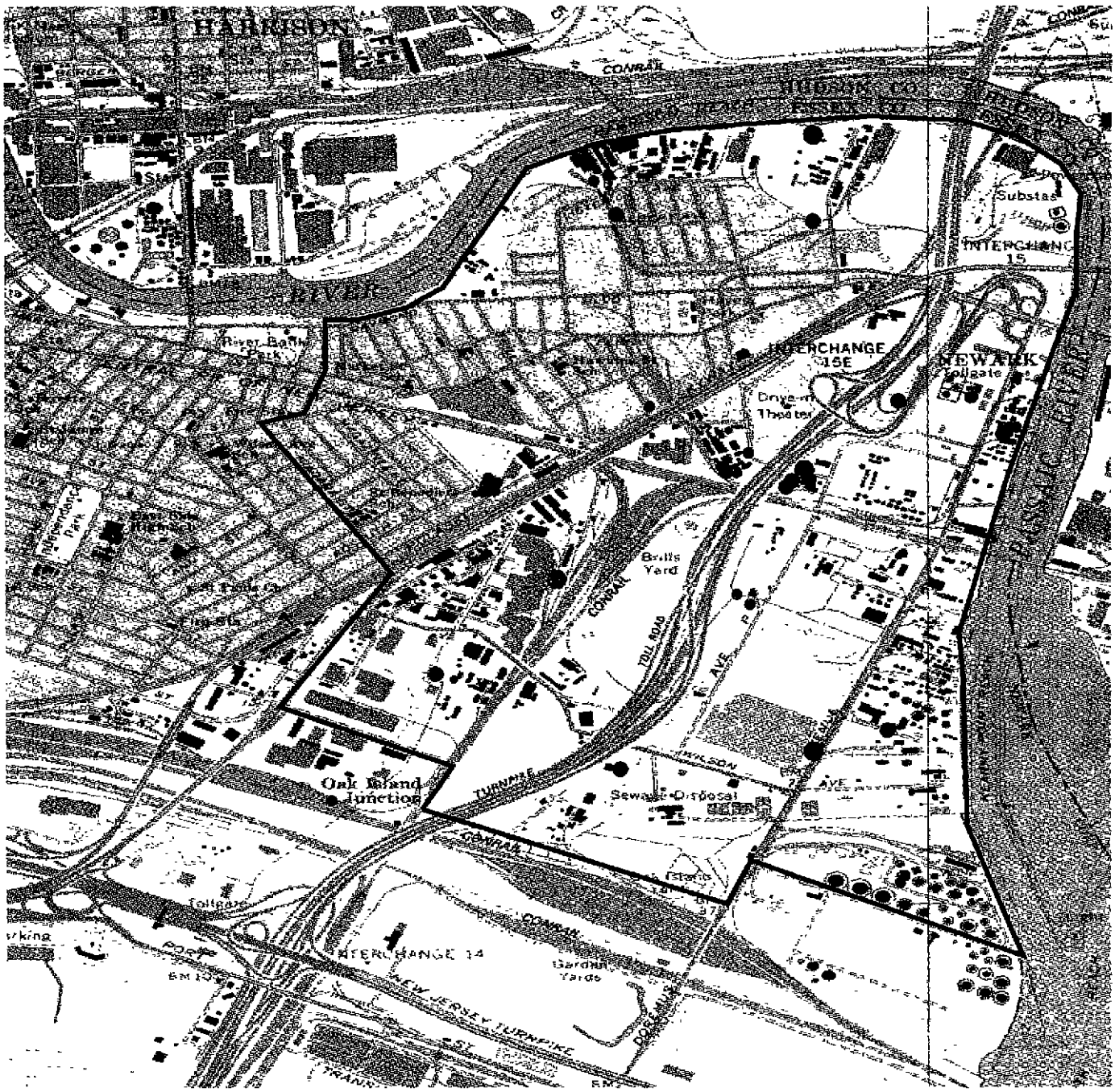
Technical Justification Document
Newark, New Jersey

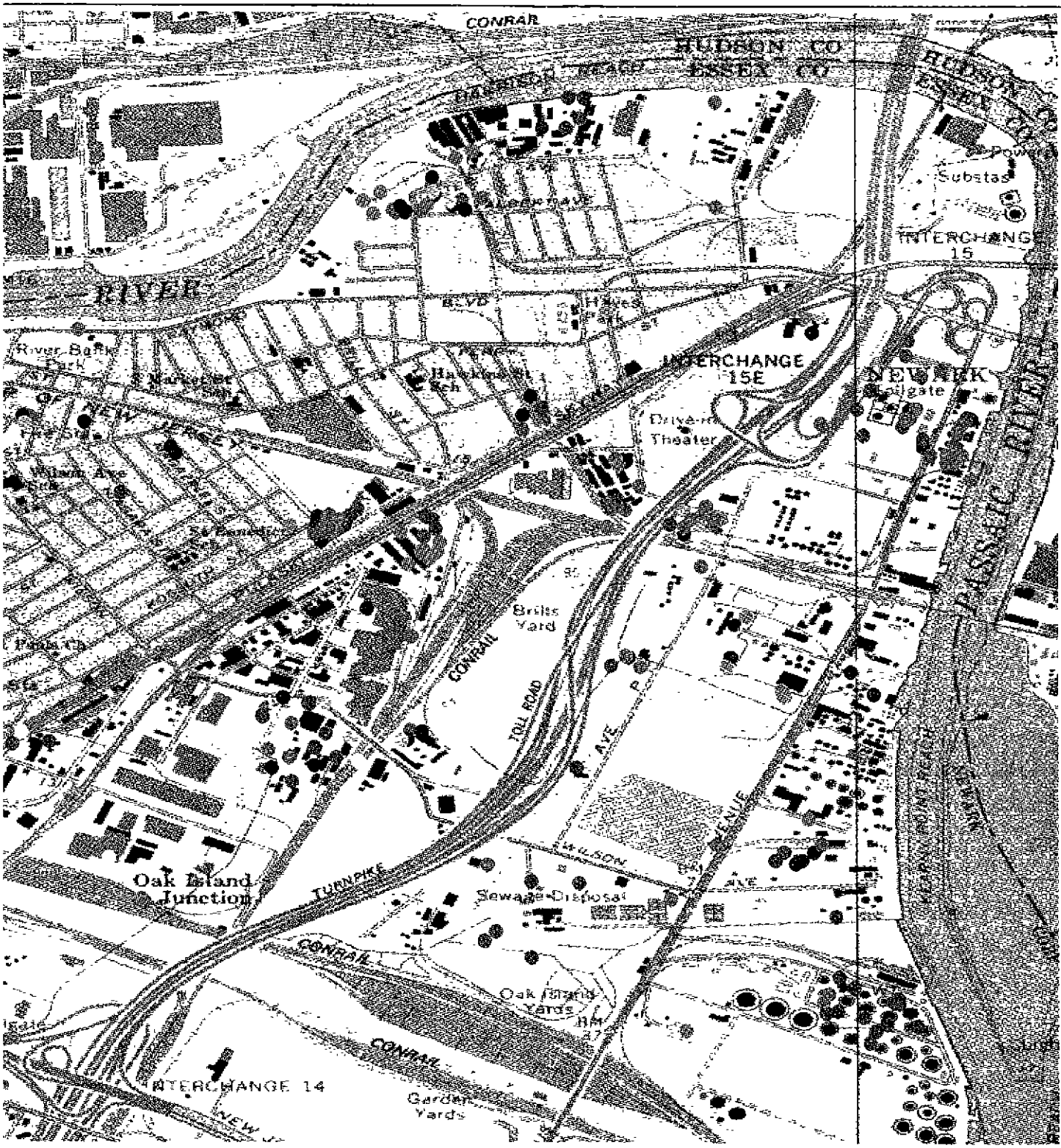
Location of Wells Containing Vinyl Chloride

Figure 6-21



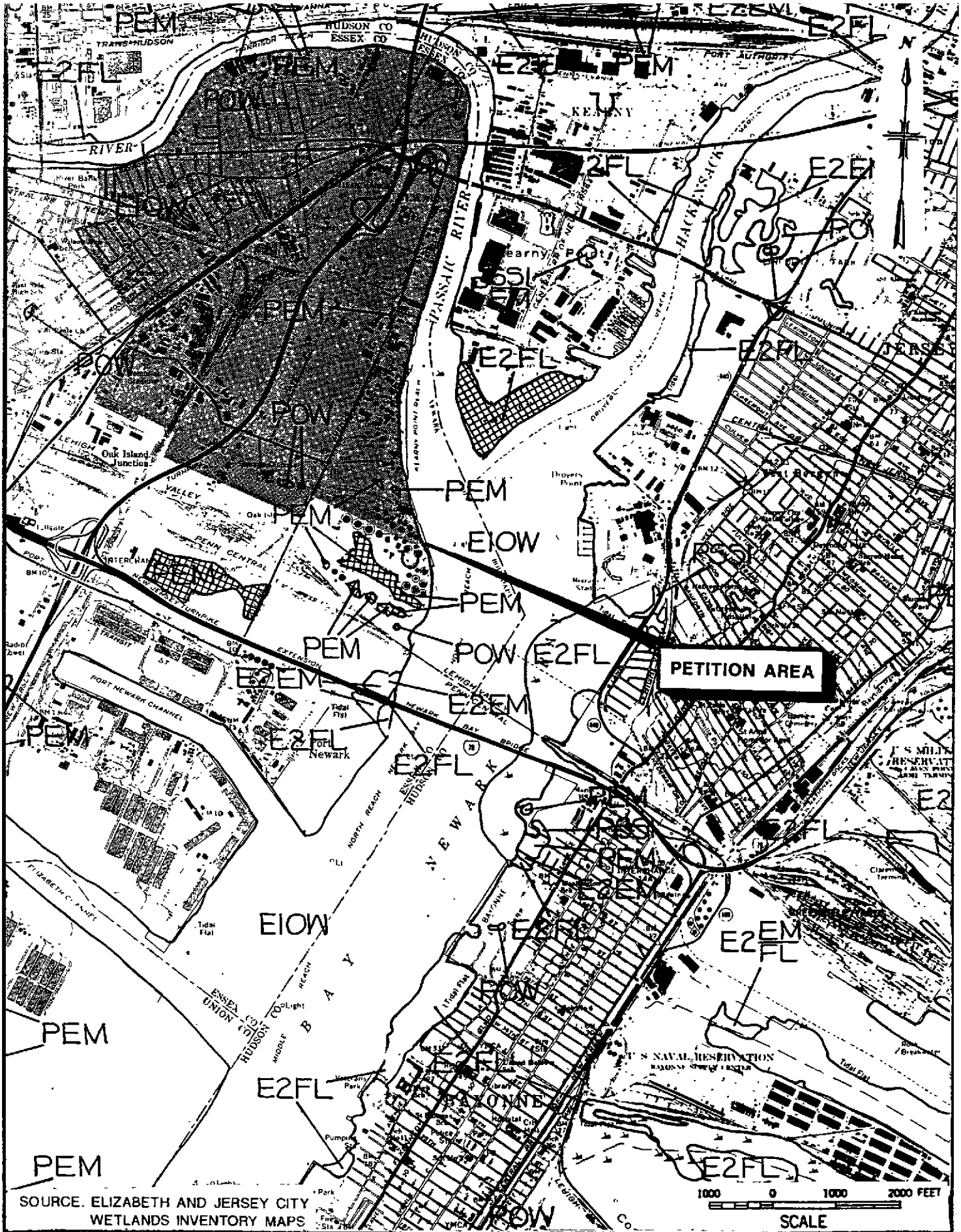
MALCOLM PIRNIE	Technical Justification Document Newark, New Jersey **Location of Wells Containing Total Zinc**	**Figure 6-22**


HARRISON
CONRAIL
HUDSON CO.
RIVER
Substa
INTERCHANGE 15
INTERCHANGE 15E
NEWARK
Tollgate
Drive-In Theatre
River Bank Park
Interstate Park
Bridge
Bridge
Bridge



ustification Document
rk, New Jersey
taining the 22 Pervasive Compounds

Figure 6-24



SOURCE: ELIZABETH AND JERSEY CITY WETLANDS INVENTORY MAPS

MALCOLM PIRNIE

TECHNICAL JUSTIFICATION DOCUMENT
NEWARK, NEW JERSEY

NATIONAL WETLANDS INVENTORY MAP

MALCOLM PIRNIE, INC.

FIGURE 7-1

075047

Table 2-1. List of Petitioners

(Signature Pages Attached)

NO.	PETITIONER	ADDRESS	TYPE OF BUSINESS
1	Alliance Chemical Co.	209-327 Avenue P	Chemicals
2	Assemblyman Richard H. Bagger	Westfield, New Jersey	Assemblyman, 22nd Legislative District
3	Association of Environmental Authorities	Mercerville, New Jersey	Professional Association
4	Cardolite Corp.	500 Doremus Avenue	Organic Chemicals
5	Chemical Industry Council of New Jersey (CIC/NJ)	Trenton, New Jersey	Business Association
6	Coalition for Environmental Liability Reform	Florham Park, New Jersey	Environmental Coalition
7	Congressman Robert D. Franks	Union, New Jersey	Congressman, 7th Congressional District
8	Congressman Donald M. Payne	Newark, New Jersey	Congressman, 10th Congressional District
9	Crompton & Knowles Colors, Inc.	58-66 Amsterdam Street	Paints & Chemicals
10	Economic Development Corporation of Essex County	West Orange, New Jersey	Economic Development
11	Elan Chemical Co.	268 Doremus Avenue	Chemicals for Fragrance and Flavors
12	Federated Metals		Non-Ferrous Metals
13	G.J. Chemical Co.	124-145 Doremus Avenue	Chemical Distribution
14	Georgia Pacific Corp.	290 Ferry Street	Chemicals
15	Henry Borda		
16	Hertz Equipment Rental	41-85 Doremus Avenue	Equipment Rental
17	Honig Chemical and Processing Co.	414 Wilson Avenue	Chemicals
18	Ironbound	Newark, New Jersey	Business Association
19	McKesson Environmental Systems Co.	600 Doremus Avenue	Pharmaceutical Distribution

Table 2-1. List of Petitioners *(continued)*
(Signature Pages Attached)

NO.	PETITIONER	ADDRESS	TYPE OF BUSINESS
20	New Jersey State Chamber of Commerce	Trenton, New Jersey	Chamber of Commerce
21	Passaic Valley Sewerage Commissioners	600 Wilson Avenue	Sewage Treatment
22	Podvey, Sachs, Meanor, Catenacci, Hildner & Cocoziello, P. C.	Newark, New Jersey	Law Firm
23	Quantum Chemical Co.	284-300 Doremus Avenue	Chemicals
24	Reichhold Chemical Co.	46 Albert avenue	Chemicals
25	Senator James E. McGreevey	Avenel, New Jersey	Senator, Natural Resources Committee
26	Senator Ronald L. Rice	Newark, New Jersey	Senator, 28th Legislative District
27	Society of Industrial and Office Realtors (SIOR)	Edison, New Jersey	Professional Association
28	Tenneco/Stratus Petroleum Corp.	678 Doremus Avenue	Petroleum
29	The Stanley Works	139 Chapel Street	Hammers & Tools
30	Troy Corp.	One Avenue L Englewood Cliffs, NJ	Paint Additives
31	Vitusa International, Inc.		
32	Waste Management, Inc.	100 Lister Avenue	Waste Management
33	Welch Holme & Clark, Co.	338 Wilson Avenue	Vegetable Oils, Dry Chemicals

SIGNATURE PAGE NO. _____

ALLIANCE CHEMICAL, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Alliance Chemical, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 309-327 Avenue P

Newark, New Jersey 07015

(201) 945-5400

_____

Statement of Interest

Our business has been in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\ALLIANCE.WPD

SIGNATURE PAGE NO.____

ASSOCIATION OF ENVIRONMENTAL AUTHORITIES

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Association of Environmental Authorities

Date: January 23, 1997

Signature: _____

Print Name: Gary Marshall

Title: AEA President

Address: 2333 Whithorse - Mercerville Road

Suite 4

Mercerville, New Jersey 08619

Telephone: (609) 584-1877

Fax: (609) 584-8271

Statement of Interest

The Association of Environmental Authorities (AEA) is a non-profit corporation whose membership includes all the large New Jersey Improvement Authorities which deal with water, wastewater and solid waste as well as municipalities who perform similar services. AEA supports this Petition because it represents a proper balance between the goals of environmental protection and economic growth. In addition, as an organization that attempts to protect New Jersey's drinking water sources, we believe that it makes sense that groundwater sources which have little present use as a drinking water source be classified as non-potable aquifers.

SIGNATURE PAGE NO. ____

HENRY P. BORDA

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Henry P. Borda

Date: _____ Signature: _____

Print Name: Robert W. Cockran, Esq.

Title: Attorney for Henry P. Borda

Address: Sutterle, Stephens, Burke & Burke

47 Maple Street

Summit, New Jersey 07901

(908) 277-2221

Statement of Interest

P:\2422003\FEB-DFT\SIGPAGES\BORDA.WPD

SIGNATURE PAGE

NO. _____

CARDOLITE CORPORATION

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Cardolite Corporation

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 500 Doremus Avenue

Newark, New Jersey 07101

(201) 344-5015

_____

Statement of Interest

Our business has been in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\CARDOLIT.WPD

SIGNATURE PAGE NO.____

CHEMICAL INDUSTRY COUNCIL OF NEW JERSEY

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Chemical Industry Council of New Jersey

Date: 11/11/96

Signature: [signature]

Print Name: H. C. Booth

Title: Executive Director

Address:

150 West State Street

Trenton, New Jersey 08608

Phone: (609) 392-4214

Fax: (609) 392-4816

Statement of Interest

The Chemical Industry Council of New Jersey (CIC/NJ) is a trade association proposed of over 100 member companies in the chemical and allied products industry. We have four standing committees addressing education, legislation, environment and communication. A significant part of the work done by the environmental committee is the review of NJDEP rules and regulations. CIC/NJ supports the groundwater reclassification regulations recommended in this Petition because they strike the proper balance between environmental protection and economic growth.

SIGNATURE PAGE NO.____

CONGRESSMAN ROBERT D. FRANKS

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Congressman Robert D. Franks

Date: 12/13/96

Signature: Bob Franks

Address: 7th Congressional District

2333 Morris Avenue, Suite B-8

Union, New Jersey 07083

Phone: (908) 686-5576

Statement of Interest

SIGNATURE PAGE **NO.___**

CONGRESSMAN DONALD M. PAYNE

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Congressman Donald M. Payne

Date:_____ Signature:_____

Address: 10th Congressional District

Martin Luther King Jr., Federal Building

Room 1016, 50 Walnut Street

Newark, New Jersey 07102

Phone: (201) 645-3213

Statement of Interest

SIGNATURE PAGE NO. ____

CROMPTON & KNOWLES COLOR, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Crompton & Knowles Color, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: P.O. Box 341

Reading, PA 19603

(610) 775-8000

_____

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\CROMPTON.WPD

SIGNATURE PAGE NO.____

ECONOMIC DEVELOPMENT CORPORATION OF ESSEX COUNTY

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Economic Development Corporation of Essex County

Date: 11-12-96

Signature: Burton Siebold

Print Name: BURTON SIEBOLD

Title: EXECUTIVE DIRECTOR

Address: 443 Northfield Avenue

West Orange, New Jersey 07052

Telephone: (201) 731-2772

Statement of Interest

The Economic Development Corporation of Essex County supports all measures that may lead to economic growth in the county without sacrificing the health, safety and welfare of its residents. The Ironbound Petition is clearly a Project that promotes that goal and we support it because it is a model that can be used elsewhere in Essex County and the State.

SIGNATURE PAGE NO. _____

ELAN CHEMICAL CO.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Elan Chemical Co.

Date: _____ Signature: _____

Print Name: _____

Title: _____

Address: 268 Doremus Avenue

Newark, New Jersey 07101

(201) 344-8014

_____

Statement of Interest

Our business has been in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\ELANCHEM.WPD

SIGNATURE PAGE NO. _____

FEDERATED METALS CORPORATION

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Federated Metals Corporation

Date: _____ Signature: _____

Print Name: _____

Title: _____

Address: c/o Bridgeview Management Co. Inc.

1160 State Street

Perth Amboy, New Jersey 08861

(908) 826-1800

Statement of Interest

Federated Metals Corporation has had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P \2422003\FEB-DFT\SIGPAGES\FEDMETAL.WPD

SIGNATURE PAGE NO. _____

GEORGIA PACIFIC CORP.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Georgia Pacific Corp.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 133 Peachtree Street, N.E. (30303)

P.O. Box 105605

Atlanta, Georgia 30348-5605

(201) 405-4646

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\GEORGIA.WPD

SIGNATURE PAGE NO. _____

G.J. CHEMICAL CORP.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

G.J. Chemical Corp.

Date: _____

Signature: _____

Print Name: Joe Masci

Title: President

Address: 370-376 Adams Street

Newark, New Jersey 07114

(201) 589-1450

_____

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\GJCHEM.WPD

SIGNATURE PAGE NO. _____

THE HERTZ CORPORATION

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

The Hertz Corporation

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 225 Brae Boulevard

Park Ridge, New Jersey 07656-0713

(201) 307-2475

_____

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

P:\2422003\FEB-DFT\SIGPAGES\HERTZ.WPD

SIGNATURE PAGE

NO. _____

HONIG CHEMICAL AND PROCESSING CORPORATION

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Honig Chemical and Processing Corporation

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 414 Wilson Avenue

Newark, New Jersey 07105

(201) 344-0881

_____

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO.____

IRONBOUND

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Ironbound

Date: 12-9-96

Signature: [signature]

Print Name: William F. Chewnings

Title: Executive Director

Address: 36 Pacific Street

Newark, New Jersey 07105

Telephone: (201) 344-4565

Facsimile: (201) 344-0499

Statement of Interest

The Ironbound began in 1917 and is one of the oldest business and industry associations in the United States. Frankly, it is this long standing history of industrial activity in the area that makes the Ironbound such an appropriate location for groundwater reclassification. We have over 250 members in our Association including manufacturing, refinance, technology, transportation, international trade, education, healthcare and professional services. We help our membership solve problems pertaining to environmental compliance, again infra-structure, plant security and employee health matters, among other things. Most of the brownfields properties in Newark's portfolio are located in the Ironbound. Consequently, we support this Petition because it makes sense and because it is an appropriate balance between the goals of economic development and environmental protection.

SIGNATURE PAGE NO. _____

MCKESSON CORP.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

McKesson Corp.

Date: _____ Signature: _____

Print Name: _____

Title: _____

Address: One Post Street

Suite 2850

San Francisco, Ca 94104-5296

(415) 983-7598

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO.___

NEW JERSEY ASSEMBLYMAN RICHARD H. BAGGER

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

New Jersey Assemblyman Richard H. Bagger

Date: 10/23/96 Signature: Richard H Bagger

Address: 203 Elm Street

Westfield, New Jersey 07090

Phone: (908) 232-3673

Fax: (908) 232-3345

Statement of Interest

As the prime sponsor of the 1996 Environmental Opportunity Zones Act and as the prime sponsor of Assembly Bill 2250 concerning liability for remediated sites, I have a strong interest in the redevelopment of New Jersey's brownfields, of which the Ironbound section of Newark is a leading example. Granting this Petition will advance both the remediation and the redevelopment of the Ironbound, providing both environmental and economic advantages. It is also very sound land use planning, consistent with the State Plan to redirect development to urban areas, while preserving our State's open spaces.

SIGNATURE PAGE NO.____

NEW JERSEY STATE CHAMBER OF COMMERCE

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

New Jersey State Chamber of Commerce

Date: January 15, 1997

Signature: [signature]

Print Name: Joan Verplanck

Title: President

Address: One State Street Square,

50 West State Street, Suite ~~1110~~ 1310

Trenton, New Jersey 08608

Telephone: (609) 989-~~9696~~ 7888

Statement of Interest

The State Chamber of Commerce supports this Petition because it is a reasonable brownfields tool that effectively balances economic development and environmental protection.

SIGNATURE PAGE - NO. _____

PASSAIC VALLEY SEWERAGE COMMISSIONERS

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Passaic Valley Sewerage Commissioners

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 600 Wilson Avenue

Newark, New Jersey 07105

(201) 817-5800

_____

Statement of Interest

We have been in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

QUANTUM CHEMICAL COMPANY

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Quantum Chemical Company

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 11500 North Lake

Cincinnati, Ohio 45249

(513) 530-6500

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Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

REICHHOLD CHEMICALS, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Reichhold Chemicals, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: P.O. Box 13582

Research Triangle Park, NC 27709

(919) 990-8297

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Statement of Interest

We have had facilities in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE **NO.____**

SENATOR JAMES E. MCGREEVEY

Natural Resources Committee

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Senator James E. McGreevey

Date: 13 November 96

Signature: James E McGreevey

Address: 1030 St. Georges Avenue, Suite 303

Avenel, New Jersey 07001

Telephone: (908) 634-2526

Facsimile: (908) 634-7626

Statement of Interest

SIGNATURE PAGE NO. _____

NEW JERSEY SENATOR RONALD L. RICE
(28TH LEGISLATIVE DISTRICT - NEWARK)

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

New Jersey Senator Ronald L. Rice
(28th Legislative District - Newark)

Date: _____

Signature: _____

Print Name: Ronald L. Rice

Title: New Jersey State Senator

Address: 1036 South Orange Avenue

Newark, New Jersey 07106

(201) 371-5665

_____

Statement of Interest

As a prime sponsor of S-1070 (1993), I am interested in developing New Jersey's Brownfields. This petition will advance that goal by balancing the need for economic redevelopment with environmental protection.

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SIGNATURE PAGE NO.____

SOCIETY OF INDUSTRIAL AND OFFICE REALTORS

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Society of Industrial and Office Realtors

Date: 11-14-96

Signature: _____

Print Name: Kenneth Crimmins

Title: President

Address: 140 Mountain Avenue

Springfield, New Jersey 07081

Telephone: (201) 379-6644

Facsimile: (201) 379-1616

Statement of Interest

Society of Industrial and Office Realtors supports this Petition because it is a good balance between the need for economic development and environmental protection and it represents an important tool for the Brownfields tool chest in the State of New Jersey.

Document #: 6698

SIGNATURE PAGE

NO. _____

THE STANLEY WORKS

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

The Stanley Works

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 1000 Stanley Drive

New Britain, Connecticut 06051

(860) 827-3802

_____

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

STRATUS PETROLEUM CORP.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Stratus Petroleum Corp.

Date: _____ Signature: _____

Print Name: _____

Title: _____

Address: 9040 Roseweld Road

Suite 540

Atlanta, Georgia 30350

(770) 641-4880

Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

TROY CORPORATION

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Troy Corporation

Date: _____ Signature: _____

Print Name: _____

Title: _____

Address: One Avenue L

Newark, New Jersey 07105

(201) 589-2500

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Statement of Interest

We have had a facility in the Ironbound for many years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

VITUSA INTERNATIONAL, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Vitusa International, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: P.O. Box 1095

110 Charlotte Place

Englewood Cliffs, New Jersey 07632

(201) 569-0800

Statement of Interest

We have had a facility in the Ironbound for years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE

NO. _____

WASTE MANAGEMENT, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Waste Management, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 3329 Street Road

Ben Salem, PA 19020

(215) 244-9514

_____

Statement of Interest

We have had a facility in the Ironbound for years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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SIGNATURE PAGE NO. _____

WELCH HOLME & CLARK COMPANY, INC.

The undersigned supports the Petition to Propose and Adopt Appropriate Regulations Identifying the Ironbound Section of Newark, Essex County as a Class II-B Non-Potable Aquifer.

Welch Holme & Clark Company, Inc.

Date: _____

Signature: _____

Print Name: _____

Title: _____

Address: 7 Avenue L

Newark, New Jersey 07105

(201) 465-1200

_____

Statement of Interest

We have had a facility in the Ironbound for years. We support this Petition because it represents an appropriate balance between the goals of environmental protection and economic redevelopment.

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TABLE 2-2

INDUSTRIAL ACTIVITY IN THE PETITION AREA

1850's to Present

No.	Company	Address	Type of Business	Years in Operation
1.				
2.	15E Sanitary Landfill	Route 1 & Foundry Street	Landfill	Early 1900's
3.	3 Brothers Provision Corp.	9 Delancy Street		Present
4.	4 Queens International Tire Supplier Inc.	78 Vincent Street		Present
5.	A&B Leather Products Corp.	9 St. Francis Street	Leather products	1950's
6.	A&B Trading & Salvage Co.	618 Wilson Avenue	Scrap metals & iron	1950s
7.	A&L Industries	33 St. Francis Street		Present
8.	A&M Used Autoparts	553 Avenue P	Auto Parts	Present
9.	A&S Atterman Inc.	357 Wilson Avenue	Processed scrap paper	1970's to 1970's
10.	A&S Corrugated Container Corp.	319 Wilson Avenue	Paper boxes	1980's to Present
11.	A. Fiore & Sons Salvage, Inc.	Doremus Avenue	Solid waste	1950's to 1980's
12.	A. Fiore & Sons Salvage, Inc.	Doremus Avenue	Solid waste	1950's to 1980's
13	A. Giordano & Sons	79 Malvern Street	Waste	1950's
14.	A. Gross & Co.	Wilson Avenue	Acid, Oil Colors, Sandals, red oil, glycerin, fatty acids	1900's to 1980's
15.	A. Lanza	87 Delancy Street	Glass bottles	1940's
16.	A. Maschmeijer Jr. Inc.	185 Foundry St.	Toilet preparations, aromatic chemicals Penicillin, pre-cursors	1930's to 1980's
17.	A. Ruderman	61 Paris Street	Leather tannery	1920's
18.	A. Tomae & Sons, Inc.	925 Doremus Avenue		Present
19.	A.. Maschmeijer Jr. Inc.	96 Roanoke Avenue	Chemicals (cleaning compounds, pharmaceuticals, and toilet preparations)	1940's - 1980's
20.	A.C. Drubel Co.	59 Manufacturers Place	Paints, varnishes, stains, japans, dryers, enamels	1930's to 1940's
21.	A.F. Dietele	99 Ann Street	Paper boxes	1900's
22.	A F. Meisselbach & Bro.	22-28 Prospect Street	Sheet metal goods	1900's
23.	A J. & J.O Pilar	Chapel and Lister Avenue	Dyes, dyestuff and intermediates, tanning extracts, leather finishing and dressing	1930's to Present
24.	A.J. Naporano	102 Malvern Avenue	Scrap iron and metal	1940's to 1950's
25.	A.O. Chemical Corp.	238 Wilson Avenue	Chemicals	Present
26.	A.O. Chemical Corp.	238 Wilson Avenue	Chemicals	Present
27.	A.P. Fiore Transfer Station	192 Delancy Street	Solid waste	1950's to 1990's
28.	A T. Fiore Transfer Station	192 Delancy Street	Solid waste	1950's to 1990's
29.	Abbey Binding Co.	61 Blanchard Street	Pamphlet Binding	1980's to Present
30.	Abbey Fiber Mills Inc.	338 Wilson Ave.	Shredded clippings - paper	1960's to 1980's
31.	ABC Plastic Molds, Inc.	119 Delancy Street	Plastic molds	1950's
32.	Abesto-Leather Globe Co.	33-35 Wilson Ave.	Leather products	1940's to 1950's
33.	Ablon Finishes, Inc.	84 Waydell Street	Paints, varnishes, lacquers, japans, enamels, vinyl plastisols, polyethylene, baking enamels and industrial finishes.	1980's to 1990's
34.	Accort Laboratories, Inc.	357 Wilson Avenue	Chemicals	Present
35.	Accort Laboratories, Inc.	357 Wilson Avenue	Chemicals	Present
36.	Accort laboratories, Inc.	358 - 364 Adams Street	Chemicals	Present
37.	Accurate Tool Co.	15 Manufacturers Place	Special machinery, jigs, tools,	1940's to 1950's

No.	Company	Address	Type of Business	Years in Operation
			dyes, gauges, fixtures. precision and general machine works	
38.	ACIMI Corp	7-33 Amsterdam Street		Present
39.	Acme Coat Apron Towel Supply Co.	124 Dalancy Street	linen supply	Present
40.	Acme Leasing	238 Wilson Avenue		Present
41.	Acme Quality Paints		Paint	1970's
42.	Acme Refining Corp.	12 Lister Avenue	Reclaimers and refinisher	1950's to 1970's
43.	Acme Shellac Products Co	108 Blanchard Street	Pure shellac (white and orange), shellac substitutes, bleached white and orange gum shellac	1940's to 1960's
44.	Acme Steel Drum Co.	560 Ferry Street	Steel barrels and drums	1930's to 1950's
45.	Active Printing	123 Dalancy Street	Printing	Present
46.	Acurate Machinery and Manufacturing	72 Roanoke Avenue	Machine shop	Present
47.	Adams Sheet Metal Co.	241 Wilson Avenue	Metal roof curbs, equipment supports	1980's to 1990's
48.	Adams Street Dump	Adams Street	Landfill	Mid-1990's
49.	Adamson Baeder & Co.	Lockwood Street and Albert Avenue	Felts (hair)	1900's
50.	ADCO Chemicals	Rutherford & Delancy	Synthetic resins. oils.	1960's to Present
51.	Ad-Co Color Corporation	66 Lister Avenue	Printing ink. toners	1940's to 1950's
52.	Ad-Co Liberty Manufacturing Corp.	49 Rutherford Street	Metal Stamping, Tools & Dyes	1980's to 1990's
53.	Adler Printing Co.	123 St. Charles Street	Commercial printing	1950's to 1960's
54.	ADM Chemicals Co.	400 Doremus Avenue	Alkyd resins	1960's
55.	Adrich Chemical Corp.	928 Doremus Avenue	Chemicals	Present
56.	Advanced Enterprises Recycling Inc.	540 Doremus Avenue		Present
57.	Advertising Communications	83 Magazine Street	Graphic design, printing	1980's
58.	AFA Pallet Co.	514 Doremus Avenue	Wooden pallets	1980's to present
59.	Afco Pest Control	236 Delancy Street	Pest Control	Present
60.	Afco, Inc.	89 St. Francis Street	Pro-type model aircraft's, parts jig boring and grinding - tool & die	1960's
61.	Afta Steel Casting Co.	Chapel Street	Iron & Steel	1900's
62.	Air Conditioning Associates. Inc.	436 Ferry Street	Sheet metal works, process piping, mechanical equipment, HVAC	1980's to 1990's
63.	Air Land & Sea	Avenue P	Freight	Present
64.	Air Products & Chemicals. Inc.	825 Wilson Ave.	Hydrogen gas - chemicals	1960's to 1980's
65.	Airoyal Chemical Products			
66.	Airport Used Auto Parts	561 Avenue P	Auto Wreckers - Metal Scrap Yard)	Present
67.	Al Koch. Inc.	475 Ferry Street	Carbonic gas-chemicals	1940's to 1950's
68.	Al Napi's Auto Wreckers	127 Doremus Avenue	Metal scrap yard	Present
69.	Albert Mertz	Plum Point Lane/One Roanoke Avenue	Fat rendering, tallow	1930's to 1950's
70.	Albert Steel Drum Co.	320 South Street	Drum Reconditioning	1960's to 1970's
71.	Aleman Enrique	175 Ferry Street		Present
72.	Alexander Moskv Associates	9 St. Francis Street	Signs. advertising, displays	1960's
73	Alexander Trand	331 Ferry Street	Foundry (brass, iron), presses (filter)	1900's
74.	Alfredo Henriques	90 Chapel Street	Auto Repair	Present
75.	All Cast Non-Ferrous Foundry. Inc.	483 Raymond Boulevard	Non-ferrous castings aluminum, brass, nickel, magnesium, bronze	1960's to 1980's
76.	All County Environmental Services	193 Christie Street	Environmental consulting	Present

No	Company	Address	Type of Business	Years in Operation
77	All Metal Polishing & Plating, Inc.	23 George Street	Plating and polishing	1980's to 1990's
78	All Metal Products Co.	12 Delancy St.	Metal spinning-tool and die	1960's to present
79	All Plating & Die Casting Corp.	589 Ferry Street	Electroplating of metals	1970's to 1980's
80	All State Paper Box Co., Inc.	223 Raymond Boulevard	Set-up paper boxes	1970's to 1990's
81	All State Publishing Co.	62 Ann Street	Commercial printing	1970's to 1980's
82	Alliance Color & Chemical Co.	33 Avenue P	Organic intermediates, dyestuff-chemicals	1940's to Present
83	Alliance Tank & Boiler Works	300 Doremus Ave.	Tanks - sheet metal work	1940's to 1950's
84	Allied Old English Inc.	223 Delancy St.	Canned foods	1960's to 1970's
85	Allstar Foods	42 Cornelia Street	Food	Present
86	Alpha Analytical Laboratories	57 Freeman Street	Metal analysis	1980's to 1990's
87	Alpha Chemical & Plastics Corp.	1 Jabez Street	Plastic materials, ppc compounds	1960's to 1990's
88	Alpha Metals, Inc.	57 Freeman Street	Metal working	Present
89	Alphagary Corp.	1 Jabez Street		Present
90	Alpine Corrugated Machinery Inc.	16 Herbert Street	Paper box machinery	Present
91	Amalgamated Dyestuff & Chemical Works	Plum Point Road	Colors (dry)	1910's to 1930's
92	Amel Laboratories	13 Delancy Street	Cleaning compounds-chemicals	1930's
93	Amerada Hess Corp.	1111 Delancy Street	Petroleum	Present
94	American Adhesives & Coatings	411 Wilson Ave.	Adhesives and gelatin-chemicals	1980's to 1990's
95	American Block and Supply Co.	46 Paris Street	concrete	Present
96	American Bumper Co., Inc.	209 Parkhurst Street		1990's
97	American Can Co..	109 Avenue L	Can making machinery, paper containers for food and liquid products	1930's to 1940's
98	American Concrete	46 Paris Street	Concrete	
99	American Concrete - Steel Co.	Plum Point Lane	Fireproofing (concrete - steel)-chemicals	1900's
100	American Creosoting Co.	Foot of Lister Avenue	Wood paving blocks (creosote)-chemicals	1910's
101	American Dye and Print Inc.	16 Main Street	Printing	Present
102	American Fabric and Merchandise	16 Herbert Street	Clothing	Present
103	American Fat & Tallow	387 Avenue P	Fat and tallow	1940's to 1950's
104	American Fuel Co. of Essex	Blanchard Street	Business petroleum	Present
105	American Hair & Felt Co.	352 Doremus Ave.	Felts (hair)	1920's to 1940's
106	American Industrial Marine Service	526 Raymond Boulevard		Present
107	American Landscape Supply Inc.	514 Doremus Avenue	Landscape supply	Present
108	American Leather Mfg. Co.		Leather	1930's to 1950's
109	American Oil & Grease Corp.		Oil and grease - petroleum	1940's to 1950's
110	American Oil & Supply Co.	238 Wilson Avenue	Oil blending, oils and greases, rust preventatives, cooper sulfate, cyanide, ammonia, anhydrous ammonia.	1930's to present
111	American Ref-Fuel	66 Blanchard Street	Resource recovery	Present
112	American Refining & Crucible Co.	Lister Avenue	Iron & steel	1890's to 1920's
113	American Smelting & Refining Co.	St. Charles and Avenue L	Smelting and refining ores and metals, solder, cork insulation.	1930's to 1970's
114	American Stamping Works	9 St. Francis Street	Hardware (trunk and bag)-metal stamping	1930's to 1940's
115	American Steel Foundries	Avenue L	Steel casting, carbon, alloy & stainless steel	1930's to 1950's
116	American Synthetic Die Co.	Avenue R (Doremus Avenue)	Chemicals	1910 to 1920's
117	American Washer Manufacturing Co.	Plum Point Lane	Metal working	1890's to 1900's

No.	Company	Address	Type of Business	Years in Operation
118.	American Wood Fireproofing Co.	Lister Avenue	Fireproofing (wood)-creosote chemicals	1900's
119.	AMI Leasing Sales & Service	87 Doremus Avenue	Truck Leasing	present
120.	Amtruck Hildermann	335 Raymond Boulevard		1990's
121.	Analab, Inc.	293 Wilson Avenue		Present
122.	Anchor Sheet Metal Works, Inc.	30 Chapel Street	Sheet metal products	1970's to Present
123.	Anhydrides & Chemicals	2 Margaretta St.	Anhydrides-chemicals	1980's to 1990's
124.	Anhydrides & Chemicals	2 Margaretta Street	Chemicals	Present
125.	Ann Street Garage	15-17 Ann Street	Auto repair	1990's
126.	Anodizing Corp.	39 Avenue L	Electroplating, polishing, anodizing & fabrication packaging	1960's to Present
127.	Anton Brux	82 Paris Street	Manufacturer of novelties	1920's
128.	Anton Possert	181 Delancy St.	Trucks-repair	1920's
129.	Apex Barrel & Container	15 Amsterdam St.	Barrel mfg.-steel	1940's to 1950's
130.	Apex Color Works, Inc.	64 Chapel Street	Paints, enamels and coatings, primer and shop coats for structural steel and misc. Iron	1960's to 1980's
131.	Archer-Daniels-Midland Co.	400 Doremus Avenue	Synthetic resins, vegetable and marine oils	1960's
132	Archibald Serratelli	155-157 Malvern Street	Waste Celluloid, cotton, fur, silk and wool-solid waste services	1940's to 1950's
133.	Arco Petroleum Products Co	1111 Delancy Street	Petroleum	Present
134.	Ardvark Auto Wreckers	553 Avenue P	Metal scrap yard	Present
135.	Arkansas Chemical Co.	185 Foundry St.	Textile, leather chemicals	1930's to 1980's
136.	Arkansas Paints	171-185 Foundry Street	Paint	Present
137.	Armark Distribution Corp.	601 Doremus Avenue		Present
138.	Armel French Ice Cream Co.	134 Rome Street	Ice Cream	1960's to 1970's
139.	Armenio's Trucking Inc.	7 Vincent Street	Delivery service	Present
140.	Armour Paper Box Corp	223 Raymond Boulevard	Set-up paper boxes	1960's to 1980's
141.	Arol Chemical Products	649 Ferry Street	Boiler cleaning products, textile chemical specialties	1970's to 1990's
142.	Arthur Rehberger & Sons. Inc.	316-330 Ferry Street		1930's to 1940's
143.	Asbestos Fiber Inc.	Avenue P	Asbestos	1940's to 1950's
144.	ASG Forwarding	474 Wilson Avenue	Delivery service	Present
145.	Ashland Chemical Co.	221 Foundry Street	Solvent, organic chemicals, inorganic chemicals	1970's
146.	Ashland Chemical Co.	400 Doremus Avenue	Resins and plastics	1970's to 1990's
147.	Associated Auto Body & Trucks	405 Raymond Boulevard	Auto service	Present
148.	Atco Chemical Co.	148 Rome Street	Varnishes-paints	1940's to 1990's
149.	ATE Purses Inc.	33 Avenue L	Purses-leather	1950's
150.	Atha Tool Co.	Chapel Street	Wedges, hammers-iron and steel	1875 to 1910's
151.	Atina Products, Inc.	77 St. Francis Street	Hair nets, nylon, silk, rayon.-chemical fabric	1950's
152.	Atlan Soap Works, Inc.	125 Chapel Street	Tallow and greases	1940's to 1960's
153.	Atlantic Freight Lines, Inc.	117 Blanchard Street	National motor freight-delivery service	1950's
154.	Atlantic Smelting Corp.	Doremus Avenue	Metal smelting	1920's
155.	Atlas Chemical Co.	71-5 Paris Street	Pharmaceutical -chemicals	1930's to 1940's
156.	Atlas Refining Corp.	138 Lockwood Street	Oils	Present
157.	Automatic Electro-Plating, Inc.	347 Ferry Street	Electroplating, cadmium, zinc, nickel, cooper	1960's to Present
158.	Automatic Plating Methods. Inc.	347 Ferry Street	Plating - metal working	Present

No.	Company	Address	Type of Business	Years in Operation
159.	Automobile Leather Mfg. Co.	8-28 Chapel Street	Leather (shoe)	1910's
160.	Avanti Demolition & Carting, Inc.	233 Wilson Avenue	Solid metal services	Present
161.	Avenue P Auto Wreckers	553 Avenue P	Auto Wreckers-metal scrap yard	Present
162.	Avenue P Landfill	357-405 Avenue P	Landfill	Mid-1900's
163.	Avon Drum Company	185 Foundry Street	Drum manufacturing - metal works	1990's
164.	Azrak-Hamway International	601 Doremus Avenue		Present
165.	B & H Co.	600 Ferry Street	Acetylene & electric cutting, welding and brazing tool and die	1930's to 1940's
166.	B&B Produce	46 Cornelia Street		Present
167.	B&C Police Towing	527 Avenue P.	Towing - auto/truck service	Present
168.	B&L Custom Crating Inc.	8 Lister Avenue	Paper/wooden box containers	Present
169.	B.Line Trucking	67 Ester Street	delivery service	Present
170.	Baker Coconut Company	Doremus Avenue	Coconut oil - food	1920's
171.	Baker Franklin Co.	Doremus Avenue	Iron & steel	1910's to 1920's
172.	Baker Importing Co., Inc.	44 St. Francis Street	Meat branding inks	1950's
173.	Balbach Smelting & Refining Co.	580 Market Street	Refining, smelting, gold, silver, platinum, copper-non-ferrous metals	1851 to 1940's
174.	Ballantine & Sons	57 Freeman Street and Raymond Boulevard	Brewers	1840 to 1950's
175.	Barret Paving Material	10 Lister Avenue	Paving material	Present
176.	Bart Mfg. Corp.	135 Manchester Place	Electroforming plating	1960's
177.	Barth Smelting Corporation	99 Chapel Street	Cooper (electrolytic, cathodes, ingots, refined and wire bars)-non ferrous metals	1940's to 1980's
178.	Bay Shore Auto Sales	54 Avenue L	Auto sales	Present
179.	Bayonne Barrel & Drum Co.	Raymond Boulevard	Cooperage/Drum reconditioning - sheet metal	1940's to 1980's
180.	Bayshore Rigging & Trucking Co., Inc.	335 Doremus Avenue	Riggers	1950's
181.	Beckwith-Chandler Co.	Delancy & Rutherford St.	Lacquers, thinners, enamels, shellac and varnishes	1910's to 1950's
182.	Beebe Refactory Repairs and Service Co.	12 Mary Street		Present
183.	Behringer Metal Works, Inc.	108-122 Jabez Street	Metal Containers-sheet metal	1940's to 1990's
184.	Belco Lights Corp.	431 Ferry Street	Patio and Christmas lights	1980 to 1980's
185.	Bell Container Corp.	615 Ferry Street	Container service	1980's to Present
186.	Ben Frozen Food Corporation	37 ½ Joseph Street	Food	Present
187.	Benjamin E. Jarvis, Inc.	74-80 Malvern	Metal and wooden patterns and models - sheet metal	1930's to 1970's
188.	Benjamin Hirsch	561 Ferry Street	Scrap iron and metal	1940's to 1950's
189.	Benjamin Moore Co.	134 Lister	Paints	1920's to 1990's
190.	Bennett Heat Treating Co.	690 Ferry Street	Commercial and aircraft heat treating and brazing	1960's to Present
191.	Bennett Steel Treating Co.	246 Raymond Boulevard	Heat treating-sheet metal	1950's
192.	Bernen Food Products Co.	30 Jabez Street	Canned food and poultry	1960's to 1990's
193.	Berwick International	117 Avenue L		Present
194.	Better Finishes & Coatings Inc.	268 Doremus Ave.	Enamels, lacquers, plastic coatings	1940's to 1960's
195.	Biertuempfel Bros. Cork Co.	33 Avenue L	Cork products	1910's to 1940's
196.	Bingham Brothers Co., Inc	Lister Avenue and Brown Avenue	Adhesives, paste, dextrines and gums - chemicals	1930's to 1950's
197.	Black Bullet Transport Inc.	99 Chapel Street	Delivery Service	Present
198.	Black Oxide Processing Corp.	85 Gotthart Street	Protective coating, plating, finishing, etc. for metals	1970's to 1980's

No.	Company	Address	Type of Business	Years in Operation
199.	Black White Repair Co.	63-65 Ferry Street	Auto repair	1910's to 1920's
200.	Blanchard Factories, Inc.	45 Pointer	Skis and sleds-metal work	1930's
201.	Blanchard Warehouse	169 Blanchard Street	Warehouse	Present
202.	Blendex Inc.	357 Wilson Avenue		Present
203.	Blue Circle Atlantic, Inc.	194 Doremus Avenue	Cement	Present
204.	Bond Laboratories, Inc.			1960's to 1970's
205.	Book Covers Repair Shop	60 Lockwood Street	Textiles	Present
206.	Book Covers, Inc.	17 Blanchard Street	Paper board	1960's to Present
207.	Booth & Flinn	Hamburg Place & Napoleon Street	Contractors	1910's
208.	Bouge-Hanson Paper Box Co.	77 St. Francis Street	Boxes (paper set-up)	1930's, to 1960's
209.	Bow Solder Products Co.	25 Amsterdam Avenue	Extrusions of solder-non-ferrous metal	1960's to 1970's
210.	Boyle & Co.	527 Avenue P	Contractors	1950's
211.	Boyle Brothers, Inc.	42 Wheeler Point Road	Freight forwarding	1950's
212.	Brady Iron & Metal Co.	55-59 Lockwood Street	Metal works	Present
213	Branch Motor Express Co.	335 Delancy St.	National motor freight	1950's
214.	Branchbrook Towing and Auto Wreckers	549 Avenue P	Auto Salvage	Present
215.	Brass Founders Supply Co.	Hamburg Place & Avenue L	Flasks (improved rib)-non ferrous metals	1910's
216.	Breyer Ice Cream Co.	444 Raymond Boulevard	Ice cream and frozen deserts	1950's to 1970's
217.	Briggs Bituminous Compound Co.	414 Wilson Avenue	Flooring	1920's
218.	Brighton Paint	Doremus Avenue	Paint	1920's
219.	Brill Equipment Co	35 Jabez Street		Present
220.	Brills Yard	Avenue P & Wilson Avenue	Railroad yard	Present
221.	Brin Mfg. Co.	109 Albert Avenue	Electric equipment for industrial use	1960's to 1980's
222.	Bristol-Donald Co. Inc.	50 Roanoke Avenue	Manufacturers dump truck bodies - iron and steel	1960's to Present
223.	Brook Warehousing	515 Doremus Avenue	Warehousing	Present
224.	Brook Warehousing Corporation	481 Doremus Avenue	Warehousing	Present
225.	Brooks and Cass (Div. of Remco Food Prod., Inc.)	523 Raymond Boulevard	Plastic resin treated paper plates	1950's
226.	Bryan's Auto Wreckers	567 Wilson Avenue	Auto wrecking	Present
227.	Buda Knitting Inc.	359 Wilson Ave.	Knitting mill-textiles	1960's to 1970's
228.	Bukowic Meat Products, Inc.	9-B Euclid Avenue	Prepared meat products	1970's to 1980's
229.	Burgmeyer Brothers	666 Ferry Street	National motor freight	1950's
230.	Burton-Mason Co.	80-92 Delancy Street	Leather	1910's
231.	Butcher & Provisions	118 Wilson Avenue	Chemicals	1910's to 1920's
232.	Butterworth & Judson Co.	Plum Point Lane	Chemicals, mixed acids, muriatic acids, nitric acids, sulfuric acids, nitre cake	1900's to 1920's
233.	C&F Auto Truck Repair	148 Rome Street	Car/truck-sales/service	Present
234.	C.A. Terrill Coal Co.	117 Albert Avenue	Coal - petroleum	1900's
235.	C E. VanWinckle	75 Paris St.	Chemicals	1930's
236.	C.L. & R. K. Smith	Hamburg Place Road		1900's
237.	C.P. Schmidt & Sons	11 Komarn Street	Leather press and off-set printing	1960's
238.	C.W.C. Industries	185 Foundry St.	Roll leaf for hot dye stamping	1990's
239.	Calco Chemical Co. Inc.	338 Wilson Ave.	Pharmaceuticals, Aniline Colors & Dyes, chemicals	1930's to 1940's
240.	Calumet Iron Works	3 Hyatt Avenue	Steel	1920's to 1930's
241.	Calumet Sales Co.	21 Hyatt Street		Present
242.	Camarato Trucking	26 Richards Street	Freight delivery	Present
243.	Canned Oil Co.	34 Lister Avenue	Motor oils and greases-	1940's to 1950's

No	Company	Address	Type of Business	Years in Operation
			petroleum	
244	Caponegro & Sons	33 Rutherford Street	Trucking	Present
245	Capstone Mgf. Co.	Roanoke Ave.	Oils, greases	1930's to 1940's
246.	Carbide & Carbon Chemicals Corp.	351 Doremus Avenue	Chemicals, cleaning compounds, pharmaceutical preparations and toilet preparations	1940's
247	Carbozite Protective Coatings, Inc.	Foot of Foundry Street	Paints and protective coating	1950's
248	Cardinal Chemical Corp	69 Margarette St.	Rosin pitch, tank coatings, resinous products, brewers equipment and supplies, protective coatings	1930's to 1970's
249.	Cardolite Corp.	500 Doremus Ave.	Organic chemicals	Present
250.	Carmen's Auto Service	Avenue P.	Auto service	Present
251	Carmine Gardano	106-112 Delancy St.	Junkyard, iron	1950's
252	Carolina Freight Carriers Corp.	580 Delancy Street	Freight	Present
253	Caspar Lubricants, Inc.	120 Lister Avenue	Oils, greases-petroleum	1930's
254	Casper Partitions Systems Inc.	164 Delancy Street		Present
255	Castrol Oils Inc.	254-266 Doremus Ave.	Oils, greases	1960's to 1970's
256	CBS Toys, Inc.	601 Doremus Avenue	Plastics	1970's to 1980's
257	CEA Resource Recovery Facility	Raymond Boulevard and Blnchard Street	Resource Recovery	1980's
258	Ceiling Components, Inc.	16 Delancy St.	Stainless steel levels	1970's to 1980's
259	Celand Tanning Co.	44 St. Francis Street	Processors of sheep skins-leather	1950's
260.	Celanese Chemical Co.	354 Doremus Ave.	Formaldehyde	1950's to 1970's
261.	Celanese Coating Co.	Delancy and Rutherford Streets	Paints, lacquers and allied products	1970's
262	Celanese Corporation	290 Ferry Street	Celluloid sheets, rods, tubes, cellulose acetate products, chemicals (cleaning compounds, pharmaceutical preparations, toilet preparations), leather dopes, photographic film basis-plastic	1940's to 1950's
263	Celeste Fur Dressing and Dyeing Corp.	44 St. Francis Street	Fur skin dressing and dyeing	1940's
264	Cellofilm Corp.	Cornelia Street	Plastics	Present
265.	Cellomer Corp.	46 Albert Avenue	Resins - chemicals	1970's to 1980's
266.	Celluloid Company	295 Ferry Street	Celluloid, nitrocellulose, molding, powders and compounds - plastics	1873 to 1930's
267	Cellulos Products Co.	78-80 Paris Street	Manufacturer of picture films - plastics	1920's
268	Celluplastic Corp.	34-50 Avenue L	Plastics	1930's to 1950's
269	Central Delivery Service	83 Joseph Street	Delivery	Present
270	Central Dyestuff & Chemical Co.	Plum Point Lane	Colors (coal tar intermediates)-chemicals	1900's to 1920's
271	Central Railroad of New Jersey			
272.	Central Stamping Co.	573 Ferry Street	Enameled wares, galvanized wares, japanned wares, sheet iron wares, tinwares (culinary articles), enameled cooking utensils	1900's to 1930's
273	Central Steel Casting & Machinery Co	Lister Avenue & Chapel Street	Foundry - iron & steel	1920's
274	Central Steel Drum Co.	704 Doremus Ave.	Steel drums	1950's to 1990's
275.	Cerium Metals & Alloys (Div. of Ronson	55 Manufacturers Place	Ware metals and alloys for	1960's

No	Company	Address	Type of Business	Years in Operation
	Metals Corp.)		electronics-non ferrous metals	
276	Challenge Transportation	474 Wilson Avenue	Freight	Present
277	Challenger Electrical Equipment Corp.	16 Herbert Street	Electrical equipment	Present
278	Chapel Leather Co.	14 Chapel Street	Leather	1910 to 1920's
279.	Chas.L. Read Co.	192 Doremus Avenue	Solvents, Denatured alcohol, Linseed oils	1930's to 1950's
280.	Chemfi Corp.	536-540 Ferry Street	Chemicals	Present
281.	Chem-Fleur, Inc.	200 Pulaski Street	Aromatic chemicals, intermediate chemicals	1960's to 1980's
282	Chemical Industries Inc.	96 Roanoke Avenue	Chemicals	1940's to 1950's
283	Chemical Lehman	80 Doremus Avenue	Chemicals	Present
284	Chemical Process Systems			1980's to 1990's
285.	Chemical Waste Management	100 Lister Ave	Chemicals	present
286	Chemical Waste Management	41-85 Doremus Avenue	Chemicals	Present
287	Chemicaland Corp.	80 Lister Avenue	Chemicals	Present
288.	Chem-Truck, Inc.	184 Doremus Avenue	Chemicals	1990's
289	Chem-Wash, Inc.	184 Doremus Avenue	Chemicals	Present
290	Chitterling Factories	50 Avenue L		Present
291	Chrome Tanning Co.	6 Mary Street	Tannery-leather	1940's to 1950's
292	Circle International	33 Rutherford Street		Present
293	Circuit Manufacturing Corp.	9 St. Francis Street	Fabricated electric products	Present
294	City Salvage Company	Wilson Avenue	Metal scrap	1990's
295	City Sign Service	38 Wilson Ave.	Signs-metal work	1930's
296	Cizo Brothers	Foot of Plum Point Lane	Garbage dump - landfill	1920's
297	Claude Harvey Associates II	600 Wilson Avenue	Operation	Present
298.	Clear Mould	187-212 Wright Street	Plastics	1980's
299	Clinton Metal Fabricating Co.	9-15 Malvern Street	Sheet metal fabricating	1970's to 1980's
300	Clover Packaging Corp	591 Ferry Street	Converted paper and paperboard products	1970's to 1980's
301	Coal & Oil Products	320 Doremus Ave.	Coal & Tar-oils, petroleum	1920's to 1930's
302.	Coal W S. Rockwell Co.	Hyatt Avenue	Oil burners	1920's to 1930's
303	Coalash & Pasinkoff	100 Ferry Street		1900's to 1910's
304	Colloids Inc.	16 Delancy St.	Oils (Textiles), textile oils, soap specialties, chemicals	1920's to 1940's
305	Colonial Packing Corp.	174 Blanchard Street	Mayonnaise - food	1950's
306	Colonial Pipeline	986 Doremus Avenue	Petroleum	1980's to Present
307	Colonial Plastics Corp.	523 Raymond Boulevard	Plastic signs and displays, lighting diffusers, air craft parts	1950's
308	Colorado Transport Corporation	16 Margaretta Street	Freight	Present
309	Columbia Leather & Coating Corp.	30 Avenue P	Fabrics, leathers, plastics, laminating, coating, processing	1950's
310	Comet Chemical Co.	410 Adams Street	Finishes, lacquers, thinners, latex, water paints	1960's to 1970's
311	Comet Chemical Co.	410 Adams Street	Chemicals	1980's
312.	Commercial Can Corporation		Can manufacturing	1960's
313	Commercial Corrugated Container Corp.	615 Ferry Street	- paper	1970's to 1980's
314	Commercial Solvents Corp.	196-202 Blanchard Street	Chemicals, solvents, pharmaceuticals, insecticides, agricultural and automotive specialties	1940's to 1980's
315	Commercial Transportation Inc.	480 Wilson Avenue	Freight	Present
316	Community Pork Packers	219 Ferry Street	Meat trimmers and processors	1950's
317	Condensation Products Corp.	71-75 Paris Street	Molding compounds-plastics	1920's to 1930's
318	Conduit - Buckley	309 Avenue P.		Present

No.	Company	Address	Type of Business	Years in Operation
319.	Conrail Oak Island	91 Bay Avenue	Railroad yard	Present
320.	Conrail Oak Island Landfill	Delancy Street	Landfill	Present
321.	Consolidated Chemical & Paint Corp.	411 Wilson Avenue	Paint Mfg.	1960's to 1970's
322.	Consolidated Color & Chemical Co.	Dock & Brown Streets	Dye stuff and colors-paints	1900's to 1930's
323.	Consolidated Machinery Rebuilders	335 Doremus Ave.	Rebuilding and Processing machinery, laundry machinery	1930's to 1950's
324.	Consolidated Rail Corp.		Rail line	
325.	Continental Die Stuff & Chemical Co.	Plum Point Lane	Analin dies and chemicals	1910's
326.	Continental Electric Co.	334-8 Ferry Street	Electric motors and generators	1930's to 1990's
327.	Continental Oil Co.	416 Doremus Ave.	Oil blending, petroleum refining and products	1930's to 1940's
328.	Continental Transportation Lines, Inc.	69 St. Charles Street	National motor freight	1950's
329.	Conus Chemical	96 Roanoke Avenue	Chemicals	Present
330.	Conus Chemical	185 Foundry Street	Chemicals	Present
331.	Cook & Dunn Paint Corp.	167 Kossuth Street	Paints, varnishes enamels	1980's to 1990's
332.	Cook & Dunn Paint Corp.	109-15 St. Francis Street	Paints, varnishes, stains, japans, dryers, enamels	1930's to 1980's
333.	Cook's Transportation Co., NY	Blanchard Street		1910's to 1920's
334.	Cooper Chemical Co.	191 Blanchard Street	Chemicals for all trades, anhydrous ammonia, anaesthol, collodion, ether, iodine, mercury and turpentine	1910's to 1950's
335.	Cooper Lighting	84 Foundry Street	Lighting products	1990's
336.	Copco Steel and Engineering Co.	44 Lister Avenue	Steel windows and building products	1950's
337.	Cornell Dubilier Electronics	150 Avenue L	Capacitors, relays, filters, antenna rotors, capacitor/resistance decades-electrical products	1970's to 1980's
338.	Coronet Chemical Co.	185 Foundry Street	Chemicals	1990's
339.	Corrugated Carton Co.		Paper cartons	1960's
340.	Country Work Shop	95 Rome Street	Wood furniture	1970's to present
341.	Courtaulds CPD, Inc.	295 Ferry Street		
342.	Courtesy Container Corp. Landfill	465 Wilson Avenue	Landfill	1980's
343.	Craig Adhesive Co.	80 Wheeler Point Road	Adhesives - chemicals	Present
344.	Creative Patterns and Manufacturing	54 Freeman Street		Present
345.	Crocker & Wheeler Co.	Blanchard Street	Foundry - iron & steel	1910's
346.	Crompton & Knowles	52 Amsterdam Street	Paints and chemicals	Present
347.	Crouse-Minds Lighting	84 Foundry Street	Outdoor lighting fixtures	1980's
348.	Crown Monarch, Inc.	44 St. Francis Street	Leather tanning finishing	1960's to 1990's
349.	CTI Trucking	480 Wilson Avenue	Freight	1990's
350.	CWC Industries	185 Foundry Street		Present
351.	CZR Trucking Inc.	411 Wilson Avenue	Freight	Present
352.	D&J Trucking and Waste Co.	Avenue P	Solid waste landfill	1970's
353.	D&L Autoparts	349 Raymond Boulevard	Autoparts	Present
354.	D. Hurley & Sons, Inc. (Furley Forge, Inc.)	69-79 Manufacturers Place	Forging (iron and steel), stainless steel and cooper dry cams, stainless steel	1930's to Present
355.	D.&M. Provision Co., Inc.	146-154 Christie Street	Prepared meat products	1970's to 1980's
356.	D.W. Ryckman, Inc.	80 Lister Avenue		Present
357.	Daily & Ivins	Foot of Doremus Avenue		1910
358.	Dan's Air Service	474 Wilson Avenue		Present
359.	Darling-Delaware Co.	825 Wilson Ave.	Tallow	1980's to Present
360	Dart Trailer Sales	80 Doremus Avenue	Freight	Present
361.	David Kahn Inc.	445 Wilson Ave.	Fountain pens	1930's

No.	Company	Address	Type of Business	Years in Operation
362.	Daybreak Express	474 Wilson Avenue	Freight	Present
363.	Dayco Corp.	133-139 Kossuth Street		Present
364.	Daytona Finishing Corp.	59 Wall Street	Centrifugal hot tinning-coating	1980's to 1990's
365.	DB Brown Inc.	425 Avenue P.		Present
366.	Deiterle & Slaight, Inc.	113 Kossuth Street	Paper boxes	1950's to 1960's
367.	Delancy Street Landfill (North & South)	Delancy Street	Landfill	Mid-1900's
368.	DeLeet Merchandising Corp.	26 Blanchard Street	Paper boxes	Present
369.	Delisa Pallet & Lumber Co.	91-97 Blanchard Street	Wooden pallets and repair	1960's to 1990
370.	Delta Engineering Co.	556 Ferrry Street	Air conditioning and refrigeration contractors, build refrigeration equipment	1980's to 1990's
371.	Delta Mfg. Co.	9 Delancy Street	Spark plugs	1910's
372.	Delta Plastic Corp.	560 Ferry Street	Manufacture Polyethylene Film and Bags-plastic	1980's to 1990's
373.	Dependable Trunk Co.	76 Ferry Street	Trunks-leather	1950's
374.	Devino Landfill	845 Doremus Avenue	Landfill	1980's
375.	Devino's Used Truck Parts	190 Doremus Avenue	Truck salvage	Present
376.	Devoe & Reynolds Co., Inc.	Delancy and Rutherford Streets	Industrial coatings, Paint, varnishes, lacquers, resins	1950's to 1970's
377.	Dewey's Garage		Auto service	
378.	Dewey's Garage Inc.	190 Wilson Avenue	Auto/Truck Service	Present
379.	Dexter Plastics	1 Jabez Street	Plastics	1990's
380.	Diamond Alkali Organic Chemicals Division, Inc.	80 Lister Avenue	Chemical products	1950's to 1980's
381.	Direct Environment, Inc.	164 Blanchard Street	Environmental consulting services	1990's
382.	Discout Auto Wreckers	553 Avenue P	Auto Salvage	Present
383.	Display Box Co., Inc.	77 St. Francis Street	Boxes (paper), display cases	1930's to 1940's
384.	Diversified Packaging Corp.	222 Thomas Street	Paper/packaging	Present
385.	Dovan Chemical Corp.	441 Riverside Avenue	Rubber accelerators-chemicals	1920's to 1930's
386.	Down Neck Towing Service, Inc.	539 Avenue P.	Towing - auto/truck service	Present
387.	Doyle Packing Co.	Lister Avenue and Brown	Dog and cat food and remedies	1930's
388.	Dri-Print Foils, Inc.	78 Wheeler Point Road	Metal foils	1960's to 1970's
389.	Drucker Hess	68 Amsterdam Ave.	Leather tannery	1920's to 1930's
390.	Dublon, Inc.			1970's to 1990's
391.	Duggan's Distillers Products Corp.	46 Wheeler Point Road	Wines	1950's to 1970's
392.	Dumore Contracting	326 Doremus Avenue		Present
393.	Duralac Chemical Corp.	84 Lister Avenue	Enamels, lacquers, thinners, shellacs and varnishes, synthetic enamels, wrinkle enamels, hammer finishes, government specification finishes ,	1930's to 1990's
394.	Durcur Services Corp.	16 Margaretta Street		Present
395.	E. Huebner & Sons Co.	177 Ferry Street	Buttons (pearl)	1900's
396.	E. Landsberg, Inc.	66 Stockton St.	Calf skins and sheep skins	1970's to 1980's
397.	E.M. Sargent Pulp & Chemical Co., Inc.	120 Lister Avenue	Chlorine products, sodium hypochlorite-chemicals	1940's - 1970's
398.	Eagle Express Inc.	1158 Paris Street	Freight	Present
399.	Eagle-Picher Lead Co.	Blanchard Street	Lead oxides, litharge, rock wool-non-ferrous	1910's to 1960's
400.	Eastcoast Freight Lines, Inc.	666 Ferry Street	National motor freight	1950's
401.	Eastern Bulk Transport Inc.	184 Doremus Avenue	Freight	Present
402.	Eastern Colortype Corp.	7 Blanchard Street	Paper converting	1970's

No.	Company	Address	Type of Business	Years in Operation
403.	Eastern Cutter Corp.	61 Avenue K	Machine shop	1960's to 1970's
404.	Eberhardt Faber Pencil Co.	219 Malvern Street	Erasers and rubber bands, molded rubber products	1960's to 1970's
405.	Ebersberger Barrel Co.	17 Margaretta Street	Barrels	1950's
406.	Economy Foundry Co.	2 Wheeler Point Road	Castings (abrasive faced, anti-slip, etc.)	1940's to 1950's
407.	Eden & Strauss	140 Paris Street	Sorting & salting hides	1950's to 1970's
408.	Edgar Miner & Co.	Blanchard Street	Methyl salicylate-chemicals	1920's to 1930's
409.	Edward Handler & Sons	230 Ferry Street	Dental supplies (artificial teeth)-plastic	1930's to 1950's
410.	Edward Simon & Brothers	77 St. Francis and Main Streets	Leather	1860's to 1900's
411.	Eisler Engineering Co.	39-41 Avenue L	Incandescent lamp mfg.	1930's
412.	Elan Chemical Co.	268 Doremus Ave.	Chemicals for fragrance and flavors	1970's to Present
413.	Eldon Glass & Mirror Co., Inc.	117 St. Frances Street	Glass	Present
414.	Electric Storage Battery Co.	109-115 Avenue L	Batteries	1920's to 1930's
415.	Elizabeth Smelting Co.	88 Paris Street	Smelting - iron & steel	1910's to 1920's
416.	Elko Chemical Works, Inc.	66 Lister Avenue	Chemicals (cleaning compounds, pharmaceuticals, toilet preparations)	1940's
417.	Emco Steel Inc.	357 Wilson Avenue	Stainless steel	1960's to 1980's
418.	Emco Steel, Inc.	357-391 Wilson Avenue	Iron & steel	Present
419.	Emil Attanasi & Sons	387 Avenue P	Scrap metal and iron	1950's
420.	Empire Bottling Works	140 Malvern	Washing fluid, bluing, ammonia-chemicals	1930's to 1960's
421.	Empire Chemical Co., Inc.	96 Roanoke Avenue	Floor wax, soap, salicylic acid, Pharmaceuticals	1930's to 1950's
422.	Empire Container	480 Wilson Avenue	Container-shipping	Present
423.	Empire Press, Inc.	62 Ann Street	Printing	1950's
424.	Empire Ship Building and Repair Corp.	604 Doremus Avenue	Ship and boat building, dry docking and repairing	1940's
425.	Engelhard Industries	429 Delancy St. Refining Division, research and Development Division.	Chemicals, catalysts, manufacturing and refining of precious metals	1960's to 1990's
426.	Enright Refining Co.	65 Euclid Avenue	Smelting non-ferrous metal	1960's to 1980's
427.	ENSI, Inc.	194 Avenue L	Emergency Clean-ups, remediation and tank work	1990's
428.	Equipment Sandblasting & Finishing Corp.	80 Doremus Avenue	Sandblasting	1970's to 1980's
429.	Erie Railroad	Newark Salt Marsh	Railroad	Early 1990's
430.	Escon Color & Chemical Co.	66 Lister Avenue	Chemicals and dyestuff	1940's to 1960's
431.	Essex Hauling Service	100 Delancy Street	Rubbish removal-solid metal servics	1950's
432.	Essex & Hudson Gas Co.	665 Ferry Street	Gas - chemicals	1900's
433.	Essex Chair Co.	574 Ferry Street	Furniture-wood working	1930's to 1950's
434.	Essex Chemical Co.	330 Doremus Avenue	Sulfur dioxide, aluminum sulfate	1940's to 1990's
435.	Essex County Resource Recovery Facility	66 Blanchard Street	Resource recovery	1990;s
436.	Essex Grain Products Co.	357 Wilson Avenue	Grain	Present
437.	Essex Industrial Chemical Corp.	351 Doremus Avenue	Chemicals	1990's
438.	Essex Tank & Welding Co.	Roanoke Avenue & Foundry Street	Welded steel products	1930's
439.	Esta Hat Co.	77 St. Francis Street	Hats	1930's to 1950's
440.	Esteves Transportation	99 Lockwood Street	Freight	Present
441.	Eureka Spring Co., Inc.	9-15 Manufacturers Place	Coil and flat springs-metal work	1960's to Present

No.	Company	Address	Type of Business	Years in Operation
442.	European Parts Exchange of New Jersey, Inc.	300 Wilson Avenue	Metal working machinery and equipment	1970's
443.	Everwear Trunk & Luggage Co.	1-17 St. Francis Street	Traveling bags and suitcases-leather	1940's
444.	Evon Industries Inc.	338 Wilson Ave.	Dry wall accessories-chemicals	1960's to 1970's
445.	Excaliber International Limited	280 Wilson Avenue		Present
446.	Exclusive Footware Corp.	1-9 St. Francis Street	Woman's sport shoes—leather	1940's to 1950's
447.	Express Container Corp.	105 Avenue P	Containers	1940's to Present
448.	F&C Truck Repair	182 Avenue L	Truck service	Present
449.	F.C. Kent Corp.	135 Manchester Place	Tube bending-metal work	1960's
450.	F.J. Kastner Brewing Co.	69 Magazine Street	Brewing	1900's to 1920's
451.	F.J. Lewis Mfg. Co.	200-300 Doremus Ave.	Coal & Tar	1920's to 1930's
452.	Fabricated Metals Corp.	Avenue L	Machine Shop	1930's
453.	Fairfield American Corp.	238 Wilson Avenue	Household insecticides-chemicals	1980's to 1990's
454.	Fairmount Chemical Co.	117 Blanchard Street	Industrial organic chemicals	1930's to Present
455.	Far Hills Seafood	50 Avenue L	Food	Present
456.	Farmer's Market Paper & Basket Co., Inc.	55 Euclid Avenue	Bags (cambric, cotton and burlap)-textiles	1940's
457.	Farmer's Products Co.	236 Doremus Avenue	Farm products	1910's to 1920's
458.	Farmers Feed Co.	467 Raymond Boulevard	Dried brewers grain (cattle feed)	1950's to 1990's
459.	Fast Fleet Inc.	83 Joseph Street	Freight	Present
460.	Fast Pak Container Corp.	319 Wilson Avenue	Corrugated paper products	1980's to Present
461.	Fedderson & Feldmeyer	21 & 23 Prospect Street	Novelties (pearl)	1900's
462.	Federal Bronze Products, Inc.	9 Backus Street	Manufacturing and distribution of bushings, bearings, brass and aluminum castings, copper and copper alloys, continuous cast iron bars and all bronze alloys-non ferrous	1960's to 1990's
463.	Federal Composition & Paint Co.	414 Wilson Ave.	Paints, varnish, stains, japans, dryers, enamels	1930's to 1950's
464.	Federal Iron and Metal Scrap	Foot of Hawkins Street	Scrap iron and metal	1930's to 1950's
465.	Federal Pacific Electric Products Co.	50 Paris St./150 Amel	Industrial circuit breakers-electrical equipment	1930's to 1980's
466.	Federal Paint Co.	414 Wilson Avenue	Paints	1940's to 1970's
467.	Federal Razor Blade Co., Inc.	97 St. Francis Street	Razor blades	1940's to 1950's
468.	Federal Salvage Corp.	156 Lister Avenue	Scrap metal, steel products	1940's to 1950's
469.	Federal Steel Corp.	2-14 Avenue L	Steel	192o's to 1930's
470.	Federated Metals	St. Charles & Avenue L	Lead pipe - non-ferrous	1930's to Present
471.	Feigenspan Brewery.	Christie Street	Brewery	1900's to 1940's
472.	Fencello & Attrili	508 Ferry Street		1910's
473.	Fenwick Mfg. Co.	134 Rome	Bags (Cambric, cotton and burlap)-textile	1930's to 1960's
474.	Fenwick-Reddaway	46 Paris Street	Belting (woven cotton)-textile	1910's to 1930's
475.	Feroleum Products Inc.	445 Wilson Ave	Rust preventatives-chemicals	1930's to 1950's
476.	Fiber-Flex	574 Ferry Street	Manufacture and distribution of polyurethane, polystyrene, fiberglass and insulation products-plastics	1990's
477.	Fidelity Chemical Products Corp	430 Riverside Avenue	Cleaning compounds and fluids-chemicals	1940's to 1950's
478	Fidelity Sales Co.	604 Doremus Avenue	Fire extinguishers and recharging, welding supplies	1940's to 1950's
479.	Fidelity Sales Co.	199 Wilson Ave.	Welding supplies, fire	1950's

No	Company	Address	Type of Business	Years in Operation
			extinguishers	
48[illegible]	Fine Pigments, Inc.	80 Blanchard Street	Custom grinding and processing of pigments, minerals, drugs, talc, waxes, food products-chemicals	1940's to 1980's
481	Finese Auto Body	28 Margaretta Street	Car repair	Present
482	Fiore Demolition	Rutherford Street	Solid waste	1980's
483	Firmenich Co.	928 Doremus Avenue	Aroma and flavor chemicals	Present
484	Fiske Brothers Refining Co.	129 Lockwood Street	Axle grease, harness oil dressing, leather dressing, oils (paint), lubricant	1890's to Present
485	Flakice Corp.	556 Ferry Street	Ice making, liquid food freezing equipment	1970's to 1980's
486.	Flexcraft Industries	527 Avenue P	Solvents, water based adhesives-chemicals	1960's to 1990's
487.	Flexo Gravure Inks	Lister Avenue and Brown Street	Printing ink	1960's
488.	Flockhart Foundry	83 Polk Street	Iron & steel	Present
489	Floquil Products, Inc.	199 Magazine Street	Fountain pens,inks for industrial uses and arts	1940's to 1950's
490	Flower City Kid Works	Magazine & Frankfurter Streets	Leather	1890's to 1910's
491	Fluidixed Processing, Inc.	19 Freeman Street	Mechanized chemical reduction	1980's
492	Fodero Dining Car	55 Delancy St.	Dining cars manufacturing - iron and steel	1950's
493	Forem Bag Co., Inc.	4 Cornelia Street	Textile	Present
494	Fort Realty and Warehousing Corp.	72 Roanoke Avenue	Warehousing	Present
495	Foundry Street Complex	185 Foundry Street	Chemicals	1980's
496	Fowler & Williams	204 Delancy St.	Motor freight	1950's
497	Frank A. Lueddeke	24 Foundry St.	Expressing/freight	1950's
498	Frank C. McCann Stone Co.	100 Roanoke Ave.	Stone products	1960's to 1970's
499	Frank G. Fanning	352-58 Doremus Ave.	Wool fat waxes-chemicals	1950's
500	Frank Lueddeke	24 Foundry Street	Expressing/freight	1950's
501	Frank Popola Barrel Co.	16-18 Thorton St.	Cooperage-barrel manufacturing	1970's to Present
502	Franklin Baker Co.	Avenue R (Doremus Ave)	Coconut oil	1910's to 1920's
503	Franklin Metals Co.	134 Rome Street	Scrap metals and iron	1950's
504	Frazer & Burchenal	Hamburg Place		1900's to 1910's
505	Fred E. Miller	237 Ferry Street	Electrical supplies and equipment	1940's
506.	Fred H. Rojahn Co., Inc.	357 Wilson Ave.	Machine Shop	1980's
507	Fred Horn	67-69 Paris Street	Abattoirs (slaughter house)	1930's
508	Freemand Brothers	18 Cornelia Street	Produce—food	Present
509	Frema Smelting & Refining Co.	338 Wilson Avenue	Non-Ferrous scrap metals	1960's to 1970's
510.	Friedman's Express	Avenue P & Foundry Street	Freight	1990's
511	Frontier Chemical Corp. (Div. of Vulcan Materials)	600 Doremus Avenue	Chlorine, caustic soda. ethylene chloride	1960's
512	Future Foods	280 Wilson Avenue	Food	Present
513	G&G Meat Co.	45 Malvern Street	Meat	1970's
514	G J. Chemicals Co.	128 Doremus Avenue	Distribution of Chemicals	1980's to Present
515.	G.N Ferguson, Inc.	117 St. Francis Street	Castings (aluminum, brass and bronze), smelting & refining ores and metals-non-ferrous	1930's to 1950's
516	Gallagher Power Plant Services. Inc.	10 Mary Street		Present
517	Garden State Associates	357 Wilson Avenue		Present

No.	Company	Address	Type of Business	Years in Operation
518.	Garden State Promotional Products Corp.	574 Ferry Street	Advertising specialties	1960's
519.	Garden State Transfer Co.	182 Delancy Street	Freight forwarding	1950's
520.	Gavan-Graham Electric Products Corp.	65 Rome Street	Paddle boards, switch boards, steel enclosures, special control devices for industrial or marine application	1950's
521.	General Dye Works	151-153 Kossuth Avenue	Dyeing and finishing (hosiery)-chemicals	1940's
522.	General Foundries	9 Albert Street	Iron & steel	1980's
523.	General Lead Battery Co.	Lister Avenue & Chapel Street	Lead batteries - non-ferrous	1910's 1920's
524.	General Lighting Products	16 Delancy St.	Lighting products	1940's to 1950's
525.	General Mold Casting Corp.	18 St. Francis Street	Steel casting, beryllium, cooper	1960's to 1970's
526.	General Resin Corp.	33 Rutherford St.	Synthetic resins-chemicals	1960's to 1970's
527.	Genserve Inc.	351 Doremus Avenue		Present
528.	George Sayegh Trucking Co., Inc.	451 Doremus Avenue	Freight	Present
529.	George W. Downes Co.	Ferry and Blanchard Streets	Box. news and straw boards-paper	1900's
530.	Georgia Pacific Corp.	290 Ferry Street	Chemicals	Present
531.	Get Fresh Produce Distributors Inc.	35 Jospeh Street		Present
532.	Getty Petroleum Corporation	86 Doremus Avenue	Petroleum	1930's to Present
533.	Glicken Brothers Inc.	2 Joseph Street	Cigarettes	Present
534.	Globe Metals Inc.	7 Avenue L	Non Ferrous	Present
535.	Golden Simcha Poultry Inc.	280 Wilson Avenue	Poultry-food	Present
536.	Goldsmith Leather Co. Inc.	117-121 Paris St.	Tanning, finishing of leather	1930's to 1970's
537.	Gomar Laboratories	79 Paris Street	Plastic products	1950's
538.	Gomar Mfg. Co., Inc.	79 Paris Street	Paper coating glazing-chemicals	1960's
539.	Goodman Plastics Mfg., Inc.	109 Avenue L	Plastics	1970's
540	Gotham Paper Co., Inc.	560 Ferry Street	Fine printing paper	1980's
541.	Grammer Dempsey & Hudson Inc.	212 Rome Street	Iron & Steel	1950's to Present
542.	Granty Manufacturing Co.	12 Delancy Street		1910's
543.	Graphic Vinyl Products, Inc.	400 Ferry Street	Plastics	Present
544.	Graver Chemical	72 Lockwood Street	Chemicals	Present
545.	Great American Veal	50 Avenue L	Meat packing	1980's to Present
546.	Great Atlantic & Pacific Tea Co.	109 Avenue L	Bakery	1960's
547.	Greenboro-Dairy Co., Inc.	4 Rome Street	Ice Cream, cultured sour cream and buttermilk	1930's to 1950's
548.	Gregory Packaging	235 Rome Street		Present
549.	Grig Freight Line, Inc.	155 Blanchard Street	Expressing-Freight	1950's
550.	Grignard Chemicals Co.	185 Foundry St.	Metal preservatives & cleaners. lubricating oils and greases	1970's to 1980's
551.	Guarantee Fur Dressers	60 Amsterdam St.	Fur dressing	1920's to 1930's
552.	Guard Chemical Co.	1 Avenue L	Chemicals	Present
553.	Gulf Car Loading, Inc.	156 Rome Street	Freight forwarding	1950's
554.	Gulf Oil & Chemicals	652 Doremus Avenue	Petroleum	Present
555.	Gulf Refining Co.	Avenue L & Mary Street	Petroleum	Present
556.	H&O Machinery and Engineering Co.	Euclid Avenue and Esther Avenue	General machinery	1940's
557.	H&S Finishing Laboratories	70 Blanchard Street	Metal finishing	1960's to 1990's
558.	H. Graifman & Son	24 Rome Street	Scrap iron and metal	1950's
559	H. M. Blake	Foot of Lister Avenue	Steel	1940's to 1950's
560.	H.A. Metz Laboratory	Roanoke Avenue & Foundry Street	Acid orange-chemicals	1920's to 1930's

No.	Company	Address	Type of Business	Years in Operation
561.	H.A. Wilson & Co.	12 Malvern	Thermostatic by-metals	1930's to 1940's
562.	H.E. & C.D. Williams Inc.	215-225 Wilson Ave.	Leather, cowhide	1910's to 1970's
563.	H.F. Muselbach & Bro.	St. Francis Street		1910's
564.	H.F. Sommer & Co.	213-235 Wilson Ave.	Leather tannery	1910's to 1930's
565.	H.J. Hoerner & Sons	Lister Avenue		1910's
566.	Hahne & Co.	Lister Avenue		1910's
567.	Hamilton Metal Products, Inc.	120 Pulaski Street	Metal fabricators, sporting goods	1970's.
568.	Hansen Paper Box Co., Inc.	77 St. Francis Street	Set-up paper boxes	1940's to 1950's
569.	Harbour Repairs	9 Lister Avenue		Present
570.	Harry Lubin	Wheeler Point Road and Delancy Street	Wooden-novelty boxes	1940's to 1950's
571.	Hartford Transportation Co., Inc.	937 Raymond Boulevard	National motor freight	1950's
572.	Harvey Steel Co.	Plum Point Lane	Iron & steel	1890's to 1910's
573.	Hay Foundry & Ironworks	Plum Point Lane	Iron and Steel bridges, kettles and retorts (refining works)-foundry	1890's to 1930's
574.	Haydo Beef Co.	75 Stockton	Slaughter house	1950's
575.	Heller & Merz Co.	338 Wilson Avenue	Aniline Sulfate, colors, ultra marine blue chemicals	1872 to 1930
576.	Heller & Sons, Jr.	149 Ferry Street	Industrial supplies, cranes, monorail systems	1990's
577.	Heller Truck Body Corp.	222 Thomas Street	Truck body manufacturing - metal works	Present
578.	Hemminger Sheet Metal & Roofing Co.	63 Rome Street	Sheet metal work (blowers, cornices and skylights, exhaust and ventilation systems, fire doors and windows, roofing, etc.)	1930's to 1980's
579.	Henry J. Brinker Inc.	185 Delancy St.	Pick-up & delivery service	1950's
580.	Henry Lang Co.	Plum Point Lane		1890's to 1910's
581	Henry Lohse Co. Inc.	50 Roanoke Avenue	Tractor, cranes and trailers	1940's to 1950's
582.	Henry W. Boeker	50 Roanoke Avenue	Machine works, General machine works	1950's
583.	Henry Westrich, Inc.	79 Euclid Avenue	Prepared meat products	1970's
584.	Heracus Enright Refining Inc.	65 Euclid Avenue	Second smelting non-Ferrous metal and precious metal	1980's to 1990's
585.	Hernandez & Sons	77 St. Francis Street	Pharmaceuticals - chemicals	1960's
586.	Hertz Equipment Rental	41-85 Doremus Avenue	Equipment rental	Present
587.	Hertz RentaCar	900 Doremus Avenue	Car rental	Present
588.	Hess & Drucker Inc.	68 Amsterdam	Leather, chamos	1940's to 1950's
589.	Hess & Harburger	68-82 Amsterdam St.	Leather, Chamois skins	1900's to 1930's
590.	Hess Corp.	1111 Delancy Street	Petroleum	Present
591.	Hess Corp.	148-182 Doremus Avenue	Petroleum	Present
592.	Hewitt's Steel Works	Chapel Street & Lister Avenue	Steel & iron	1910's to 1920's
593.	Highway Corp.	120 Lister Avenue	Asphalt and asphalt products - chemicals	1930's
594.	Hilton Davis Chemical Co.	120 Lister Avenue	Inorganic or Organic pigments - chemicals	1980's
595.	Hoechst-Celanese Chemical Co.	354 Doremus Avenue	Chemicals	Present
596.	Hoechst-Celanese Chemical Co.	Rome & St. Charles Streets		
597.	Hollanderizing Corp. of America	11 Paris St.	Cleaning of furs	1940's to 1950's
598.	Homecraft Mfg. Co.	40-42 St Francis Street	Woodworking shop	1950's to present
599.	Honig Chemical Co.	414 Wilson Ave.	Chemicals	1970's to present
600.	Hope Electrical Co.	338 Wilson Ave.	Electrical junction boxes	1950's
601.	Howard Fertell & Co., Inc.	57 Paris Street	Fur, skin dressing and dying	1930's

No.	Company	Address	Type of Business	Years in Operation
602.	Hudsar Inc.	567 Wilson Ave.	Smelters/refiners of precious metals - non ferrous	1960's to 1970's
603.	Hudson Leather Co.	15 Margareta Street	Leather	1900's to 1920's
604.	Hudson Metal Products	18 Malvern Street	Manufacture small metal components for electronic industry	1990's
605.	Hudson Oil Co. Inc.	254-226 Doremus Ave.	Oil blending, lubricating oils. oils and greases	1930's to 1950's
606.	Hudson Smelting & Refining Co.	85 Hyatt Avenue	Processors of non ferrous metal scrap, producers of copper, aluminum, lead	1950's
607.	Hudson Tool & Die Co.	59 Wall Street	Metal work	Present
608.	Hudson Tool and Die Co.	18 Malvern Street	Electric enclosures, deep drawn metal cans, high production stamping	1960's to 1990's
609.	Humko Chemical	652 Doremus Ave.	Fatty acids, glycerin	1990's
610.	Hummel Lanolin Corp.	185 Foundry St.	Medicinal Chemicals	1960's to 1990's
611.	Hutt Lumber Co.	357 Wilson Avenue	Wood	Present
612.	Hy Product Feed, Inc.	305 Doremus Avenue	Feed	Present
613.	Hydrocarbons Chemicals. Inc.	130 Lister Avenue	Chemicals	1950's
614.	Hygienic Tube & Container Co.	34 Avenue L	Celluloid containers - plastic	1930's to 1940's
615.	Hygrade Laboratories, Inc.	44 St. Francis Street	Pharmaceutical products - chemicals	1940's to 1950's
616.	Ideal Silk Screen Co.	357 Wilson Ave.	Silk screening - printing	1960's to 1970's
617.	Ideal Toy Corp.	601 Doremus Ave.	Toys - plastic	1970's to 1980's
618.	Illinois Leather Co.	Blanchard and Ferry Streets	Felts (hair), plaster, fiber	1900's to 1910's
619.	IMC Chemicals Group	96 Blanchard Street	Chemicals	Present
620.	Impact Provision Screw Products Inc.	10 Delancy Street	Machine working	Present
621.	Imperial Leather Co.	12-28 Chapel Street	Leather (enameled)	1900's
622.	Industrial Equipment Co.	465 Raymond Boulevard	Material handling equipment and forklift trucks	1970's to 1980's
623.	Industrial Finishers	16 Amsterdam Street		Present
624.	Industrial Hard Chromium Co.	7-11 Rome Street	Chromium plating	1940's to present
625.	Industrial Office Supply Co.	140 Wilson Avenue	Dictaphone machines - office supplies	1950's
626.	Industrial Petro Chemicals Inc.	128 Doremus Ave.	Alcohol, fuel oils, petroleum solvents and chemicals	1960's to 1990's
627.	Industrial Processing Engineers	8 Lister Avenue	Process plants and process equipment for chemicals, paint and process industries - stills. dissolvers, soap and grease crutchers, autoclaves, screw extruders, diagestures. absorbers,. Mixers, adjatators	1940's to 1970's
628.	Industrial Sales Corp.	106 Blanchard Street	Chemicals (cleaning compounds, pharmaceutical preparations, toilet preparations)	1940's
629.	Industrial Waste Technologies, Inc	99 Chapel Street		1990's to Present
630.	Industrial Welding Co.	653 Ferry Street	Steel fabrication	1940's to 1990's
631.	Interchemical Co.	Doremus/Delancy St.	Printing ink - chemical	1950's
632.	Intermetal Corp.	251 Doremus Ave.	Chemical laboratory	1930's to 1940's
633.	Intermil Inc.	280 Wilson Avenue		Present
634.	International Precision Products	61 Avenue K		Present
635.	International Escavating Co.	Lister Avenue and Ester Street	General Contractors	1950's
636.	International Forwarding Co.	153 Wilson Avenue	Freight forwarding	1950's

No.	Company	Address	Type of Business	Years in Operation
637.	International Hoist & Machinery Co.	155 Ferry Street	Construction equipment, rebuilding, equipment repairs, Hoisting machinery	1940's to 1960's
638.	International Metallurgical Services	196 Blanchard Street	Non-ferrous metals	1980's to 1990's
639.	International Motor Company	560 Ferry Street	Machine shop	1910's
640.	International Petroleum & Resin Corp.	180 Blanchard Street	Chemicals (cleaning compounds, pharmaceutical preparations, toilet preparations)	1940's
641.	International Printing Ink Corp.	Doremus Ave. & Delancy	Lithographic inks	1930's to 1950's
642.	International Screw Machine Shop	16 Delancy St.	Screw machine products, precision machine shop	1960's to 1990's
643.	Interol Co. Inc.	250 Doremus Ave. 622 Doremus Ave.	Waterproof products, paints, varnishes, stains, japans, dryers, enamels, waterproofing solutions	1920's to 1940's
644.	Interport Sandblast Co.	Delancy Street	Sandblasting	Present
645.	Interstate Casing Co., of Ohio	105 Rome Street	Casings - metal working	1950's
646.	Interstate Soap Corp.	171 Blanchard Street	Grease rendering	1960's to 1970's
647.	Iron Bound Auto Recycling	553 Avenue P	Auto salvage	Present
648.	Ironbound Amusement Company	128 Wilson Avenue	Movie theater	1910's to 1930's
649.	Ironbound Cleaners	131 Ferry Street	Cleaners	1990's to Present
650.	Ironbound Machine Co.			1960's to 1970's
651.	Ironbound Mattress Co.	110 Ferry Street	Mattresses, bedsprings, pillows, etc.	1930's to 1960's
652.	Ironbound Recreation Center	132 St. Charles Street	Recreation center	Present
653.	Ironbound Transportation Park	474 Wilson Avenue	Trucking/freight	Present
654.	Ironbound Upholstery & Repair Co.	107 Ferry Street	Upholstering, repairing, appliances, washing machines, televisions and stoves	1950's
655.	Ironbound Welding		Welding - machine shop	1960's
656.	Irving C. Steinberg & Son	33 St. Francis Street	Sheet metal fabrics, chassis cabinets	1940's to 1950's
657.	Irvington Varnish & Insulator Co.	500 Doremus Ave.	Insulation products, bottle cap lining materials	1940's to 1950's
658.	J. Frederic Schroeder Hair Felt Co.	Blanchard Street	Felts (hair)	1910's to 1950's
659.	J. Heller & Sons	149 Ferry Street	Industrial supplies, pipes, fittings, hoist and hardware	1950's to 1990's
660.	J. Kaufman & Son	387 Avenue P	Scrap iron and metal	1940's to 1950's
661.	J. Paskusz & Son	Magazine & Amsterdam Street	Leather	1900's
662.	J. Steinberg & Son	33 St. Francis Street	Fireproof doors	1940's to 1950's
663.	J.B. Grumen Co.	77 St. Francis Street	Pharmaceuticals - chemicals	1910's to 1950's
664.	J.B. Shohan Laboratories	78 Wheeler Point Road	Synthetic organic chemicals	1950's
665.	J.F. Coburn	Magazine & Frankfurt Streets	Leather - patent and enameled leather	1864 to 1890's
666.	J.H. Ladew Co.	Plank Road	Manufacturer of heavy leather (belting butts, belt leather, sole leather)	1909 to 1920's
667.	J.H. Reitzel & Co.	55 Rome Street	Firebrick and installation material and products	1950's
668.	J.P. Autowreckers	557 Wilson Avenue	Auto wrecking	Present
669.	J.P. Keegan & Son	183 Christie Street	Gray iron and semi-steel and bronze castings	1940's to 1950's
670.	J.R. Denman	71-75 Barbara Street	Ornamental and bent glass for offices, banks, churches, showcases, etc.	Established 1868

No.	Company	Address	Type of Business	Years in Operation
671	S. Henry Chemical Co. - North Coast	357 Wilson Avenue	Chemical company	Present
672	S. Mundy	22 Prospect Street	Boilers (steam), engines (hoisting)	1900's
673	Jackson Roofing Co.	110 Paris Street	Roofing	Present
674	Jake Kniefer	76 Ferry Street	Trunks - leather	1930's
675	James A. Coe Co.	72 Roanoke Ave.	Steel	1940's to 1950's
676	James Nuzzo	132 Paris Street	Leather (finishing)	1930's
677	Jan Packaging Inc.	335 Doremus Ave.	Packaging military and commercial supplies - paper	1960's to 1970's
678	Jarchem Industries, Inc.	40 Ball Street	Food and pharmaceutical preservatives - chemicals	1980's to 1990's
679	Jay Food Laboratories	9-11 Malvern Street	Phosphoric acid - chemicals	1940's to 1950's
680	Jay Syrup Co., Inc.	13-15 Malvern Street	Phosphoric acid - chemicals	1940's
681	Jean Griffoul Foundry	10-12 Mary St.	Foundry, bronze, brass, aluminum casting	1940's to 1960's
682	Jefferson Printing Company	97 Ferry Street	Printing	1910's
683	Jersey Machine Manufacturing Co.	8 Lister Avenue	Adjuration machinery for the chemical process industry	1950's to 1970's
684	Jersey Millwork Co.	38 Blanchard Street	Millworks	1990's
685	Joe's Auto Wreckers	38 Stockton Street	Auto salvage	Present
686	John Brown Engineers	35 Blanchard Street	Engineers	Present
687	John Camy	12 Delancy Street.	Casting - iron/steel	1920's to 1930's
688	John Ebersberger Inc.	13 Margarette St.	Cooperage	1930's to 1940's
689	John Engelhorn & Sons	17 Avenue L	Meat packing	1920's to 1960's
690	John F. Boyle	78 Paris St.	Leather (finishing)	1930's
691	John L. Armithage Co.	52 Dawson Street	Lacquers & thinners, paints, shellacs and varnishes	1870's to 1960's
692	John Maff Inc.	9-11 Delancy St.	Printing ink - chemicals	1920's to 1930's
693	John S. Geigers & Sons, Inc.	72 Roanoke Avenue	Truck, crane service	1960's to 1970's
694	Jones - Dapney Co.	Rutherford and Delancy Streets	Resin enamels, paints and varnishes	1940's to 1950's
695	Jordan Chemical Co., Inc.	60 Blanchard Street	Laundry chemicals	1950's to 1960's
696	Jos. Henseler Brewing Co.	73 Hamburg Place (Wilson Avenue)	Ale and porter - brewery	1890's to 1950's
697	Joseph & Joseph	150 Avenue L		Present
698	Joseph B. Epstein	72 Roanoke Avenue	Machinery	Present
699	Joseph Boyle & Co.	527 Avenue P	Contractors	1950's
700	Joseph Hollander Inc.	Wilson & Paris St.	Fur, skin, dressings dyeing	1920's to 1930's
701	JTS Auto Salvage	553 Avenue P	Auto salvage	Present
702	Kar King USA Inc.	555 Avenue P	Auto Wreckers	Present
703	Karl Oswald Jr. & Co.	318 Ferry Street	Bag, purse and satchel frames - metal working	1900's to 1910's
704	Karl Suchomel Co.	35-7 Ester Street	Sheet metal work	1930's to 1970's
705	Karla Looms	528 Ferry Street	Manufacture bedspreads and drapes - textiles	1990's
706	Kartow Towing and Storage	41 Mary Street	Towing - auto/truck service	Present
707	Kasen Industries	88 St. Francis Street	Pressure sensitive tape - chemicals	1970's
708	Kasen Products	Doremus Avenue	Lubricants	1920's to 1970's
709	Kastwell Foundry Co.	183-87 Christie	Castings (iron)	1930's to 1940's
710	Kauffman Engineering	604 Doremus Ave.	Engineering	1940's to 1950's
711	Kaufherr & Siegel	200-204 Magazine Street	Leather	1910's
712	Kaufman & Sons	387 Avenue P		1940's to 1950's
713	Keegan Technology & Testing	119-123 Paris Street		Present
714	Keith Industries	238 Delancy Street	Chemicals	1980's to 1990's

No.	Company	Address	Type of Business	Years in Operation
715.	Kelly & Co.	Delancy & Adams	Washing and recleaning rags, recycling	1930's
716.	Kelsey & Mueller, Inc.	40 Paris Street	Steam valves - metal work	1930's
717.	Kester Solder Division	88 Ferguson Street	Solder, fluxes - chemicals	1980's to 1990's
718.	Kevin's Used Auto Parts	555 Avenue P	Auto Wreckers	Present
719.	Keyman Co., Inc.	19 Hyatt Avenue		Present
720.	Kieley Mueller, Inc.	40 Paris Street	Pneumatic industrial controls - metal working	1930's
721.	Killey & Mueller	40 Paris St.	Engineering specialties	1930's
722.	Kil-Tome Chemical Co.	169 Malvern Street	Chemicals	1910's
723.	Kingsland & Co., Inc.	75 Manufacturers Place	Sheet metal working	1930's to 1960's
724.	Kirby & Kirby, Inc.	79 Malvern Street	National motor freight	1950's
725.	K-J Upholstery Co.	56 Ferry Street	Slip covers	1950's
726.	Klaus & Co	541 Ferry Street	Machinery - metal working	1930's to 1950's
727.	Kleanit Chemical Co.	191 Delancy St.	Washing fluids - chemicals	1930's to 1950's
728.	Koch Carbonic Corp.	433 Raymond Boulevard	Carbondioxide gas and dry ice - chemicals	1980's to 1990's
729.	Kohler Delicatessen Meats, Inc.	57 Napoleon Street	Hams and bologna products	1970's to present
730.	Kolker Chemical Works, Inc.	80 Lister Avenue	Chemical products	1950's to 1960's
731.	Konstan Plastic Company	33 St. Francis Street	Extrusion of thermo-plastics	1960's to 1990's
732.	Krispak, Inc.	125 Christie Street		Present
733.	Krouse-Hindes Lighting, Inc.	84 Foundry Street	Lighting	Present
734.	Krueger Brewing Company	113 Delancy Street	Brewery	1860's to 1970's
735.	Kuebeck & Kellover	Avenue L		1890's
736.	L&J Produce Inc.	21 Joseph Street		Present
737.	L. Cooper & Sons	152 Paris Avenue	Fur dressing	1920's to 1930's
738.	L. Reusche & Co.	2-6 Lister Avenue	Ceramic precious metal preparations, ceramic colors - paints	1930's to 1990's
739.	Lacey Used Autoparts	305 Wilson Avenue	Auto wrecking	Present
740.	Lacquer Specialties, Inc.	249 Avenue P	Lacquers, industrial finishes - paints	1930's to 1970's
741.	Lafayette Crane and Hoist Co.	800 Raymond Boulevard	Electric hand hoist, cranes, conveyers, lift trucks	1950's
742.	Laiblin Company	56 Ferry Street		1910's
743.	Land Mfg. Corp.	9 St. Francis Street	Raincoats and outwear garments	1970's to 1980's
744.	Landsberg, Inc.	66 Stockton Street	Calfskin, sheepskins	1980's to 1990's
745.	Lapin Products	164 Delancy St.	Sunglasses, toys - plastics	1940's to 1960's
746.	Larry's Tank Cleaning Services, Inc.	169 Blanchard Street	Tank cleaning	1990's
747.	Laurel Lamp Manufacturing Co., Inc.	Rome and Magazine Streets	Portable floor and table lamps, desk lamps, smoking stands and allied products	1950's to 1980's
748.	Leather & Patent Cloth Novelty	128-148 Paris Street	Leather tannery	1920's to 1930's
749.	Lecourteney Company	Ferry and Main Streets	Centrifugal pumps, machinery	1970's
750.	Ledkuecher & Co.	28 Prospect Street	Silver smithing - non-ferrous	1900's
751.	Legal Consolidating and Warehousing Service Corporation	601 Doremus Avenue	Warehousing	Present
752.	Lehigh & Wilkesbarre Coal Company	96 Ferry Street	Coal/petroleum	1890's to 1900's
753.	Lehigh Valley & Central Railroad		Railroad	1860's to 1950's
754.	Leiman Brothers	160 Christie Street	Steam blowers, dental specialties, air pumps, sand blasts, general machinery, dust collecting systems, blower systems, exhaust systems - metal work	1910's to 1960's

No.	Company	Address	Type of Business	Years in Operation
755.	Lewis Reback Business Factory	132 Ferry Street		1910's
756.	Lexington Electrical Products Co., Inc.	12 Chapel Street	Pneumatic industrial controls, switch boards and panels	1930's to 1970's
757.	Liberty Ornamental Iron Works	148 Fleming Avenue	Iron	Present
758.	Liberty Union Charcoal Company	Manufacturers Place	Coal/petroleum	1910's to 1920's
759.	Lily Truck Leasing Corp.	474 Wilson Avenue	Freight	Present
760.	Lincoln Farm Products Co.	305 Doremus Ave.	Flour and feed, meat scraps, fat rendering	1930's to 1970's
761.	Linde Co. (Div. of Union Carbide)	351 Doremus Avenue	Metal working machinery	1960's
762.	Linde Gases of the Mid-Atlantic, Inc.	360 Avenue P	Gases - chemicals	1990's
763.	Linde-Griffith Construction Co.	Wilson Avenue	General contractors	1950's
764.	Linden Provisions Co., Inc.	146-154 Christie Street	Prepared meat products	1980's to 1990's
765.	Lineboard Corp. of America	262-296 Wilson Avenue	Corrugated products - paper	1970's
766.	Link Column Co., Inc.	Ferry & Foundry Streets	Sash weights	1930's
767.	Lion Extruding Corp.	106 Rutherford St.	Grinding of plastics, sale of acrylic, purging, compound and acetate	1970's to Present
768.	Liotta Trucking and Warehousing	54 Freeman Street	Warehousing/trucking	Present
769.	Liquid Bread Co.	132 Paris Street	Bakery	1920's to 1930's
770.	Lister Agricultural Chemical Works	Lister Avenue	Asphalt, bone black, bone fertilizers, fertilizers, glue, lubricating greases - chemicals	1850's to 1920's
771.	Litecraft Mfg. Company	135 Rome Street	Lighting fixtures	1940's to 1950's
772.	Little Gallery	95 Rome Street	Wood products	1950's to 1960's
773.	LNS Manufacturing Co.	28 Darcy Street	Machine shop	1980's to 1990's
774.	Long Island Bleach Co.	300 Doremus Ave.	Bleaches, washing fluids - chemicals	1930's
775.	Lou Bole Carpet Carriers	445 Wilson Avenue	Carpet - textiles	1990's
776.	Louie Dreyfuss Engery	678 Doremus Avenue		1990's
777.	Louis B. Weintraub & Sons	One St. Francis Street	Hatters fur, fur skin dressing and dyeing, waste celluloid, cotton, silk and wool	1940's
778.	Louis Sacks Inc.	357-91 Wilson Ave.	Iron casting	1890's to 1930's
779.	Lowe Brothers Co.	Lister Avenue		Present
780.	LS Transit Systems	601 Doremus Avenue	Freight	Present
781.	Luggage Gallery	133 Kossuth Street	Luggage and business cases - leather	1970's to 1980's
782.	Luminall Paint Inc.	411 Wilson Ave.	Paints	1960's to 1970's
783.	Luso-Americano Co., Inc.	88 Ferry Street	Newspaper publishing and printing	1940's to 1990's
784.	Lyon Brewery Company	28 Chapel Street	Brewery	1900's to 1910's
785.	M&M Transportation Co.	503 Wilson Avenue	National coordinated motor freight	1950's
786.	M&M Trucking Co.	St. Charles & Kossuth Streets	Freight	1910's to 1920's
787	M. Chasen & Sons, Inc.	20 Esther Street	Cotton felt stuffing material - textile	1960's to Present
788.	M.B. Garrigan Co.	99 Gotthart Street	Plumbing and fixture fittings - metal work	1970's to 1980's
789.	Maas & Waldstein Co.	Riverside Avenue	Cellulose solutions, chemicals, refined oil, soluble cotton, varnishes, enamel	1910's to 1950's
790.	Mac Truck Repairs	295 Wilson Avenue	Truck service	Present
791.	Machinecraft Corp.	800 Wilson Ave.	Used machinery	1960's to 1980's
792.	Mag Machine Co.	357 Wilson Ave.	Machine shop	1980's to 1990's
793.	Magga Products, Inc.	18 Delancy Street		1990's
794.	Mahon's Express	95 Jabez Street	Expressing - freight	1950's

No.	Company	Address	Type of Business	Years in Operation
795.	Major Scrap Rubber Co.	545 Avenue P	Processor of scrap rubber - recycling	1960's to 1970's
796.	Malcolm Foundry Co.	69 Polk Street	Iron and steel foundry	Present
797.	Malvern Metals Co., Inc.	204 Malvern Street	Junk dealers - scrap metal	1950's
798.	Manhattan Buckle Co.	198 Magazine Street	Buckle and Buckle tongues, hinges, (belt, suspenders, shoe and garder) - metal work	1900's to 1910's
799.	Mapes Formula & Peruvian Guano Co.	Blanchard and Ferry Streets	Fertilizers - chemicals	1920's to 1930's
800.	Marden Orth & Hastings Co.	Doremus Avenue	Analine dyes - chemicals	1910's to 1930's
801.	Marhoffer Sheet Metal Works	140 Magazine Street	Copper smithing - metal work	1940's to 1950's
802.	Mario's Express Service Inc.	474 Wilson Avenue	Freight	Present
803.	Marne Tool & Dye Co.		Deep drawn metal - tool & die	1960's to 1970's
804.	Marsh Metal Works, Inc.	16 Herbert Street	Metal work	Present
805.	Martinez Iron Works	194 Avenue L	Iron and steel	Present
806.	Mason Metal Works, Inc.	56-62 St. Francis Street	Fabricated Metal casings for electric motors	1970's to 1980's
807.	Material Wiper Supply Co., Inc.	14 Chapel Street		Present
808.	Maurer Mfg. Co.	Blanchard Street	Flour and feed	1940's to 1950's
809.	May Chemical Works	204 Niagara Street	Intermediates - coal tar - chemicals	1920's to 1930's
810.	Mayfair Packing Co., Inc.	129 Christie Street	Folding boxes - paper	1970's to 1990's
811.	McGee Walsh	Wilson Avenue	Steel bars	1920's to 1930's
812.	McKesson Environmental Systems Co.	600 Doremus Avenue		Present
813.	McMullin Co.	Doremus Avenue		1910's
814.	Meadlo Duff Paint Co.	157-161 Delancy	Paint, varnishes	1940's to 1950's
815.	Meadow Paper Boxboard Company	Blanchard Street	Business paper	1900's to 1910's
816.	Meadows Industries, Inc.	28 Paris Street	Plastic coatings	1980's to 1990's
817.	Melrose Chemical Co.	15-19 Margaretta Street	Benzoate of soda, ophthalmic and anhydride	1910's
818.	Mercer Plastics Co.	1 Jabez Street	Vinyl flooring accessories - plastics	1970's to 1980's
819.	Mercury Records Corp.	223 Raymond Boulevard	Phonograph records - plastics	1950's
820.	Merit Leather Strap Co.	133-55 Kosoff Street	Briefcases and portfolios, leather handles, straps and corners - leather	1930's to 1970's
821.	Messinger Trucking & Warehousing Corp.	84 Euclid Avenue	Freight	Present
822.	Metal Parts Processing Co. Inc.	165 Delancy St.	Tumbling equipment - metal working	1950's to present
823.	Metal Specialty Corp.	300 Wilson Avenue	Metal work	1990's to Present
824.	Metaloy, Inc.	33 Avenue P	Zinc, dye cast, non-ferrous	1950's
825.	Metro Color Works	132 Paris St.	Colors & Dyes - chemicals	1930's
826.	Metropolitan Iron & Steel co.	26 St. Charles Street	Iron and steel	Present
827.	Mid -Atlantic Vegetable Shortenings Inc.	193 Christie Street	Food	Present
828.	Mid-Atlantic Packaging	33 Rutherford Street	Paper	Present
829.	Middle Specialty Corp.	300 Wilson Avenue	Special Dyes and Tools. Dye sets, jigs, fixtures and stampings - metal working	1980's to 1990's
830.	Midland Metal Manufacturing Co.	74 Chapel Street	Roof flanges - metal work	1950's to 1960's
831.	Milton Dreuth	74 Avenue L	Welding - metal work	1950's
832.	Mincing Trading Corp.	528 Ferry Street		Present
833.	Mincing Trading Corp.	528 Ferry Street		Present
834.	Miniature Wire Forms Inc.	10 Delancy St.	Wire forms - metal work	1960's to 1980's
835.	Minnesota Mining & Mfg. Co.	500 Doremus Ave.	Chemicals	1960's to 1980's
836.	Mobay Chemical Co.	414 Avenue P.	Chemicals	Present
837.	Modutech Housing Ind. Corp.	357 Wilson Avenue	Modular components for	1970's

No.	Company	Address	Type of Business	Years in Operation
			building industry - wood	
838.	Mogen David Kosher Foods Products Inc.	280 Wilson Avenue	Food	Present
839.	Moldcast Mfg. Co.	164 Delancy St.	Molders, manufacturer of extruded and cast aluminum lighting products - metal works	1960's to 1970's
840.	Monahan McCann Stone Co.	100 Roanoke Ave.	Marble, cut stone, stone products	1930's to 1970's
841.	Monahan Stone Company	Plum Point Lane	Stone cutting	1890's to 1930's
842.	Monoplant Chemical Corp.	106 Rutherford Street	Chemicals	Present
843.	Monoplast Chemical Corp.	33 Avenue P	Acrylics	1950's to Present
844.	Montrose Chemical Co.	100 Lister Avenue	Chemicals	1930's to 1970's
845.	Mooney's Transportation Lines	61 Rome Street	Trucking	1950's
846.	Morrison Flockhart Foundry	Rome & St. Charles Streets	Foundry - iron & steel	1910's to 1930's
847.	Moru Candy Co.	194 Malvern Street	Confectionery	1940's to 1960's
848.	Mother's Food Products, Inc.	50 Wheeler Point Road	Food products	1950's to Present
849.	Moyer Plating	175 Christie Street	Metal plating	1960's to present
850.	Mucon Corporation	9 St. Francis Street	Sub-miniature ceramic capacitors	1960's
851.	Muller Sheet Metal Works	347 Ferry Street	Sheet metal works	1930's
852.	Munne & Steele, Inc.	130 Lister Avenue	Rock wool - chemicals	1930's to 1940's
853.	Murer Steel Barrel Co.	105 Avenue L	Steel barrels & drums	1930's
854.	Mutual Briefcase Co.	133 Kosoff Avenue	Briefcases and portfolios - leather	1930's to 1970'ss
855.	My Mother's Bakery	138 Ferry Street	Bakery products	1970's
856.	N. Sobic Co.	231 Ferry Street	Models, patterns (except paper) - metal working	1960's
857.	N.F.O. Technologies, Inc.	298 Delancy Street		Present
858.	N.J. Del-Pak Corp.	149 Wilson Ave.	Meat food	1960's to 1970's
859.	N.J. Fur Dressing	152 Paris St.	Dressing rabbit fur	1950's
860.	N.J. Kneuer	185 Ferry Street	Carriages, wagons and trucks	1900's
861.	N.J. Packing Co.	149-153 Wilson Ave.	Fresh Italian sausage, bologna, frankfurters and other meats	1940's to 1950's
862.	N.J. Scratch Food & Oyster Co.	10 Mary Street	Poultry	1920's to 1930's
863.	N.R. & H.A	Avenue P		Present
864.	N.Y. & N.J. Lubricant Co.	Foot of Delancy Street	non-fluid oils, oils and greases, lubricants	1920's to 1960's
865.	Naparano Iron & Metal Co.	Hawkins Street	Locomotive parts, freight cars, passenger cars and component parts, diesel engines, generators - scrap steel	1990's
866.	Nason Metal Works, Inc.	60 St. Francis Street	Fabricated and welded metal parts	1980's
867.	National Biscuit Co.	427 Ferry Street	Bakery products	1930's to 1950's
868.	National Car Rental Systems	400 Delancy Street	Car Rental	Present
869.	National Chemical Mfg. Co.	411 Wilson Avenue	Casin, synthetic rubber, resin emulsion paint	1950's to 1960's
870.	National Distillers and Chemical Corp.	300 Doremus Avenue	Chemical	1990's
871.	National Fuel Oil, Inc.	525 Raymond Boulevard	Petroleum	Present
872.	National Leather Products Inc.	98 Avenue L	Leather (finishing)	1930's to 1950's
873.	National Machinery Exchange Inc.	72 Roanoke Avenue	Machinery	Present
874	National Spring Co.	246 Raymond Boulevard	Auto, truck, trailer, springs - metal work	1970's to 1990's
875.	National Stamping Co.	187 Christie Street	Metal stamping	Present
876	National Sulfur Co.	Foot of Brill Street	Sulfur - chemicals	1910's
877.	National Tank Cleaning Company	525 Raymond Boulevard	Tank cleaning	1990's

No	Company	Address	Type of Business	Years in Operation
[illegible]	National Trucking Co.	72 Roanoke Ave.	National motor freight	1950's
[illegible]	Natural Flavors	268 Doremus Avenue	Chemicals	Present
880	Navin Linoleum Company	300 Hamburg Place	Textiles	1900's
881	New Brook Meat Provision Inc.	146 Christie Street	Meat	Present
882	New Brunswick Chemical Co.	346 Riverside Avenue	Textile chemicals	1940's
883	New Crus-Toast Corp.	82-84 Jabez Street	Bread crumbs - food	1980's
884	New Jersey Bell Telephone	Doremus Avenue	Manhole contamination	Present
885	New Jersey Candy Co.	39 Ferry Street	Confectionery - food	1940's
886	New Jersey Central Aluminum Foundry	65-67 Avenue L	Aluminum castings - non-ferrous	1950's to 1960's
887	New Jersey Dell-Pak Corp.	149 Wilson Avenue	Sausages - food	1950's to 1960's
888	New Jersey Department of Transportation	Delancy Street Magazine Street St. Charles Street Roanoke Avenue Foundry Street	Historic landfill	Present
889	New Jersey Fur Dressing Co., Inc.	152 Paris Street	Dressing Rabbit fur - leather	1950's
890	New Jersey Transit Bus Operations	601 Doremus Avenue	Bus service/repair	Present
89[illegible]	New Jersey Turnpike Authority	140-166 Raymond Boulevard 357-405 Avenue P 339-355 Avenue P	Historic landfill	Present
89[illegible]	New Jersey Zinc Company	Chapel Street	Paints - zinc oxide	1850's to 1940's
893	New Process Metals, Inc.	45-65 Manufacturers Place	Minerals earth's ground treated non-ferrous (Parent Co. - Ronson Corp.)	1960's
894	New Star Laundry	134 Delancy St.	Laundry	1940's to 1950's
895	New York Bronze Powder	481 Doremus Ave.	Brush and Spray Paints	1990's
896	New York Folding Box Co.	129 Christie Street	Paper Folding boxes	1970's to Present
897	New York Plow Company	Foot of River Street	Iron & steel foundry - manufacturer of plows and other farm instruments	1870's to early 1900's
898	Newark Baseball Park	Foot of Hamburg Place Road		1900's to 1940's
899	Newark Bay Co-Generation Plant	414 -462 Avenue P	Power plant	Present
900	Newark Bleaching Company	Avenue L & Mary Street	Chemicals	1890's to 1900's
901	Newark Boxboard Co	Blanchard Street	Paper box, box, straw, news, chip, paste and tar	1910 to Present
902	Newark Charcoal Company	62 Chapel Street	Charcoal	1900's to 1930's
903	Newark Chemical Company	130 Malvern Street	Chemicals	1890's
904	Newark Cleaning & Dying Works	26 Brown Street	Chemicals	1910's to 1920's
905	Newark Coal Gas (PSE&G)	155 Raymond Boulevard	Gas	Present
906	Newark Compressed Steel Corporation	40 Manufacturers Place	Scrap iron and steel	1940's to 1950's
907	Newark Drive-In	104-108 Foundry Street	Movie theater	1950's to 1960's
908	Newark Engineering Traffic Signal and Maintenance	156 Wilson Avenue	Engineer	Present
909	Newark Equipment Sales Corp.	191 Avenue P.		Present
910	Newark Fireproof Sash & Door	138 Wilson Avenue	Metal containers - metal working	1930's to
911	Newark Group Inc.	57 Freeman Street	Recycled paperboard products	1990's to Present
912	Newark Industrial Spraying Inc.	12-20 Amsterdam St.	Metal paint finishing	1970's to 1990's
913	Newark Industrial Spring		Metal work	1980's to Present
914	Newark Machine Co.	130 Ferry Street	Machine shop	1980's to 1990's
915	Newark Malleable Iron Works	357 Wilson Ave.	Iron casting	1940's to 1950's
916	Newark Motor and Export Co.	191 Avenue P..	Freight	Present
917	Newark Paraffin Paper Co.	70 Blanchard Street	Waxed papers, lamented foils - paper	1960's to 1970's
918	Newark Pastry Co.	473-483 Raymond Boulevard	Cakes, pies, danish, pastries	1950's

No.	Company	Address	Type of Business	Years in Operation
919.	Newark Pattern Works	26-32 Avenue L	Patterns & Models - metal	1930's to 1950's
920.	Newark Police Academy	Avenue P	Police	Present
921.	Newark Recycling & Composting Company	360 Avenue P	Recycling	Present
922.	Newark Redevelopment & Housing Authority	549 Avenue P	Landfill	Present
923.	Newark Sign Company	334-336 Ferry Street	Metal work	1900's to 1910's
924.	Newark Sinker Co., Inc.	12-14 Napoleon Street	Lead sinkers and castings - lures non-ferrous	1970's
925.	Newark Special Machinery, Inc.	135 Komorn Street	Photo chemicals, microfilm chemicals, x-ray photo finishing, graphic arts chemicals	1990's
926.	Newark Special Tool, Co.	99-109 St. Francis Street	Special machinery	1930's to 1980's
927.	Newark Stair Rod Manufacturing Co.	72 & 74 Prospect Place	Novelties (metal), novelties (wood)	1900's
928.	Newark Tank Wash, Inc.	355 Raymond Boulevard	Chemical wash	Present
929.	Newark Tanning Extract Corp.	565 Ferry Street	Tanning Extracts - chemicals	1940's
930.	Newark Tube & Metalworks	560 Ferry Street	Steel tubing, umbrella rods, sheet metal goods	1900's to 1920's
931.	Newark Varnish Works	97-111 Delancy Street	Varnish & Coatings, Japans	1900's to 1930's
932.	Newburgh Transfer, Inc.	79 Malvern Street	Trucking	1950's
933.	Newman Electric Motors, Inc.	357 Wilson Avenue	Electric motors	1960's
934.	Nickelsburg Brothers Co.	Meadow Street	Leathered cloth and paper	1910's
935.	Nimco Bus Division	354 Doremus Avenue	Scrapyard	Present
936.	Nimco Shredding Co.	254 Doremus Avenue	Metal Scrap	Present
937.	NL Chemicals, Inc.	400 Doremus Avenue	Refined lindseed and soy bean resins and oils - chemicals	1980's to 1990's
938.	Non Fluid Oil Corp.	298 Delancy St.	Industrial lubricants	1960's to 1990's
939.	Norman Hertz	9 St. Francis Street	Leather	1950's
940.	Norman Process of New Jersey, Inc.	170-74 Malvern Street	Commercial Printing	1970's
941.	Norpak Corp.	70 Blanchard Street	Waxed paper, plain and printed laminated foils, barrier aerials - paper	1970's to 1990's
942.	North Coast Warehousing and Transportation Inc.	457 Wilson Avenue	Warehouse	Present
943.	Northern Feather, Inc.	39 Backus Street	Processing feathers, bed and sofa pillows	1980's
944.	Novelty Tin Smith Shop	44 Ferry Street	Sheet metal work	1930's to 1950's
945.	No-Worry Chemical Co.	41-3 Manufacturers Place	Washing Fluids - chemicals	1930's to 1950's
946.	Nuco Leather Finishing Co.	138-40 Paris Street	Leather finishing	1930's
947.	Nutley Hat Mfg. Co.	338 Wilson Avenue	Hats	1950's
948.	O'Brien Newark Cogen, Inc.	35 Blanchard Street	Recyling/reuse	Present
949.	Oak Island Solid Waste Landfill	Delancy Street	Landfill	1960's to Present
950.	Oak Point Dairies of New Jersey	128 Rome Street	Ice cream, ices	1960's to 1970's
951.	Occidental Chemical Corp.	461 Avenue P	Chemicals	Present
952.	Ocean Fresh Seafood Company	79 Joseph Street	Seafood	Present
953.	Oceano Products Co.	125 Chapel Street	Pharmaceuticals - chemicals	1920's to 1930's
954.	Ogden Bodies Works Co.	1438-40 Ferry Avenue	Automobile bodies - metal scraps	1930's
955.	Ohmlac Paint	Foundry St.	Roofing coating - paint	1940's to 1950's
956.	Oliver Truck Export	563 Wilson Avenue	Truck Sales	Present
957.	Olson Preservative & Paints	9-11 Delancy	Copper paints & preservatives, paints, varnishes, stains, japans, dryers, enamels	1930's to 1950's
958.	Olympia Tool & Machine Co.	119 Delancy St.	Plastic extruding machines	1960's to 1970's
959.	Omega Alloy Fitting Co.	99-109 Gotthart Street	Alloy pipe nipples -metal work	1970's to 1990's

No.	Company	Address	Type of Business	Years in Operation
960.	Ontell Brush Co.	77 St. Francis Street	Paint brushes	1960's to 1970's
961.	Onyx Laboratories, Inc.	193-203 Christie Street	Paints, varnishes, stains, japans, dyers and enamels	1930's
962.	Onyx Oils and Resins, Inc.	193 Christie Street	Resins or paint trade	1950's to 1980's
963.	Optical Industries	11 Delancy St.	Optical lenses - glass	1970's to 1990's
964.	Ordowler Packing Co.	50 Avenue L		Present
965.	Orlando Son Auto & Truck Parts	73 Joseph Street	Auto parts	Present
966.	Orlex Chemical Corp.	52 Amsterdam Street	Chemicals	Present
967.	Ortex Products, Inc.	Blanchard Street	Industrial chemicals	1960's to 1970's
968.	Ostolski Labs Inc.	357 Wilson Avenue		Present
969.	Ottilio & Sons Landfill	18-60 Blanchard Street	Landfill	1970's to Present
970.	Otto Koenig & Son	151 Wilson Ave.	Meat packing	1920's to 1970's
971.	Otto V. May, Inc.	52 Amsterdam Ave.	Dyes, toners - chemicals	1930's to 1980's
972.	Ottos Truck Body Works Corp.	26-32 Avenue L	Truck bodies - metal scrap	1970's to Present
973.	Outdoor Clothing Co., Inc.	9 St. Francis Street	Outerwear, sheeplined coats and leather jackets - clothing	1940's to 1970's
974.	Overseas Inc.	58 Cornelia Street	Freight	Present
975.	Owens New World Trucking Inc.	451 Doremus Avenue	Freight	Present
976.	P & K Pole Products	84 Foundry St.	Industrial lighting and fixtures	1990's
977.	P&N Trucking	481 Doremus Avenue	Freight	Present
978.	P. Scuorozo	15 Amsterdam	Stack barrels - metal work	1950's
979.	P.D. Casting & Finishing Corp.	80 Jabez Street	Castings	1960's
980.	Packaging Products & Design Corp.	574 Ferry Street	Polyethylene extruding - plastic	1970's
981.	Palmer Industries	99 Chapel Street		Present
982.	Palumbo Brothers, Inc.	347 Ferry Street	Electroplating - metal work	1950's
983.	Paper Board Products	357 Wilson Ave.	Converted paper products	1970's to 1990's
984.	Paper Converting Co.	357 Wilson Ave.	Shredded wax paper, cellophane	1960's to 1970's
985.	Parry Bimble	11 Delancy St.	Harness accessories, Metal works	1900's to 1930's
986.	Passaic Chemical Works	Foot of River Street	Sulfuric acid - chemicals	1850's to 1910's
987.	Passaic Valley Sewerage Commissioners	600 Wilson Avenue	Sewage Treatment Plant	1900's to Present
988.	Pennsylvania Railroad Company	Former Newark Salt Marsh	Railroad	1850's to 1950's
989.	Peoples Express Co.	497 Raymond Boulevard	Trucking	1950's
990.	Pereira Iron Works	121 Delancy St.	Iron works	1980's to 1990's
991.	Pereira Repair Corp.	85 Doremus Avenue		Present
992.	Peridot Chemicals	330 Doremus Avenue	Aluminum Sulfate, Sulfuric Acid and Sufar Dioxide - chemicals	1990's to Present
993.	Perk Service Chemical Co.	338 Wilson Avenue	Chlorinated solvents, waste solvents, disposal	1960's
994.	Peter F. Mallon, Inc.	528 Ferry Street	Printers and bookbinders	1960's to 1970's
995.	Peter Pan Industries	145 Korman Street	Children's records - plastic	1970's to 1990's
996.	Peters Transportation Co.	91 Blanchard Street	National Motor freight	1950's
997.	Petite Purses, Inc.	33 Avenue L	Purses - leather	1950's
998.	Petroleum Products, Inc.		Petroleum	1950's
999.	Petzold Fur Dyeing Corp. Limited	9 St. Francis Street	Fur skin dressing and dyeing	1940's
1000.	Pfaff & Kendall	84 Foundry St.	All aluminum lighting brackets, flag poles, concrete filled columns non-ferrous	1910's to 1980's
1001.	Pfister Chemical	Avenue P	Chemicals	Present
1002.	Pierini Tanning & Dyeing Corp.	28 Paris St.	Fur goods	1960's to 1970's
1003.	Pilar River Plate Corp.	145 Chapel Street	Tanning supplies - chemicals	Present
1004.	Pittas Bakery	184-86 Ferry Street	Breads and cakes	1970's to 1990's

No.	Company	Address	Type of Business	Years in Operation
1005.	Pitt-Consol Chemical Co.	191 Doremus Ave.	Rubber chemicals	1960's to 1980's
1006.	Plastic Glass Co.	33 Avenue P	Acrylic sheeting, methyl, methacralate - plastic	1950's
1007.	Plasti-Pulp Permeation Co.	120 Lister Avenue	Molded plastics	1940's
1008.	Plating City Corp.	347 Ferry Street	Electroplating of barrels	1980's
1009.	Plibrico Sales & Service	17 Herbert St.	Acid brick work	1970's to 1980's
1010.	Polarome Manufacturing Co.	361 South Street	Plastics	Present
1011.	Polaski Autobody	189 Delancy Street	Auto Repair	Present
1012.	Polychrome Chemicals Corp.	46 Albert Avenue	Thermoset plastics and resins	1980's
1013.	Polymer Extruded Products		Plastics	1990's
1014.	Popio Serratellim & Sons	9-11 Rome Street	Hats	1930's to 1950's
1015.	Port Realty & Warehousing Corp.	76 Roanoke Avenue	Heavy cranes, storage space	1950's
1016.	Porta Can Corp.	83-85 Malvern Street	Metal stamping	1970's
1017.	Power Oil Corp.	15 Stockton Street	Oil	Present
1018.	PPD Corporation	574 Ferry Street	Polyethylene extrusions - plastic	1970's to 1980's
1019.	PPI Entertainment Group	88 St. Frances Street		1990's
1020.	PPI Industries	88 St. Frances Street		Present
1021.	Prefix Products Corp.	53 Rome Street		1910's to 1920's
1022.	Premier Tool & Mfg. Co. Inc.	28 Margarette St.	Tools & dyes	1950's
1023.	Prentiss, Drug & Chemicals	338 Wilson Ave.	Insecticides, fertilizers - chemicals	1970's to 1980's
1024.	Prest-O-Lite	351 Doremus Ave.	Acetylene - chemicals	1920's to 1940's
1025.	Printers Services	26 Blanchard Street	Printing	Present
1026.	Prismatic Development Corp.	601 Doremus Avenue		Present
1027.	Products Co.	25 Amsterdam Ave.	Extrusions of solder	1960's to 1970's
1028.	Professional Mfg. Co.	400 Delancy Street	Metal office furniture	1960's
1029.	Progressive Bindery Corp.	357 Wilson Avenue	Bookbinder	1970's
1030.	Propane Power Corp.	873 Delancy Street		Present
1031.	Pro-Screen Printing	283 Rome Street	Printing	Present
1032.	Prospect Steel Drum Co.	346 Riverside Avenue	Steel drums and barrels	1940's
1033.	Public Service Coordinated Transport	703 Ferry Street	Cars, trolley and bus building and repair	1910's to Present
1034.	Purax Chemical Products Co.	268 Doremus Avenue	Chemicals (cleaning compounds, pharmaceuticals, toilet preparations)	1940's
1035.	PVSC Sanitary Landfill	Wilson Avenue	Landfill	Present
1036.	Quaker Soap Co.			Present
1037.	Quaker Waxed Products Corp.	70 Blanchard Street	Waxed papers, interfold, flat sheets, rolls	1970's to 1980's
1038.	Quala Systems	80 Doremus Avenue	Chemicals	Present
1039.	Quantum Chemical Co.	300 Doremus Ave.	Ethyl Alcohol. Ether. Vinyl, Acetate, Polyethylene and solvents - chemicals	1990's to Present
1040.	R&C Harness Trimming Co.	56 Ferry Street	Metal work	1900's to 1910's
1041.	R&T Plastics Fabricating Co., Inc.	106 Rutherford Street	Umbrella handles - plastic	1980's
1042.	R&V Miller, Inc.	574 Ferry Street	Graders and packers of woolen clips, rags and sweater waste - recycling	1940's to 1950's
1043.	R. Neuman & Hardware Co.	9 St. Francis Street	Hardware	1900's
1044.	R. Neumann Hardware Co.	9-17 St. Francis Street	Traveling bags, satchels and pocketbook frames - metal works	1900's to 1910's
1045.	R.Forman & Co.	9 St. Francis Street	Leather	1910's
1046.	R.W. Smelting & Refining	35 Avenue P	Refining & smelting - iron	1940's to 1950's

No.	Company	Address	Type of Business	Years in Operation
1047.	Radel & Mentz	Hamburg Place Road	Leather	1900's
1048	Radel Leather Mfg. Co.	445 Wilson Avenue	Leather tannery, upholstery leather	1910's to Present
1049	Randt Plastics Fabricating	106 Rutherford St.	Umbrella handles - plastics	1970's to 1980's
1050	Rauchbach Goldsmith Co.	83 St. Francis Street	Trunks - leather	1910's
1051.	Rauchbach Trunk and Luggage Co.	9 St. Francis Street	Trunk and luggage -leather	1950's
1052	Rauchbach-Goldsmith Co.	79 St. Francis Street	Trunks - leather	1910's
1053	Ray Leather Co.	9 Francis Street	Leather finishing	1930's to 1950's
1054	Raymond Enterprises	943-997 Raymond Boulevard		Present
1055	Rebuth Steel Corp	300 Wilson Avenue	Carbon flat rolled steel	1970's to Present
1056	Rectifier Systems Corp.	338 Ferry Street	Plating, power supplies and rectifiers	1980's to 1990's
1057.	Recycled Fibers	60 Lockwood Street		Present
1058	Red Hand Compositions Co., Inc.	26 Blanchard Street	Marine paints	1950's to 1970's
1059	Red Star Express Lines of Auburn	400 Delancy Street	Trucking	Present
1060	Reddaway Mfg.	32 Euclid Avenue	Mfg. Asbestos brake lining and belting	1960's to 1990's
1061	Redi Strip of Newark	46 Paris Street	Chemicals	Present
1062	Regent Records	56 Ferry Street	Photograph records - plastics	1960's to 1970's
1063	Regent Smelting & Refining	387 Avenue P	Smelting and refining of lead scrap non-ferrous	1950's
1064	Regulatory Compliance Services	481 Doremus Avenue	Environmental compliance	Present
1065	Reichold Chemicals	46 Albert Avenue	Thermosetting and thermoplastic resins - chemicals	1990's to present
1066	Reichold Chemicals	400 Doremus Ave.	Refined linseed oils - chemicals	1990's to Present
1067	Reilly Tar & Chemical Corp.	191 Doremus Ave.	Tar products/acids, naphthalene, roofing material., roofing felt - chemicals	1930's to 1970's
1068.	Reiner & Campbell Co., Inc.	19 Euclid Avenue	Soldering outfits, quick set dividers, duplex soldering touches, quip punchers and drive cleat notches - metal work	1950's
1069	Reliable Fur Dressing & Dying Co.	338 Wilson Avenue	Fur dressing and dyeing	1950's
1070	Reliable Leather Pigment Finish Co., Inc.	142 Rome Street	Leather finishes in regular pigment and plastic	1940's to 1970's
1071	Reliable Mfg. Co.			1960's
1072	Reliable Pigment Finish Co.	133 Kossuth Avenue	Leather finishes and dressings	1930's
1073	Reliable Steel Drum Co.	Avenue P & Plum Point Lane	Steel drums	1940's to 1950's
1074	Reliance Smelting		Iron and steel	1960's to 1970's
1075	Renee Ice Cream	121 Kosoff Avenue	Ice cream	1940's to 1950's
1076	Resistol Hats	53 Rome Street	Leather	Present
1077	Retseil Corp.	84 Lister Street		1990's
1078	Reusche & Co. of TWS, Inc.	2 Lister Avenue	Chemicals	Present
1079	Revere Smelting & Refining Corp.	383 Avenue P	Smelting/refining - iron/steel	1960's to 1970's
1080.	Rex Imperial Leather Company	28 Chapel Street	Leather	1900's to 1910's
1081	Rex Vinegar Co.	830 Raymond Boulevard	Vinegar - food	1970's to 1990's
1082	Reyom Corp.	173 Christie Street	Plating and finishing of metals	1980's to Present
1083	RFE Industries, Inc.	185 Foundry Street		1990's
1084.	RFE Industries, Inc.	185 Foundry Street	Chemicals	Present
1085.	Rheem Mfg. Co.	105 Avenue L	Fabricated metal, wood barges	1930's
1086	Rhett Trensport	391 Ferry Street	Freight	Present
1087.	Rhone poulenc, Inc.	515 Derumus Avenue	Chemical warehouse	Present

No.	Company	Address	Type of Business	Years in Operation
1088	Rich Ladder Co.	481 Doremus Avenue	Manufactures step ladders, tressels, stools, extensions - metal work	1990's
1089	Rico Meat Packing, Inc.	79 Euclid Street	Ham	1980's to 1990's
1090	Right-Of-Way	57 St. Charles Street	Freight	Present
1091	Ritchie Fabrics Co.	445 Wilson Avenue	Box toe materials - textile	1930's
1092	River Plate Corp.	573 Ferry Street	Tanning extracts, pharmaceuticals, chemicals	1950's
1093	River Smelting & Refining	387 Avenue P	Smelting & refining	1940's to 1950's
1094	Riverside Dyeing & Finishing	96 Roanoke Avenue	Dyeing - chemicals	1940's to 1950's
1095	Riverside Manufacturing Co.	162-166 Riverside Avenue	Galvanized steel (portable buildings) - metal fabricators	1910's
1096	Roadco, Inc..	335 Delancy Street	Trucking	Present
1097	Roanoke Motor & Yacht Club	800 Doremus Avenue	Yacht club	Present
1098	Robert Bossert & Co., Inc.	10 Lister Avenue	Asphalt materials - chemicals	1960's to 1980's
1099	Rockrette Recyling Corp.	928-964 Doremus Avenue	Steel or star heel plate	1990's to Present
1100	Rokeach & Sons	80 Avenue K	Food products	1990's to Present
1101	Roller-Smith Inc. (Subsidiary of Federal Pacific Electric)	50 Avenue L	Electrical indicating instruments	1960's to 1970's
1102	Rollins Leasing Corp.	299 Roanoke Avenue	Truck leasing	Present
1103	Rolonis Truck Rental	299 Roanoke Avenue	Truck Leasing	Present
1104	Rona Laboratories	352 Doremus Ave.	Pearl essence - chemicals	1950's
1105	Rondack Woodcraft, Inc.	55 St. Francis Street	Furniture frames, upholstered furniture - wood	1950's to 1970's
1106	Ronson Metals Corp.	55 Manufacturers Place	Flints, rare earth metals and alloys - non-ferrous	1960's to Present
1107	Rose Color Inc.	170 Blanchard Street	Chemicals	Present
1108	Rossendale Ruboil Co.	32 Euclid Avenue	Belting (canvas, cotton and hair), textiles	1930's to 1950's
1109	Rossendale-Reddaway Belting & Hose Co	Euclid Avenue	Firehose (linen), belting (camel hair, content stitched) - textile	1900's to 1910's
1110	Rossenfeld & Broder	278 Ferry Street		1900's
1111	Rossville Commercial Alcohol Corp.	Blanchard and Passaic River	Industrial alcohol - chemical	1930's to 1950's
1112	Rotex Rubber Company, Inc.	1-23 Jabez Street	Plastics and rubber scrap - recycling	1950's to 1970's
1113	Royal Crown Bottling Co of Newark	245 Raymond Boulevard	Carbonated beverages and fountain syrups - food	1950's to 1970's
1114	Royal Smelting	387 Avenue P	Lead - non-ferrous	1950's
1115	Royce Therm Plastics Division	207 Avenue L	Plastic	Present
1116	Rubber & Celluloid Harness Trimming Co.	27-35 Prospect Street	Hardware (saddler and harness), Harness rings and rosettes - metal working	1900's to 1910's
1117	Rubber & Celluloid Products Corp.	411-43 Wilson Avenue	Plastics	1910's to 1920's
1118	Rubberset Co.	56 Ferry Street	Brushes (shaving and tooth) (paint and varnish)	191's to 1940's
1119	Rubino Leather Co.	58 Amsterdam Street	Leather tanning and finishing	1940's to 1950's
1120	Ruby Light Ball & Gun Co.	Avenue L	Forging - iron & steel	1890's
1121	Ruin, Kelley & Co.	56 Ferry Street		1910's
1122	Rus Export Corp.	150 Avenue L		Present
1123	Ruso Glass Co.	117 St. Frances Street	Glass	Present
1124	S. Haydu & Sons	118 -22 Magazine	Meat packing	1930's to 1960's
1125	Sacks-Barlow Foundaries	357 Wilson Avenue	Castings (iron)	1930's to 1950's
1126	Safety Hammer Co.	187 Christie Street		Present
1127	Sal-Mar Autobody, Inc.	50 Bruen Street	Auto repair	Present
1128	Salor Compound Corp.	Stockton & Delancy Streets	Chemicals	1910's to 1920's

No.	Company	Address	Type of Business	Years in Operation
1129.	Salvage and Appraisal Co.	127 St. Charles Street		Present
1130.	SAV Trucking and Leasing Corp.	16 Herbert Street	Truck leasing	Present
1131.	Savino Paving	500 Delancy Street	Paving	Present
1132.	Savoy Trunk Co.	90 Ferry Street	Trunks - leather	1930's to 1960's
1133.	SCA Chemical Services	100 Lister Avenue	Chemicals	1990's
1134.	Scanlan Wool Co., Inc.	332-352 Doremus Ave.	Wool & pickled sheep skins - leather	1940's to 1960's
1135.	Schiffenhaus Brothers	326 Riverside Avenue	Boxes (corrugated shipping containers), paper specialties	1930's to 1950's
1136.	Schlesinger Furniture Co.	184 Ferry Street	Wood	1910's
1137.	Schmidt Permanent Mold	6 Mary Street	Permanent mold, aluminum castings - non-ferrous	1950's
1138.	Schultz Vegetable Oil	268 Doremus Ave.	Vegetable Food products	1920's to 1930's
1139.	Schwabsky Fur Dressing Co.	152 Paris St.	Fur skin, dressing & dyeing - leather	1930's
1140.	Schwartz Brothers	Rome and St. Charles Streets	National motor freight	1950's
1141.	Schwing & Co.	190 Ferry Street	Architectural sheet metal	1900's
1142.	Scientific Chemical Processing, Inc.	411 Wilson Ave.	Chemical solvents, recovery equipment, processing ink	1970's to 1980's
1143.	Scientific Chemical Processing. Inc	411 Wilson Avenue	Chemicals	1970's to 1980's
1144.	Scither & Ellis, Inc.	228 Ferry Street	Industrial supplies and equipment, bronze bars and bushings - non-ferrous	1940's to 1950's
1145.	Sea Coast Packaging Corp.	105 Avenue L	Cardboard - paper	1980's to 1990's
1146.	Seaboard Chemical Co.	Blanchard Street	Insecticide (household) - chemicals	1920's to 1930's
1147.	Sealand Tanning Co.	44 St. Francis Street	Processors of sheep skins - leather	1950's
1148.	Sealing Components, Inc.	16 Delancy St.	Stainless steel eyelets - machine works	1970's to 1980's
1149.	Security Paint & Varnish Corp.	33 Avenue P	Paints, varnishes, lacquers	1950's
1150	Seither & Ellis	228 Ferry Street	Aluminum, brass and bronze castings, non-ferrous	1940's to 1950's
1151.	Seko Air Freight	85 Joseph Street	Freight	Present
1152.	Select Transportation	451 Doremus Avenue	Freight	Present
1153.	Sepenuk & Sons, Inc.	21 Hyatt Street	Metal works	Present
1154.	Serrateeli's Sons, Inc.	154-8 Malvern Street	Blown fur hat grounding	1940's to 1950's
1155.	Serta Mattress Co.	280 Wilson Ave.	Mattress and box springs	1970's to 1980's
1156.	Shapiro Felt Rug Co.	77 St. Francis Street	Felt rugs	1930's to 1950's
1157.	Shelly Coat	9 St. Francis Street	Ladies raincoats	1970's
1158.	Shelton Mfg. Company, Inc.	591 Ferry Street	Paper board boxes, folded setup, corrugated	1950's to 1980's
1159.	Sherwin-Williams Co.	Brown Street & Lister Avenue	Paints, varnishes	1900's to Present
1160.	Shields & Co.	10 Delancy St.	Industrial alloys - non-ferrous	1950's
1161.	Shields Refining Co.	10 Delancy St.	Refining of precious metals	1950's
1162.	Shmizaki Corp.	860 Doremus Avenue		Present
1163.	Sigie's Auto Wreckers	527 Avenue P.	Auto salvage	Present
1164.	Siloo, Inc.	164 Blanchard Street	Automobile chemicals, oils, lubricants and cleaners	1970's to 1980's
1165.	Simplex Machine Production Corp.	78 Paris Street	Films - plastic	1920's to 1930's
1166.	Simpro Corp.	37-39 Avenue L	Silk covered steel purse frames, handbag and pocket book frames - metal work	1940's to 1950's
1167.	Skyway Meat Packing Co. Inc.	71 Paris Street	Abattoir (slaughter house)	1950's
1168.	Sleepmaster Products	280 Wilson Ave.	Mattresses and box springs	1970's to 1990's
1169.	Sleep-Rite Corp.	74 Ferry Street	Mattresses, bedsprings, pillows	1930's to 1940's

No.	Company	Address	Type of Business	Years in Operation
1170.	SLS Gases, Inc.	299 Wilson Avenue	Gases and welding and cutting equipment	1960's
1171.	Solar Compound Corp.	Delancy & Stockton St.	Paint	1920's to 1930's
1172.	Solvents Recovery Service, Inc.	Brown and Lister Avenues	Solvents - chemicals	1930's to 1940's
1173.	Son Blind Co.	909 Delancy Street		Present
1174.	Special Steel Compounds	340 Delancy	Steel	1940's to 1950's
1175.	Specialty Castings Co.	483 Raymond Boulevard	Iron, steel and mechanize castings	1950's
1176.	Spence Embossing Co.	25 Margarette St.	Finishing, embossing plates - metal work	1910's to 1990's
1177.	Spencer Kellogg Corporation	400 Doremus Avenue	Chemicals	1980's
1178.	Standard Bitulithic Co.	Foot of Brill and Passaic River	Paving contractors, paving materials, Asphalt and asphalt products - chemicals	1930's to 1950's
1179.	Standard Canvas	12 Chapel Street	Textile	Present
1180.	Standard Embossing Plate Mfg. Co.	129-31 Pulaskie Street	Engraving on metal, electroplating, embossing - metal work	1960's to 1990's
1181.	Standard Leather Co.	83-87 Malvern Street	Leather	1900's
1182.	Standard Tallow Co.	Foot of Blanchard Street	Tallow, grease	1910' to 1990's
1183.	Stanley Rule & Level Co. (Alpha Division)	139 Chapel Street	Hatchets, hammers - iron - steel	1910's
1184.	Stanley Tools	139 Chapel Street	Hammers and tools	1950's to Present
1185.	Star Bet Co., Inc.	126 Christie Street		Present
1186.	Star Enterprise/Texaco	909-910 Delancy Street	Petroleum	Present
1187.	Star Finishing Inc.	41 Chapel Street		
1188.	Star Heel Plate Co., Inc.	187 Christie Street	Metal, wood shoe findings	1970's to Present
1189.	Steiner-Ives Co.	8-16 Avenue L	Industrial ovens, furnaces, baking ovens, ovens (electric-industrial and laboratory) - metal work	1930's to 1950's
1190.	Stengel & Rothschild	Kossuth & St. Francis Streets	Leather (enameled), canners	1880's to 1920's
1191.	Stockton Auto Sales Inc.	75 Stockton Street	Auto sales	Present
1192.	Stoia Lumber and Mill Work Co.	96 Delancy Street	Wood	Present
1193.	Storm & Co.	Komorn & Vessy Streets	Elevator manufacturer - metal works	1910's to 1920's
1194.	Stratus Petroleum Corporation	678 Doremus Avenue	Petroleum	Present
1195.	Strauss Plastic Co., Inc.	111 Gotthart Street	Custom plastic molds	1970's to 1990's
1196.	Sty-Jar, Inc.	33 St Francis Street	Cuprous oxide, charges of hydro-gas - chemicals	1940's to 1950's
1197	Sun Chemical Corp.	185 Foundry St.	Organic Pigments for printing - chemicals	1960's to Present
1198.	Sun Mark Industries	436 Doremus Ave.	Petroleum products	1970's to 1980's
1199.	Sun Oil Co.	432 Doremus Ave.	Oil blending	1930's 1990's
1200.	Sun Refinery & Marketing Co.	436 Doremus Avenue	Petroleum	Present
1201.	Sun-Dic Acquisition Corp.	185 Foundry Street	Petroleum	1990's
1202.	Sunoco Service Station	63-69 Wilson Avenue	Gas station - petroleum	Present
1203.	Superior Air Products Co.	132 Malvern Street	Liquid air, liquid nitrogen, containers for all liquefying gases, oxygen and acetylene - chemicals	1940's to 1970's
1204.	Superior Knicker Company	436 Ferry Street	Boys clothing	1980's to 1990's
1205.	Supreme Coat Apron Towel and Linen Supply Co., Inc.	121 Malvern Street	Coats, aprons, towels, uniforms, linen service	1950's
1206.	Supreme Metal Corp	26 St. Charles Street	Metal work	Present
1207.	Supreme Processing Corp.	44 St. Francis Street	Chemicals	Present

No.	Company	Address	Type of Business	Years in Operation
1208.	Sutterlich & Co.	Blanchard Street		1920's
1209.	Swan-Finch Oil Corp.	120 Lister Avenue	Fish oils	1930's to 1950's
1210.	Sweeney Boiler Repairs Inc.	10-12 Mary St.	Boiler installation and repairs	1960's to Present
1211.	Synfax Mfg. Co.	441 Avenue P	Electrostatic toners, liquid bond toners, dry powder toners - chemicals	1980's
1212.	Synpro Corp.	37-9 Avenue L	Handbag and pocketbook frames - metal work	1930's
1213.	Synthetic Dye Co.	Doremus Avenue	Chemical & dye stuff	1910's to 1920's
1214.	Synthetic Plastics Co., Inc.	88 St. Francis Street	Buckles (casein), (clips and paper), casein and Catalan novelties, ornaments (millinery), casein plastics	1930's to 1990's
1215.	T. Fiore & Sons	216 Delancy Street	Waste, junk dealers scrap metal	1950's
1216.	T. Scurozo			1950's
1217.	T.B. Peddie & Co.	77 St. Francis Street	Satchels, travel bags, trunks - leather	1900's
1218.	Tanners Products Inc.	Doremus Avenue	Leather tannery	1920's to 1930's
1219.	Tannin Export Corp.	565 Ferry Street	Tannic acid- chemicals	1940's
1220.	Taymar Sportswear, Inc.	9 St. Francis Street	Woman's sportswear - clothing	1980's
1221.	Tech-Line Corporation			1960's
1222.	Technical Coatings Co.	134 Lister Avenue	Paints and varnishes	1970's
1223.	Technical Plastic Extruders, Inc.	574 Ferry Street	Extruded plastic sheeting and film	1980's to 1990's
1224.	Technick Products	357 Wilson Avenue		Present
1225.	Teddys Provisions	219 Ferry Street	Sausages and prepared meats	1970's to 1990's
1226.	Tele-Mast Corp.	50 Roanoke	Antenna casts - non-ferrous	1950's
1227.	Tennaco Oil Company	678 Doremus Avenue	Petroleum	Present
1228.	Texaco Inc.	909 Delancy Street	Petroleum	Present
1229.	Texas Oil Company	Plum Point Lane	Petroleum	1910's to 1930's
1230.	Textile Bag & Waste Co.	317 Doremus Ave.	Textile waste materials - solid waste	1930's
1231.	Textile Leather Co.	Brown Street and Lister Avenue	Leather	1910's
1232.	Textile Leather Company		Leather	1910's
1233.	Thatcher Furnace Co.	36 St. Francis Street	Boilers, heaters, furnaces and ranges - iron	1900's to 1910's
1234.	The Tire Store Pit Stops of America	75 Stockton Street	Tires	Present
1235.	Thermo-Equipment	179 Pulaskie Street	Refrigeration for buses, trucks and trailers - metal work	1970's
1236.	Thiabaut & Walker Co.	Rutherford & Delancy	Varnishes and resins	1970's to Present
1237.	Thomas H. Brooks & Co., Inc.			1960's
1238.	Thomas Popola Barrel & Drum Co.	68-92 Delancy St.	Barrels, metal, wood - metal work	1940's to Present
1239.	Thomasset Colors	338 Wilson Ave.	Dry colors - chemicals	1950's to 1970's
1240.	Thymer Industries, Inc.	436 Ferry Street	Hospital cabinets and medication parts	1980's to 1990's
1241.	Tide Water Bailing Corp.	26 St. Charles Street	Scrap iron	1950's to present
1242.	Tide Water Transfer Corp.	480 Wilson Avenue		Present
1243.	Tile and Stone Sales Inc.	16 Herbert Street	Tile	Present
1244.	Tire Cycle of New Jersey	34 Ester Street	Tires	Present
1245.	Tital Storage Battery Co.	Foot of Chapel Street	Lead battery - non-ferrous	1910's
1246.	Titan Steel Casting Co.	Lister Avenue & Chapel Street	Steel iron casting	1910's
1247.	Tobacco Machine Supply Co., Inc.	230 Ferry Street	Cigar making and tobacco machines, metal working	1930's

No.	Company	Address	Type of Business	Years in Operation
1248	Tobia Trucking	46 Paris Street	Freight	Present
1249	Todard Co.	84 Niagra Street		1900's
1250.	Tony's Auto Wreckers	121 Paris Street	Auto Salvage	Present
1251.	Tony's Autobody	23-24 Foundry Street	Auto repair	Present
1252.	Tops Metal Products	347 Ferry Street	Metal stamping wire forms	1940's to 1950's
1253.	Tower Mfg. Co.	85 Doremus Avenue	Alkali Blue - chemicals	1910's to 1930's
1254.	Towers Transportation Co.. Inc.	72 Ronoake Avenue	Trucking	1950's
1255.	Traffic & Street Sign Co.	80 Foundry	Street signs - metal working	1940's to 1960's
1256.	Traffic Management Control Corp.	83 Joseph Street		Present
1257.	Trans Service Trailer Rental and Leasing	351 Doremus Avenue	Trailer rental	Present
1258.	Transfer Metal Casting Co.	Doremus Avenue	Foundry - iron	1920's
1259.	Trautz Co.	10 Delancy St.	Refining, smelting and refining precious metals, Assailing - non-ferrous	1920's to 1950's
1260.	Tress Chemical Co.	573-589 Ferry Street	Chemicals	Present
1261.	Tri State Tube and Supply Co.. Inc.	32 Brill Street	Metal Work	Present
1262.	Trilectrone Industries, Inc.	338 Ferry Street	Electrical power supplies, machine control systems	1970's
1263.	Trin Desk Jam	391/2 Joseph Street		Present
1264.	Triplex Oil Refining Co., Inc.	80 Lister Avenue	Petroleum products	1940's to 1950's
1265.	Tripple A Tomato Co.	20 Cornelia Street	Food	Present
1266.	Trojan Tube Co Inc.	39 Hyatt Ave.	Metal tubing - metal working	1960's to 1970's
1267.	Troy Chemical Corp.	338 Wilson Ave.	Paint additives - chemicals	1960's to Present
1268.	Trucktor Corp	156 Wilson Ave.	Truck crawler devices, chains, sprockets - metal work	1930's to 1950's
1269.	True Mask Products Co.	16 Herbert Street		Present
1270.	Tuchman Brothers	55 St. Francis Street	Woodworking	1940's to 1950's
1271.	Turco Products, Inc.	120 Lister Avenue	Cleaning compounds for industry - chemicals	1950's
1272.	U.S. Express	83 Joseph Street	Delivery	Present
1273.	U.S Industrial Alcohol Co.	400 Doremus Ave.	Alcohol - chemical	1920's to 1940's
1274.	U.S. Industrial Chemicals, Inc.	400 Doremus Ave.	Chemicals, alcohol's, solvents	1930's to 1990's
1275.	U.S. Rockwell Co.	Hyatt Avenue	Industrial heating furnaces - iron	1930's
1276.	U.S Spray Finishing Co.	20 Blanchard Street	Paint	Present
1277.	Union Camp Corp.	240 Raymond Boulevard	Wood and paper boxes	1970's
1278.	Union Carbide Corp.	351 Doremus Ave.	Acetylene - chemicals	1960's to 1970's
1279.	Union Smelting & Refining Co.	St. Charles Street and Avenue L	Alloys, white metals, type metals, non-ferrous	1910's to 1920's
1280.	United Box & Lumber Co.	Wheeler Point Road	Boxes (packaging - plywood, vinear, wood), crates, shooks, etc., luggage - paper	1930's to 1970's
1281.	United Carbon Company, Inc.	Brown and Lister Avenue	Carbon black (Emulsified) - chemical	1930's to 1950's
1282.	United Casing Corp.	28 Margaretta St.	Sausage casing- food	1970's to 1980's
1283.	United Radio Co.	56 Ferry Street	Electronic parts and tubes	1960's to 1970's
1284.	United Refining Corp.	132-136 Harris St.	Oil blending	1930's
1285.	United Shellac Corp.	108 Blanchard Street	Enamel - paint	1940's to 1960's
1286.	United Smelting & Refining co	125 Stockton	Refining & smelting, iron	1940's to 1950's
1287	United States Spray Finishing	70 Blanchard Street	Paint	Present
1288.	United Transport	320 Doremus Avenue	Freight	Present
1289.	Universal Caster & Foundry Co.	574-600 Ferry Street	Castings (iron)	1910's
1290.	Universal Fur Dressing	94-104 Avenue L	Fur dressing	1920's to 1930's
1291	Universal Pigment Chemical Co.	352 Doremus Ave.	Color pigments - chemicals	1940's to 1950's

No.	Company	Address	Type of Business	Years in Operation
1292	Universal Products Corp.			1940's to 1950's
1293	Upson-Walton Co. of New York	462 Riverside Avenue	Wire rope - non-ferrous	1910's
1294	UrCryl Polymer Corp.	49 Rutherford Street	Plastic	Present
1295	Utility Paint & Varnish Co. Inc.	84 Paris St.	Paints, varnishes	1930's
1296	Utility Trailor Sales of NJ, Inc.	32 Brill Street	Trailer Sales	Present
1297	V M Industries	164 Delancy St.	Aluminum dye casting - non-ferrous	1980's to 1990's
1298	Vacuum Ash and Soot Conveyors, Co.	445 Wilson Avenue	Conveyors - metal work	1950's to 1960's
1299	Vacuum Dye Casting Corp.	164 Delancy St.	Aluminum dye casting - non-ferrous	1970's to 1980's
1300	Val Welding corp.	241 Wilson Avenue	Welding - metal work	Present
1301	Valley Chemical Co., Inc.	80 Wheeler Point Road	Chemicals (cleaning compounds, pharmaceutical preparations, and toilet preparations), dyes	1940's to 1950's
1302	Valley Color & Chemical Co., Inc.	78-82 Wheeler Point Road	Chemicals	1940's to 1950's
1303	Val-U-Pak, Inc.	48 Cornelia Street	Confectionery Products	1970's to 1980's
1304	Valvoline Oil Co.	Manufacturers Place	Petroleum	1910's
1305	Vanberstine Co.	825 Wilson Avenue		Present
1306	Velva Chamois Co.	121 Paris St.	Leather (Chamois)	1930's
1307	Versatile Metal Fabricators	16 Herbert Street	Metal work	Present
1308	Victory Clothing	120 Ferry Street	Clothing store	1940's to 1950's
1309	Vita-Var	46 Albert Avenue	Enamel - paint	1940's to 1950's
1310	Vogue Industries	5 Rutherford Street		Present
1311	Volunteer Express	451 Doremus Avenue	Delivery	Present
1312	Vulcan Detinning Division	600 Doremus Avenue	Scrap steel and tin recovery	1960's
1313	Vulcan Materials Co.	600 Doremus Ave.	Chlorine, ethylene chloride, caustic sodas, chloroform, Methyl chloride, muratic acid - chemicals	1960's to 1970's
1314	W.I Moore & Co.	72-78 River Street	Hat manufacturer - leather	1870's to 1900's
1315	Wall Products, Inc.	55 Rome Street	Concrete curing compounds, waterproofing and cement paints	1950's
1316	Wallenius Lines North America Inc.	326 Doremus Avenue	Freight	Present
1317	Walsh Manufacturing Co.	156 Blanchard Street		Present
1318	Ware Industries	61 Avenue K	Steel studs - metal working	1980's to Present
1319	Warren Brothers Co.	Foot of Brill and Passaic River	Bituminous concrete	1970's
1320	Wax & Novelty Co.	67 Paris Street	Plastics	1920's
1321	Weatherall, Inc.		Paint	1970's
1322	Webb Electric Inc.	300 Wilson Avenue	Electric equipment	Present
1323	Weidle Products Co.	300 Doremus Avenue	Boiler stacks - iron	1930's
1324	Welch, Holme & Clark Co. Inc.	338 Wilson Ave.	Vegetable oils, fats, dry chemicals	1950's to Present
1325	Welco Gases	855 Raymond Boulevard	Non-electrical welding and cutting equipment	1980's to 1990's
1326	Weld Edge Plastics, Inc.	270 Ferry Street	Electronic welders of pliable plastics specialties	1950's
1327	Welded Glass	Doremus Avenue	Bullet proof glass - plastic	1920's to 1950's
1328	Welded Products Co.	300 Doremus Avenue	Smelting and refining, fabricated metal products, welding - carbon steels, nickel, aluminum - non-ferrous	1930's to 1990's
1329	Welding & Cutting Equipment Co.	855 Raymond Boulevard	Welding and cutting equipment	1970's to 1980's
1330	Welding Rental and Repair Corp.	49 St. Charles Street		Present

No.	Company	Address	Type of Business	Years in Operation
1331.	Welin Davit & Boat Corp.	8 Lister Avenue	Life saving equipment	1930's
1332.	Well Co. Gasses			Present
1333.	West Brook Industries, Inc.	140Malvern Street	Tool and dye shop - metal work	1950's to 1960's
1334.	Weston Chemical Corp.	96 Roanoke Avenue	Chemicals	1960's
1335.	Wheeler Manufacturing Co.	Meadow Road	Binders, trunk, button and boxboards - leather	1900's
1336.	Wheeling Transportation. Inc.	72 Roanoke Avenue	Warehousing	1950's
1337.	White Rose Meat Corp.	425 Avenue P	Food	1990's
1338.	Whittaker Corp.	249 Avenue P	Industrial finishes - paint	1970's
1339.	Wide Range Tire Co.	99 Chapel Street	Tires	Present
1340.	Wiedenmeyers Brewing Company	250 Ferry Street	Brewery	1900's to 1920
1341.	William H. Becker, Inc.	97-99 Ann Street	Printers Lithographers	1950's to 1970's
1342.	William Klemp	322 Ferry Street	Handbag and pocketbook frames, metal goods	1930's
1343.	William Yeskel & Co.	317 Doremus Avenue	Bags (Cambric, cotton and burlap), celluloid, cotton, fissile and wool waste - solid waste	1930's
1344.	Wilson Auto Parts	149 Wilson Avenue	Auto parts	Present
1345.	Wilson Ave Transmission and Auto Repair	191 Wilson Avenue	Auto repair	Present
1346.	Windsor Wax Co.	Doremus Avenue	Wax - petroleum	1920's to 1930's
1347.	Wings Transportation Systems	77 Joseph Stret	Freight	Present
1348.	Wise Engineering Co.	66 Chapel Street	Portable and collapsible gantry cranes	1950's
1349.	Witco Chemical Corp.	652 Doremus Avenue	Chemicals	1980's to Present
1350.	Wohlman Sign Co.	50 Roanoke Avenue	Signs, advertising, displays - metal work	1960's
1351.	Woodcraft Furniture	185-89 Delancy St.	Furniture	1920's to 1930's
1352.	World Class Automotive	553 Avenue P	Auto Salvage	Present
1353.	Wyndmoor Mfg. Corp.	70 Blanchard Street	Packaging equipment - metal work	1960's to 1970's
1354.	Yellow Freight Systems	335 Delancy Street	Trucking	Present
1355.	Yeskel Supply Co.	317 Doremus Ave.	Bags - leather	1920's to 1930's
1356.	Z&M Corporation	33 Brille Street		Present
1357.	Ziegel, Eisman & Co.	121 Paris Street	Tannery - leather	1880's to 1960's
1358.	Zisch Engineering	39-43 Avenue L	Electrical fittings - metal works	1920's to 1930's
1359.	Zwigard Metal Recycling	411 Wilson Avenue	Metal Scrap	Present

Table 2-3
Primary Industry Groups in the Petition Area

Type of Business	Number of Facilities
Chemicals and Allied Products	170
Paint and Varnish	50
Plastic	51
Iron and Steel	73
Non-ferrous Metal	40
Fabricated Metal Products	166
Petroleum	49
Leather	93
Paper/Cardboard	38
Motor Freight Transportation and Warehousing	79
Truck/Auto - Sale/Service/Lease	39
Scrap Metal	39
Landfills	14

Table 2-4
Other Significant Businesses in the Petition Area

Type of Business	Number of Facilities
Asbestos	2
Auto Parts	4
Brewery	7
Concrete	4
Electrical/Lighting	21
Environmental Services	4
Fat Rendering	5
Glass	5
Laboratories	2
Novelties	4
Printing/Publishing	18
Professional Services	10
Slaughter House/Meats/Foods/Grains/Bakeries	66
Stone	2
Textiles	20
Waste Services/Resource Recovery/Recycling	16
Wood/Pallets/Cork/Boat Building	18

Table 2-5. Distribution of Facilities Within the Petition Area by Street Address

Street Name	Number of Facilities
Adams Street	3
Albert Avenue	7
Amsterdam Street	15
Ann Street	5
Avenue K	4
Avenue L	51
Avenue P	57
Backus	2
Ball Street	1
Barbara Street	1
Blanchard Street	59
Brill Street	6
Bruen Street	1
Chapal Street	30
Christie Street	21
Cornelia Street	8
Darcy Street	1
Dawson Street	1
Day Street	1
Delancy Street	83
Doremus Avenue	145
Euclid Street	12
Ester Street	4
Fleming Street	1
Ferguson Street	1
Ferry Street	117
Foundry Street	29
Freeman Street	6
George Street	1
Gotthart Street	4
Hamburg Place	8
Hawkins Street	2
Herbert Street	9
Hyatt Street	8
Jabez Street	11
Joseph Street	13
Komorn Street	4
Kossuth Avenue	10
Lister Avenue	58
Lockwood Street	7
Magazine Street	10
Main Street	1
Malvern Street	26
Manchester Place	2

Table 2-5. Distribution of Facilities Within the Petition Area by Street Address *(continued)*

Street Name	Number of Facilities
Manufacturers Place	12
Margaretta Street	12
Market Street	1
Mary Street	8
Meadow Street	1
Napoleon Street	2
Niagara Street	2
Paris Street	44
Parkhurst Street	1
Plank Road	1
Plum Point Lane	12
Pointer Avenue	1
Polk Street	2
Prospect Street	5
Pulaski Street	45
Raymond Boulevard	39
Richards Street	1
River Street	2
Roanoke Avenue	28
Rome Street	30
Rutherford Street	17
St. Charles Avenue	14
St. Francis Avenue	61
South Street	1
Stockton Street	9
Thomas Street	2
Thornton Street	1
Vincent Street	2
Wall Street	2
Waydell Avenue	1
Wheeler Point Road	10
Wilson Avenue	135
Wright Street	1

Table 2-6. Primary Industry Groups that Use the Pervasive Compounds

	Pervasive Compounds	Primary Industry Groups												
		1 Chemicals	2 Paint/ Varnish	3 Plastic	4 Iron/ Steel	5 Non-Ferrous Metal	6 Fabricated Metal	7 Petroleum	8 Leather	9 Paper/ Cardboard	10 Motor Freight	11 Truck/ Auto	12 Scrap Metal	13 Landfills
	BTEX*	X	X	X	X	X	X	X	X	X	X	X	X	
1	Benzene	X		X				X						X
2	Toluene	X	X	X				X	X					X
3	Ethylbenzene	X	X					X						
4	Xylenes (total)	X	X	X				X	X	X				
	Volatile Organics													
5	1,1 Dichloroethane	X	X											X
6	1,1,1-Trichloroethane	X	X				X							
7	1,2 Dichloroethane	X	X					X						
8	Chlorobenzene	X										X		
9	Tetrachloroethene	X			X	X	X							
10	Trichloroethene	X	X				X					X		
11	Methylene Chloride	X	X									X		X
12	Vinyl Chloride	X		X										X
13	Chloroform	X	X							X				
	Semi-volatile Organics													
14	Bis(2-Ethylhexyl)	X	X	X						X				
	Metals													
15	Antimony	X	X	X			X							X
16	Arsenic	X				X								X
17	Cadmium	X		X		X	X							X
18	Chromium	X			X	X	X		X				X	X
19	Lead	X	X		X		X	X						X
20	Mercury	X	X											
21	Nickel	X			X	X	X	X						X
22	22	X	X		X	X	X			X				X

*Means that the Industry Group often stored gasoline or petroleum products in underground storage tanks. A separate "x" next to benzene, toluene, ethylbenzene or toluene means that the Industry Group uses that compound in manufacturing processes.

TABLE 3-1

Facilities in the Petition Area with Known or Potential Discharge



DISCLAIMER

This Table is not an accusation that the named facilities are "responsible parties" for ground water contamination as that phrase may be defined by federal, state or local statues, regulations or ordinances. Ground water contamination in the Petition Area may be the result of (1) historic discharges, (2) a combination of historic and current discharges or (3) current discharges. It is not the purpose of this Petition to determine liability for a discharge.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
1.	15E Sanitary Landfill	Route 1 & Foundry Street	NJL900000019 BFO-CA-930526	Landfill	Early 1900's	KCSL (1995)
2	Ace Truck & Trailor Repairs, Inc.	245 Raymond Blvd.	BUST-0302384		Present	UST-2 tanks, 6,000 Gallons total capacity installed 1944. Status: active.
3.	A & S Atterman	357 Wilson Avenue	NJD011475159	Swap paper	1920's to 1970's	
4.	A. Fiore & Sons Salvage, Inc.	Doremus Avenue		Solid waste	1950's to 1980's	September 18, 1994 N.O.V. Issued re: Operating a Solid Waste Transfer without a Permit. November 26, 1985 an Administrative Consent Order was executed permitting the Company to continue operating pending DEP's review of its application for a permit. Land filling operations ceased 1986/87.
5.	A. Gross & Co.	65 Doremus Avenue	NJD094951258	Chemicals	1900's to 1980's	Well Search. January 19, 1915 fire - careless use of matches. May 2, 1916 Fire - caused by grease tank. October 29, 1922 fire - locomotive spark ignites factory, stable and sheds. February 8, 1929 fire - matches. CAS (1992). This Company was later purchased by Humko Chemical - a division of Witco Corp.
6.	0A.J. & J.O. Pilar, Inc. 0 0 0 0 0 0 0	Chapel & Lister Avenues	NJD002153930	Chemicals	1930's to Present	
7.	Allstate Paper Box Co	223 Raymond Blvd.	BUST-0269788	Paper boxes	Present	UST-1 tank, 10,000 gallons total capacity, installed 1951. Status: active.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
8.	A.O. Chemical Corp.	238 Wilson Avenue	NJD980753099	Chemicals	Present	
9.	A.T. Fiore Transfer Station	192 Delancy Street	NJD980529127	Sold Waste	1950's to 1990's	Well Search May 3, 1994 N.O.V. Issued for Operating an Illegal Solid Waste Transfer Station August 19, 1984 - Administrative Order issued demanding that the operation cease and desist. Operations were terminated.
10.	Abandoned Building	200 Blanchard Street				Spill Report. 5/7/87. One 55-gallon drum hydrazine.
11.	Accort Laboratories, Inc.	357 Wilson Avenue	NJD101239663	Chemicals	Present	Well Search
12.	Accort Labs, Inc.	358-364 Adams Street	NJD986577781	Chemicals	Present	Registered Hazardous Waste Generator (1992)
13.	ACIMI Corp.	7-33 Amsterdam Street	NJD981876667		Present	
14.	Adams Street Dump	Adams Street	NJD980528675	Landfill		
15.	Adams Street Landfill	Adams Street		Landfill		CSL (1992).
16.	Adco Chemical Co.	49 Rutherford Street	NJD002154806	Chemicals	1960's to present	Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** CSL (1992).
17.	Adrich Chemical Corp.	928 Doremus Avenue		Chemicals	Present	Spill Report 5/28/92 four ounces acetic acid.
18.	Afta Steel Casting Co.	Chapel Street		Iron & Steel	1900's	November 3, 1907 - fire unknown
19.	Air Land & Sea	Avenue P	NJD980537047	Freight	Present	
20.	Airoyal Chemical Products		NJD001533004			
21.	Albert Steel Drum	338 Wilson Avenue	NJD0005251154 Lead: BSM-910708	Drum reconditioning	1960's to 1970's	**Significant groundwater contamination.** KCSL(1995) **State Funded Cleanup Underway.** Contamination of this abandoned facility has resulted from various operations as well as buried and scattered drums throughout the site. Previous owners include Prentiss Drug & Chemical Company which produced pesticides and chemicals and Albert Steel Drum, which operated a re-conditioning facility. Site ownership was assumed by Newark Redevelopment & Housing Authority in 1977. The site was secured with a fence in 1987. Initial sampling by NJDEP confirmed contamination of soil, surface and groundwater, structures and sediment. In 1994, DEP approved a $7,000,000 plan to cleanup the property using public funds. A cost recovery action is being pursued against responsibility parties. CSL (1992), Albert Steel Drum (ASD) operated a drum reconditioning and recycling facility ASD occupied a portion of the 9 acre site from 1974 to 1977. Prentiss Drug and Chemical

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Company occupied a portion of the site from 1956 to 1982. NJDEP undertook environmental investigation of soils, sediments, surface water, groundwater and building interiors. Volatile organic compounds (chlorobenzene, toluene, ethylbenzene, and total xylenes) and metals (arsenic, cadmium, chromium, lead, and mercury) were detected at significantly elevated levels in groundwater. Groundwater monitoring and remediation to occur on site. **Groundwater data available.**
22.	Aiken Realty Co.	410 Adams Street				UST- 1 tank, 3,000 gallons total capacity, installed 1980. Status: inactive.
23.	All County Environmental Services	193 Christie Street	NJD000691758	Environmental consulting	Present	Well Search. CSL (1992).
24.	Alliance Color & Chemical, Inc.	309-327 Avenue P	NJD986595072 Lead: BF0-M	Chemicals	1940's to Present	KCSL(1995). **DPCC Plan Filed** CSL (1992). Alliance Color and Chemical Co., manufacturers chemical intermediates for the textile and photographic industries. The site is bounded on the south by property owned by the Newark Housing Authority, on the north by Conrail, on the west by the Turnpike Authority, and on the east by Avenue P. Company filed a RCRA part-A application in November 1980 (EPA ID No.NJD045794971); the only hazardous waste activity described was the neutralization of acid waste (NJDEP Division of Waste Management Files). Company undertook environmental investigation of soil and groundwater. One or more of the organochloride pesticides (4,4'-DDE, 4,4'-DDT, 4,4'-DDD, endosulfan sulfate, and methoxychlor) and volatile organics (chlorobenzene) were detected in soil. Volatile organic compounds (chlorobenzene, ethylbenzene, and xylenes) and metals (iron, manganese, and sodium) were detected in groundwater in excess of NJAC groundwater quality criteria. **Groundwater data available.**
25.	Alpha Chemical Plastics Corp	I Jabez Street	NJD002144467 NJPDES Permit No. NJ0035807 (1983-1987) BUST 0032384	Plastics	1960's to 1980's UST - 3 tanks, 25,000 gallon total capacity, installed	Spill Report 1/6/92 50 gallons of dye (2-ethylhexyl) ph. Well Search.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
					1976 through 1982. Status: inactive.	
26.	Alpha Metals, Inc.	57 Freeman Street	NJD082990912	Metal working	Present	Well Search. CSL (1992).
27.	Alphagary Corporation	1 Jabez Street	07140070500		Present	**DPCC Plan Filed**
28.	Amalgamated Die Stuff & Chemical	Plum Point Road		Chemicals and dye stuff	1910's to 1930's	November 22, 1920 Fire - friction June 29, 1917 fire - friction. October 11, 1922 fire in chemical plant by spontaneous combustion. January 20, 1918 - Fire - acids and chemicals. July 5, 1918 Fire in grinding room due to friction.
29.	American Adhesives & Coating Co.	411 Wilson Avenue	ECRA 88985, 88951.	Adhesives & Chemicals	1980's to 1990's	February 1988 Fire at the property. Post-fire cleanup undertaken. March 17, 1988 - N.O.V. issued for discharge of hazardous substances resulting from the fire. The building contained tetrahydrofuran, phenol acids and flammable liquids. Cleanup completed. American Adhesives & Coatings Co. (AA&C) occupied a portion of a single story building from September 1977 to September 1988. The leasehold property is located in the rear of the Scientific Chemical Processing (SCP) complex. The company triggered ECRA in 1988. They undertook environmental investigation of soil, groundwater, and building interiors. Metals (arsenic, lead, and mercury) and volatile organic compound (t-butyl alcohol) were detected at low levels in soil and groundwater. AA&C attributed source of metal contamination to previous owners and operators and proposed no further action. Based on t-butyl alcohol's high degree of natural biodegradability, AA&C proposed no further action. Groundwater monitoring wells abandoned June 1994. **Groundwater data available.**
30.	American Bumper Company, Inc.	209 Parkhurst Street	NJD980755748 ECRA 87264		1990's	Well Search. ECRA - soil cleanup only. No groundwater investigation. American Bumper Company, Inc. owned and operated this industrial establishment since 1981. Company triggered ECRA in 1987. They undertook environmental investigation of soil. Contaminated soil was removed from site.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Company in full compliance of ECRA April 1990.
31.	American Fuel Co. of Essex	Blanchard Street	NJD986569671	Petroleum	Present	
32.	American Hair & Felt Co.	352 Doremus		Felts - leather	1920's to 1940's	June 5, 1928 fire - overheated dryer.
33.	American Industrial Marine Service	526 Raymond Boulevard	NJD980773006		Present	
34.	American Oil & Supply Co.	238 Wilson Avenue	NJD064264740	Oil blending	1910's to Present	Well Search. January 20, 1918 - Fire - "needless". February 4, 1981 - DEP investigation of on-site spill of a hazardous substance. September 24, 1922 fire in boiler room by stove. September 24, 1922 fire - rekindled. This site was constructed on an old dump. (Zdepski, 1987)
35.	American Ref-Fuel	66 Blanchard Street	NJD986577195 NJPDES Permit No. NJ0055247 (1989 to 1991)	Resource recovery	Present	Registered Hazardous Waste Generator (1992)
36.	American Refining & Crucible Co.	Lister Avenue		Iron & Steel	1890's to 1920's	March 18, 1902 Fire "sparks from bond fire."
37.	American Synthetic Die Co.	Avenue R.		Chemicals	1910's to 1920's	November 16, 1917 fire . December 1, 1917 Fire - acids. February 11, 1918 Fire - smoking March 24, 1918 Fire - "friction" August 4, 1918 Fire
38.	American Washer Mfg Co.	Plum Point Lane		Metal Working		September 25, 1902 fire "hot washer fell in hot tub of oil." April 9, 1903 fire caused by "defective chimney."
39.	American Wood Fireproofing Co.	Lister Avenue and Chapel Street		Creosote - Chemicals	1890's to 1900's	January 24, 1902 Fire caused "from overheating." June 29, 1907 fire - unknown.
40.	Amtruck Hildermann Industries	335 Raymond Boulevard	NJD980769483		1990's	Well Search. CSL (1992).
41.	Analab, Inc.	293 Wilson Avenue	NJD981555899		Present	
42.	Anchor Sheet Metal	30 Chapel Street	NJD006798110	Sheet Metal	1970's to Present	
43.	Ann Street Garage	15-17 Ann Street	NJL000039859	Auto repair	1900's	Well Search.
44.	Anton Brux	82 Paris Street		Factory - manufacturer of novelties	1920's	January 12, 1922 fire - electricity.
45.	Apex Color Works	64 Chapel Street	NJD002153781	Paints	1960's to 1980's	CSL (1992).
46.	Arco Newark Terminal	1111 Delancy Street	BUST 0084611	Petroleum	Present	UST - 8 tanks, 8,000 gallons total capacity, installed 1949 through 1982. Status: active.
47.	Arco Petroleum Products Company	1111 Delancy Street	NJD9865570505 Lead: BEECRA-E86649	Petroleum	Present	KCSL(1995). **Significant groundwater contamination.** ARCO Products Company formerly operated a bulk petroleum storage and distribution terminal. The former ARCO terminal occupies 21 acres bordering the west bank of Newark Bay. Company triggered ECRA in 1986. ARCO sold the facility to Amerada Hess Corporation in 1989. Subsequent environmental investigation

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						identified soil and groundwater contamination. BTEX compounds (benzene, toluene, ethylbenzene, and total xylenes) were detected in groundwater. ARCO currently performs monthly well gauging and product recovery and quarterly groundwater sampling activities. Data indicates BTEX concentrations in groundwater samples are declining with time. **Groundwater data available.**
48.	Arkansas Chemical Co.	185 Foundry Street	NJD986634848	Chemicals	1930's to 1980's	On January 3, 1994, NJDEP identified this site as a priority site. The department intends to use public funds to remediate it. 26 N.J.R. 259-60. Company undertook voluntary site investigation pursuant to Memorandum of Agreement with NJDEP. Environmental investigation revealed groundwater contamination. Volatile organic compounds (total xylenes, benzene, tetrachloroethene, and chlorobenzene) and metals (arsenic and lead) were detected at concentrations exceeding the NJDEP Groundwater Cleanup Standard. Groundwater remediation and monitoring still occurring on site. **Groundwater data available.**
49.	J L. Armitage		BUST- 0255882			UST-3 Tanks, 4,500 Gallons Total Capacity Installed 1944, status active.
50	Arol Chemical Products, Co.	649 Ferry Street	BUST 0040853	Chemical Company	Present	UST - 6 tanks. 72,000 gallons total capacity, installed 1958. Status: active.
51.	Ashland Chemical Co	221 Foundry Street	NJD060803905 Lead: BEECRA-E88695.	Chemicals	1970's to Present	KCSL(1995). Registered Hazardous Waste Generator (1992) **Significant groundwater contamination.** CSL (1992). The New Jersey Turnpike bisects the site into the West Plant and the East Plant areas. All facility buildings, process lines, and storage tanks, as well as on-site railroad sidings, were dismantled and removed from the site in 1992; building foundations remain Company triggered ECRA 1988. They undertook environmental investigation of soil and groundwater. Chlorinated volatile organic compounds (1,1,1-trichloroethane, cis-1,2-dichloroethane,

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						chlorobenzene, methylene chloride, vinyl chloride) and petroleum-related compounds (benzene, toluene, ethylbenzene, and xylenes) were detected in both soil and groundwater. Ashland concludes that the dissolved compounds in groundwater are attenuating naturally. **Groundwater data available.**
52.	Associated Autobody & Trucks	405 Raymond Boulevard	NJD011474921	Auto Service	Present	
53.	Atha Tool Casting Co.	Chapel Street		Iron & steel	1875 to 1910	This company was one of the largest steel manufacturers in the late 1800's. The Company made refined cast steel, particularly file steel, agriculture cast steel, cast spring steel, railway cast steel, machinery cast steel and various steel implements of War as well as table cutlery, trap springs, skates, wagon axle, and sleigh shoes. Atha Tool Company was an outgrowth of Benjamin Atha's Newark Steel Works which began in 1865. The firm name became Benjamin Atha & Company in 1871. In 1875, Atha established the Forging Department to make hammer heads, originally from scraps of the steel mill. By 1884, hand-forged hammers were replaced by drop-forged equipment. By 1891, blacksmith tools had developed into a substantial business causing the Company to be incorporated. The Company manufactured hammers, chisels, hardies and tongs. November 3, 1907 fire - unknown. In 1913, the Company was sold to Stanley Rule & Level Company (now Stanley Works). March 23, 1901 Fire caused by "hot metal from mold." August 24, 1901 Fire caused by "bursting of a furnace.", May 6, 1903 "gasoline tank fire from lamp." September 23, 1906 fire caused when "oil tank took fire." July 22, 1907 fire - unknown. December 4, 1911 fire - "heat from oven." October 25, 1913 fire - spark from electric motor. May 11, 1916 Fire caused by friction
54.	Atlas Refining	138 Lockwood Street	NJD002153344	Oils	Present	

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
55	Automatic Eletroplating Corp.	185 Foundry Street	NJD002445500 Lead: BSCM	Electoplating	1960's to Present	KCSL(1995). Spill Report 4/9/91 unknown qty of electroplating solution.
56	Automatic Plating Methods, Inc.	347 Ferry Street	NJD071177034	Plating - metal working	Present	
57	Automobile Leather Mfg. Co.	12-28 Chapel Street		Japanning - leather	1910's	January 21, 1916 Fire - unknown origin
58	Avenue P Landfill	357-405 Avenue P	NJD980504831	Landfill	Mid 1900's	Well search. CSL (1992). The 1956 aerial map showed municipal garbage dump had shifted to a site bounded by Avenue P, Wilson Avenue and Doremus Avenue. This site (known as Avenue P landfill) is now owned by Newark Redevelopment and Housing Authority. (Zdepski 1987)
59	Avon Drum Company	185 Foundry Street	Lead: BSCM-920632	Drum mfg. - metal work	1990's	KCSL(1995)
60	B&C Towing	461 Avenue P	NJD980528764	Auto/truck service	Present	Well Search. CSL (1992).
61	B Line Trucking		NJD049863350	Freight delivery	Present	
62	Baker Coconut Company	Doremus Avenue		Coconut oil - food	1920's	March 10, 1921 Fire in the Pressing Department - electricity June 11, 1922 fire - "spontaneous combustion."
63	Baker Franklin Co.	Doremus Avenue/Avenue R		Iron & steel	1910's to 1920's	July 19, 1921 Fire - hot slag
64	Balbach Smelting & Refining Co.	Avenue R		Non-ferrous metals	1851 to 1940's	Al Balbach, Jr., devised an improved method whereby gold and silver, when found in small proportions with other metals, could be withdrawn and refined quickly at small expense. This process was known as "DE-Silverizing." They received unrefined metals all over the world and produced pure lead with gold and silver ingots. The ingots were then treated with acids producing gold and silver solutions. Further processing produces the precious metal. Much of the precious metal was used in Newark's tremendous jewelry industry. January 18, 1916 Fire caused by furnace July 18, 1917 fire - burning wire insulation. July 31, 1917 fire - "burning wire in yard." September 13, 1917 fire - smoke stack. February 11, 1918 Fire - electricity. June 27, 1918 Fire - "smoking" December 17, 1918 Fire - "needless" January 1, 1919 Fire - Miscellaneous February 9, 1919 Fire - stove August 31, 1919 Fire -

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						miscellaneous August 12, 1921 Fire - smoking December 1, 1921 Fire - oil burner. July 22, 1922 fire - matches. July 24, 1922 fire - lightening
65.	Balentine & Son	59-63 Christie Street		Brewers	1850's to 1950's	February 3, 1894 Fire caused by unknown origin. November 25, 1906 fire caused by unknown origin. November 29, 1919 Fire - oil stove
66.	Ballantine & Sons	488 Ferry Street			Est. 1840 to 1950's	Ballantine Breweries is one of the countries most well known beer manufacturers. The lager beer brewery and bottlery were located on Freeman, Christie, Oxford, East Ferry and Bowery Streets. All these buildings covered 12 acres. The Company drew large quantities of groundwater to make its beer and ale. The tremendous pumping of water over many decades eventually lowered the groundwater level in the area drawing in salt water from the Passaic River. Eventually, this saltwater intrusion forced Ballantine to shut down its Newark operations February 3, 1911 fire - "defective flue." October 19, 1917 fire. March 17, 1922 fire - brush fire.
67.	Barrett Paving Material	10 Lister Avenue	NJD002154052	Paving material	Present	
68.	Bauermann, Miss	205 Ferry Street		Millinery		June 20, 1917 fire - matches.
69	Bayonne Barrel & Drum Co	150 Raymond Boulevard	NJD009871401. Lead: EPA-910944	Drum reconditioning	1940's to 1980's	**Groundwater contamination.** KCSL(1995). **EPA Cleanup.** Company operated a drum re-conditioning facility from early 1940's until 1982 when it filed for bankruptcy. Area used for land filling activity in the 1940's and 50's. Cleanup still underway. CSL (1992) - "formerly Newark City Dump."
70.	BB&D Trailor	150-154 Raymond Boulevard	NJD986644946	Trailer sales/service	Present	
71.	Behringer Metal Works, Inc.	108 Jabez Street	BUST- 0311357			UST-2 Tanks, 2,500 Gallons Total Capacity Installed 1975 and 1979, status active.
72.	Bell Container Corp.	615 Ferry Street	NJD001341494 Lead: BUST-0046695. Lead: BFO-IN-E91549	Container service	1980 to Present	KCSL(1995). Spill Report 10/26/89 unknown qty #4 fuel oil.. Well Search UST - 10 tanks, 80,000 gallon total capacity, installed 1944 through 1980. Status: inactive.
73.	Benjamin Moore Co.	132 Lister Avenue	NJD002456242	Paints	1920's to Present	This Company is one of America's greatest names in

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						canned paint. It has been in New Jersey (Carteret) since 1903. They started their Newark plant in the 1920's. Registered Hazardous Waste Generator (1992). Spill Report 9/30/88 20-55 gallons of acetate, acrylate. **DPCC Plan Filed.**
74.	Bennett Heat Treating & Co.	690 Ferry Street	NJD002153724, BUST-0022475	Heat treating & brazing	1960's to Present	UST-3 Tanks, 5,000 Gallons Total Capacity, Installed 1979 to 1987. Registered Hazardous Waste Generator (1992). Spill Report 1/10/92 unknown qty ammonia.
75.	Berwick Ice Urban Renewal, Inc.	123 Avenue L	BUST 0202646			UST - 1 tank, 10,000 gallon total capacity, installed 1985. Status: inactive.
76.	Biertuempfel Bros.	33 Lister Avenue		Cork	1910's to 1940's	This Company later became known as the Newark Cork Works which was recognized as the State's leading cork importer and manufacturer. 80% of the wine corks used in the State were made by this Company. The Company made 1,200 kinds of cork. Some special cork was made as stoppers for soda and beer bottles. Its related business, the United Corrugated Paper Packing Co., made bottle wrappers, crating and partitions from the shipping of bottles. October 26, 1921 Fire
77.	Black White Repair Co	63-65 Ferry Street		Auto repair	1910's to 1920's	July 21, 1920 Fire - electricity
78.	Blanchard Property Associates	164 Blanchard Street	NJD981873516			Registered Hazardous Waste Generator (1992)
79.	Blanchard Warehouse	169 Blanchard Street	NJD980786529	Warehouse	Present	
80	Blue Circle Atlantic, Inc.	194-200 Doremus Avenue	NJL600199426 Lead. BUST-0028190	Cement	Present	KCSL(1995) UST - 2 tanks, _____ gallons total capacity, installed 1967. Status: inactive.
81.	Book Covers Repair Shop	60 Lockwood Street	NJD986623809	Textiles	Present	
82	Booth & Flinn	Hamburg Place and Napoleon Street		Contractors	1910's	December 14, 1913 fire - careless use of matches. October 19, 1914 fire - electric wire.
83.	Brady Iron & Metal Co.	55-59 Lockwood Street	NJD981877764	Metal work	Present	
84.	Breyers Warehouse	414 Raymond Boulevard	NJD980769509	Warehouse	Present	Well Search. CSL (1992).
85.	Brill Equipment Co.	35 Jabez Street	NJD980504948		Present	Well Search. CSL (1992).
86.	Brills Yard	Avenue P and Wilson Avenue	NJD986647501	Railroad yard	Present	
87.	Brook Warehousing	515 Doremus Avenue	071400419005 NJD986583979		Present	**DPCC Plan Filed**
88.	Bryan's Autowreckers	567 Wilson Avenue	NJD986615490	Auto wrecking	Present	
89.	Burton-Mason Co.	83-87 Malvern Street		Leather factory	1910'a	September 30, 1918 Fire - smoking
90.	Butcher & Provisions	118 Wilson Avenue		Chemicals	1910's to 1920's	May 7, 1919 Fire - ammonia tanks - "needless"
91.	Butterworth & Judson Co.	Plum Point Lane		Chemicals	1900's to 1920's	May 2, 1894 Fire to property "from meadows burning." June 7, 1910 fire - "bursting

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						of carboy of acid." April 24, 1914 fire - broken wagon load of acid carboy. January 8, 1915 fire - broken carboy facet. September 13, 1915 fire - "bursted acid pipe - needless." May 12, 1916 Fire caused by smoking June 11, 1916 Fire caused by sparks from furnace. February 20, 1918 Fire - "acids and chemicals" April 11, 1918 Fire - "friction" April 18, 1918 Fire - "miscellaneous" May 8, 1918 Fire in the meadows June 5, 1918 Fire in die room #41 - "needless" August 16, 1918 Fire August 18, 1918 Fire August 27, 1918 Fire "electrical" October 20, 1918 Fire - "acids and chemicals" November 3, 1918 Fire - electricity. November 28, 1918 Fire - electric wires January 12, 1919 Fire - locomotive sparks March 1, 1919 Fire - friction July 11, 1919 Fire - electricity November 25, 1919 Fire - miscellaneous December 17, 1919 Fire September 20, 1920 Fire - "acids and chemicals" October 28, 1920 Fire in the Oil Department April 26, 1922 fire - "chemicals".
92	C.A. Terrill Coal Co.	117 Albert Avenue		Coal - petroleum	1900's	February 5, 1901 Fire caused by "sparks from chimney igniting the building."
93.	C.L. & R.K. Smith	Hamburg Place Road			1900's	March 2, 1904 fire caused by "kettle overheating."
94.	Calco Chemical Co., Inc.	338 Wilson Avenue		Pharmaceuticals	1930's to 1940's	December 20, 1919 Fire - "acids and chemicals" December 21, 1919 Fire - rekindled
95.	Cardolite Corporation	500 Doremus Avenue	NJD980783849	Organic chemicals	Present	**DPCC Plan Filed.** Registered Hazardous Waste Generator (1992). Ground water data unavailable.
96.	Carmen's Auto Service	Avenue P	NJD986624435	Auto service	Present	
97.	CBS Toys, Inc.	601 Doremus Avenue	ECRA 85732 NJD127253490	Plastic	1970's to 1980's	Well Search. This facility occupies what has been called the former Avenue P Landfill. Company triggered ECRA in 1985. They undertook environmental investigation of soil, groundwater, and building interiors. Volatile organic

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						compounds (benzene, chlorobenzene, and acetone) and petroleum hydrocarbons were detected in soil and groundwater. **Groundwater data available.**
98.	CEA Resource Recovery Facility	Raymond Boulevard & Blanchard Street	SWF0714G1SP01	Resource Recovery	1980's	Resource Recovery Facility - Terminated (Authorized Wastes: 10, 13, 23, 25)
99.	Celanese Chemical Co.	375 Doremus Avenue				CSL (1992).
100.	Celanese Corporation of American	Rome & St. Charles Streets	NJD986610848 E 86973	Chemicals and paints	1970's to 1990's	On January 3, 1994, NJDEP identified this site as a priority site. The department intends to use public funds to clean it up. 26 N.J.R. 259-60.
101.	Celanese Newark Terminal	Doremus Avenue				CSL (1992).
102.	Cellofilm Corp.	Cornelia Street	NJD000813451	Plastic	Present	Well Search. CSL (1992).
103.	Cellomer Corp.	46 Albert Street	NJD048797195	Resins	1970's to 1980's	Well Search.
104.	Celluloid Co.	295 Ferry Street		Plastics	1873 to 1930's	This Company is one of the first successful plastics companies in the United States. Its founder, John Wesley Hyatt is credited with being the discoverer of the first successful synthetic plastic - Celluloid. The product is a combination of cellulose nitrates (nitric acid and a cellulose, usually cotton) and champhor. It was created as a direct result of a $10,000 award offered by a New York firm to come up with a synthetic billiard ball since elephant ivory was coming into short supply. In 1878, Hyatt and his partner, Charles Burroughs patented an injection molding machine and used it to produce harness buckles, buttons, combs and shaving brush handles. Celluloid Products were popular until World War I when Bakelite was introduced. Bakelite was not flammable - Celluloid was flammable. Stories of Collars stays burning men's necks and hair pins setting woman's hair a flame were legendary. The Cellanese Corporation assumed full control of Celluloid Co. in 1941 and maintained the Ferry Street facility until the 1960's. The facility was later occupied by Courtalades Compounds, Inc. and Polymer Extruded Products. The Ferry Street facility took up three city blocks. July 9, 1903 "fire in compressor."

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						September 25, 1907 fire - "leak in oil tank." December 30, 1908 fire - unknown. April 15, 1910 fire - unknown. March 27, 1911 fire - unknown. June 26, 1912 fire - defective chimney. August 2, 1912 fire - friction in machinery. December 17, 1912 fire - unknown explosion. June 28, 1913 fire - defective flue. October 31, 1913 fire - sparks from adjoining cupola. November 14, 1914 fire - oil stove upset. May 6, 1915 fire - friction. April 29, 1916 Fire of unknown origin. June 30, 1917 fire - friction. May 16, 1918 Fire - "needless" January 17, 1919 Fire - friction October 10, 1919 Fire - miscellaneous December 4, 1919 Fire - friction July 29, 1920 Fire - friction October 30, 1920 Fire - "explosion" January 27, 1922 fire - friction in the cutting room. March 7, 1929 fire - matches. March 24, 1929 fire - smoking.
[illegible]	Cellulos Products Co.	78-80 Paris Street		Manufacturer of picture films - plastic	1920's	January 12, 1922 fire - electricity.
[illegible]	[illegible]rial Dyestuff & Chemical Co.	Plum Point Lane		Chemicals	1900's to 1920's	April 25, 1908 Fire caused by boiler. June 14, 1916 Fire caused by acid fumes August 8, 1916 Fire caused by hot fire box. December 12, 1916 Fire caused by furnace. July 25, 1918 Fire "acids and chemical August 10, 1918 Fire. August 25, 1919 Fire - gas. October 12, 1919 Fire - spontaneous combustion April 3, 1920 Fire- spontaneous combustion July 14, 1920 Fire - lightening October 15, 1920 Fire in the Naphthol Department May 4, 1922 fire - "chemicals" May 23, 1922 fire - "spontaneous combustion in chemicals mixing room." August 28, 1922 fire in mixing room - spontaneous

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						combustion. November 6, 1922 fire - furnace and chemical plant. December 22, 1922 fire - friction.
107.	Central Railroad of New Jersey	28 Lister Avenue 38-60 Blanchard Street	NJD041819475	Railroad		May 25, 1914 fire - explosion of headlight. (Freight yard and Hamburg Place). April 21, 1916 - fire of freight car caused by locomotive spark. (Freight yard and Hamburg Place).
108.	Central Stamping Co.	595-599 Ferry Street		Enamel wares	1900's to 1930's	March 1, 1910 fire - "overheated grease pot." July 26, 1910 fire - "overheating of grease pot." August 17, 1910 fire - unknown. November 1, 1910 fire - unknown. February 10, 1912 fire - "sparks from chimney." December 18, 1912 fire - "broken oil pipe." August 15, 1915 fire - overheated oven. April 2, 1917 fire. September 28, 1917 fire - Naphtha fumes.
109.	Central Steel Casting & Machinery Co.	Lister Avenue and Chapel Street		Foundry iron steel	1920's	April 27, 1922 fire - "stove." Central Steel Drum operated a drum reconditioning facility on 8.5 acres. NJDEPE required environmental investigation of soil, groundwater, and surface water in 1983. High concentrations of metals (lead, zinc, chromium, and cadmium) were found in groundwater. Site remediation and monitoring still ongoing. **Groundwater data available.**
110.	Central Steel Drum Company	704 Doremus Avenue	NJD011482577 Lead: BFCM BUST 0200617 & 0200675	Drum reconditioning	1950's to 1990's	**Groundwater Contamination.** KCSL (1995). **Cleanup underway.** This Company was the largest reconditioner of 55 gallon steel drums in the world It went out of business in the early 1980's. Many leaking drums containing hazardous substances were left on site. November 25, 1983 EPA Consent Agreement and Final Compliance Order executed (Docket No.: 2RCRA-82-0112). EPA charged this Company with using the site for the illegal generation, treatment, storage and disposal of hazardous waste. The Company was required to come into compliance with hazardous waste laws and to

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						investigate and cleanup the property. Penalty assessed. NJDEP filed a civil action in Superior Court in 1991 charging air pollution violations (Chancery Division, Essex County, Docket No.: C-152-91). In 1993, the Company filed for bankruptcy. Cleanup not completed CSL (1992). UST - 2 tanks, 7,000 gallon total capacity, installed 1944 and 1979. Status: active.
111.	Challenger Electrical Equipment Corp.	16 Herbert Street	NJL500006317 Lead: BEECRA-E89318	Electrical equipment	Present	KCSL (1995). See Federal Pacific Electric.
112.	Chapel Leather Co.	14 Chapel Street		Leather factory	1910's to 1920's	September 16, 1918 Fire - electricity
113.	Chemical Lehman Tank Lines		BUST 0097068			UST - 1 tank, 1,000 gallon total capacity, installed 1967. Status: inactive.
114.	Chem Fleur International	928-964 Doremus Avenue	NJD981080401	Chemicals	Present	**DPCC Plan Filed.** Registered Hazardous Waste Generator (1992).
115.	Chemfi Corp.	536-540 Ferry Street	NJD064313059	Chemicals	Present	
116.	Chem-Fleur, Inc.	200 Pulaski Street	NJD986572865 Lead. BEECRA-E85407, 89504	Aromatic chemicals	1960's to 1980's	**Groundwater Contamination.** KCSL (1995). **Ongoing cleanup.** Leaking underground storage tanks. Company triggered ECRA in 1989. They undertook environmental investigation of soils, groundwater, and building interiors. Groundwater sampling revealed contamination.
117.	Chemical Leaman Tank Lines	80 Doremus Avenue	NJD040743072	Chemicals	Present	Spill Report 2/12/88 700 gallons of #2 diesel fuel. February 17, 1988 N.O.V. issued for the discharge of a hazardous substance. Soil contamination resulted from spill which occurred when fuel was being loaded into a tractor. Registered Hazardous Waste Generator (1992).
118.	Chemical Waste Management of New Jersey	100 Lister Avenue	NJD089216790 TSDF-NJD089216790 BUST 0204914	Chemicals	Present	Spill Report 10/26/87 18,000 gallons with treated aqueous waste. Spill Report 6/3/88 two gallons nitric acid. Spill Report 4/17/91 unknown qty of soil contaminated with petroleum. Spill Report 2/17/92 12,000 gallons of nitric acid. Spill Report 3/23/92 5,000 gallons of sulfuric acid. Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** TSD Facility - large quantity generator (treatment and storage). UST - 1 tank, 20,000 gallon total capacity,

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						installed 1959. Status: inactive.
119.	Chemical Waste Management of New Jersey	41-85 Doremus Avenue	NJD982532301 Lead: BUST-0094377	Chemicals	Present	KCSL (1995). Registered Hazardous Waste Generator (1992) UST - 4 tanks, 21,000 gallons total capacity, installed 1973 through 1989. Status: active.
120.	Chem-Truck, Inc.	184 Doremus Avenue		Chemicals	1990's	Spill Report 8/91 5 gallons of transmission oil.
121.	Chem-Wash, Inc.	184 Doremus Avenue	NJD007875628	Chemicals	Present	
122.	City Salvage Company	Wilson Avenue	NJD980755292	Metal scrap	1990's	Well Search. CSL (1992).
123.	Cizo Brothers	Foot of Plum Point Lane		Garbage Dump - landfill	1920's	June 14, 1921 Fire
124.	Claude Harvey Associates II	600 Wilson Avenue	NJD98660905		Present	Well Search.
125.	Clear Mould	187-212 Wright Street	ECRA85082	Plastics	1980's	ECRA Investigation of soil and groundwater. BUST-removed. No remediation.
126.	Coalash & Pasinkoff	100 Ferry Street			1900's to 1910's	January 7, 1914 fire - overheated gas iron.
127.	Colonial Pipeline	986 Doremus Avenue		Petroleum	1980's to Present	Spill Report 11/8/89 unknown qty of oil.
128.	Comet Chemical Co.,	410 Adams Street	ECRA88766 NJD002142081 Lead: BEECRA	Chemicals	1980's	KCSL (1995). This cleanup resulted in a Superior Court, Appellate Division case -chemos Corp. V. State DEP, 237 N.J. supra., 359 (App.div.1989). The Court held that (1) DEP could rescind its ECRA Negative Declaration Approval and (2) Lessee was not prejudiced by the absence of toxicity standards. Comet Chemical triggered ECRA in 1988. Company undertook environmental investigation of soil and ground water. Volatile organic compounds (toluene, ethylbenzene, and xylenes) were detected in ground water. Company proposes source removal (soil excavation) as remediation. **Ground water data available.**
129.	Commercial Corrugated Container Corp.	615 Ferry Street	NJD001341494	Corrugated boxes - paper	1970's to 1980's	
130.	Conrail Oak Island	91 Bay Avenue	NJD980769525 Lead: BSCM, BUST-0309215; 0058782	Railroad yard	Present	KCSL (1995). CSL (1992). UST-3 Tanks, 12,000 Gallons Total Capacity Installed 1944, status active. UST-3 Tanks, 6,000 Total Capacity Installed 1944, status, inactive. Conrail's Oak Island Terminal occupies 56 acres. Historical spillage of #2 fuel oil during locomotive fueling operations is primary source of contamination on

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						site. Collection system and treatment plant installed in 1987. Environmental site assessment was conducted in 1989 to determine the extent of soil and groundwater contamination. Petroleum hydrocarbons were detected in soil and groundwater. Light non-aqueous-phase liquid (LNAPL) was detected in monitoring wells. Company proposed recovery well system to remove LNAPL from site. Ongoing operation and maintenance of recovery system and semi-annual groundwater monitoring occur on site. **Groundwater data available.**
131	Conrail Oak Island Landfill	Delancy Street	NJD980505572	Landfill	Present	KCSL (1995). Well Search.
132.	Conrail Oak Island Landfill	860 Doremus Avenue	BUST- 0311497			UST-3 Tanks, 14,000 Gallons Total Capacity Installed 1944, status inactive.
133.	Consolidated Color and Chemical Co.	Dock and Brown Streets	Paints	1900's to 1930's		June 29, 1907 fire - unknown. January 12, 1916 Fire caused by spontaneous combustion April 29, 1916 Fire caused by friction July 10, 1916 Fire of box car on siting caused by spontaneous combustion. August 30, 1916 Fire caused by boiler. February 14, 1919 Fire - miscellaneous June 18, 1919 Fire - spontaneous combustion
134.	Consolidated Rail Corporation	Brills Rail Yard Wilson Avenue and Avenue P	NJPDES Permit No. NJ0081361 (1991 to 1996)	Rail line		
135.	Continental Die Stuff & Chemical Co.	Plum Point Lane		Analine dies and chemicals	1910's	January 21, 1918 Fire - spontaneous combustion
136.	Continental Electric Co.	325 Ferry Street	92-07-29-0954	Electric equipment	Present	January 7, 1993. Company notified DEP that three 550 gallon USTs were being abandoned in place given their proximity to an adjacent building. Approval granted.
137.	Conus Chemical	96 Roanoke Avenue	NJD986578094	Chemicals	Present	Spill Report 9/14/89 unknown qty unknown liquid. Spill Report 1/2/90 unknown qty unknown liquid.
138	Conus Chemical	185 Foundry Street	NJD986595916	Chemicals	Present	
139.	Cook & Dunn Paint Corp.	167 Kossuth Street	NJD002154144 ECRA88672	Paints	1980's to 1990's	Well Search. Spill Report September 30, 1991. Aromatic solvent leak from an underground pipe. Less than 10 gallons discharged. CSL (1992).
140.	Cook & Dunn Paint Corp.	109-121 St. Francis Street	ECRA88284	Paints	1930's to 1980's	Six BUST- removed (fuel oil, solvents, gasoline). No leaking. Negative

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						declaration approval issued June 16, 1989.
141	Cook's Transportation Co., N.Y.	Blanchard Street			1910's to 1920's	July 20, 1920 - fire due to leaky acid tanks "needless"
142	Cooper Chemical Co.	370 Ferry Street		Chemicals	1910's to 1950's	August 21, 1914 fire - delivery wagon, carboy of acid.
143	Cooper Lighting	84 Foundry Street	ISRA95493	Lighting products	1990's	**Groundwater Contamination.** ISRA Investigation and cleanup ongoing. Cooper Lighting occupies 5 acres. Company triggered ECRA in 1995. They undertook environmental investigation of building interiors, soils, and groundwater. Volatile organic compounds (benzene and ethylbenzene) were detected in groundwater . **Groundwater data available.**
144	Coronet Chemical Co., Inc	185 Foundry Street	NJD046954715	Chemicals	1990's	
145	Country Workshop	95 Rome Street	NJD002152668	Woodworking	1970's to Present	
146	Courtaulds CPD, Inc.	295 Ferry Street	NJD980773568 Lead: BEECRA-E87A52			KCSL (1995).
147	Courtesy Container Corporation Landfill	465 Wilson Avenue (Block 5020, Lot 69)	NJD082978248 NJPDES Permit No. NJ00065170 (1987 to 1990)	Landfill	1980's	Site was used for unauthorized solid waste disposal activity in the early 1980's. The site is presently owned by the Newark Housing Authority CSL (1992).. Company undertook environmental investigation of soil as part of their underground storage tank closure activities. Petroleum contaminated soils were removed from site in 1987.
148	Craig Adhesive Co.	80 Wheeler Point Road	NJD000308817 Lead: BEECRA-E86704, E90140 BUST 0157971	Chemicals	Present	**Groundwater Contamination(?)** KCSL (1995). Registered Hazardous Waste Generator (1992) Craig Adhesives Company facility occupies 2.5 acres. Company triggered ECRA in 1986 Environmental investigation of soils, groundwater, and building interiors revealed petroleum hydrocarbon contamination of soil and groundwater. Volatile organic compounds (chlorobenzene, isopropyl alcohol, toluene, and total xylenes) were detected in groundwater at concentrations exceeding the NJDEP Groundwater Cleanup Standard. Free phase floating product layers consisting of a kerosene/gasoline mixture and toluene were present in three monitoring wells on

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						site. Product monitoring and recovery still occurring on site. **Groundwater data available.** UST - 6 tanks, 14,000 gallons total capacity, installed 1966 through 1984. Status: inactive.
149.	Crocker & Wheeler Co.	Blanchard Street		Foundry Iron, steel	1910's	October 29, 1917 fire - brush.
150.	Crompton & Knowles Corp.	52 Amsterdam Street	NJD000694190 Lead: BUST-0193908 and BFO-CA-921184 BUST 0193908	Paints, chemicals	Present	KCSL (1995). **DPCC Plan Filed.** Registered Hazardous Waste Generator (1992). CSL (1992). Company undertook environmental investigation of soil and ground water following the removal of 2 underground storage tanks. Company filed NJPDES-DGW 1991. Ground water data unavailable. UST - 3 tanks, 38,000 gallon total capacity, installed 1944. Status: inactive.
151.	Cruz Construction Co., Inc.	293 Wilson Avenue	BUST 0095574	Construction Company	Present	UST - 5 tanks, 35,000 gallons total capacity, installed 1961 through 1987. Status: active.
152.	CTI Trucking	480 Wilson Avenue		Freight	1990's	Spill Report 4/6/90 unknown qty of waste oil.
153.	CWC Industries	185 Foundry Street	NJD118868975		Present	
154.	D&J Trucking & Waste Co	310-336 Avenue P 387 Avenue P	NJD980528962 OHMP Case#77-12-16-4 Lead: BSCM SWF Permit 2683	Solid waste landfill	1970's	KCSL (1995). August 30, 1977 - NJDEP Notice of Prosecution issued for operating an unregistered solid waste facility landfill. Penalty assessed. Cleanup demanded. Many drums observed by Newark Police being buried on site. December 1977, Newark Police arrest two men caught dumping drums of chemical waste at this property. Dumping appeared to be occurring for many months. Some of the material appeared to be "still bottoms" and bad paint batches from paint manufacturers. February 14, 1978 - NJDEP Administrative Order issued revoking the Company's Permit to collect and haul solid waste. 1979 - EPA did an inspection and determined that the site may be a potential hazardous waste site. 1982 - during Turnpike widening operations, the Turnpike Authority discovers buried drums on this property. Newark Housing Authority (NHA)

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						takes ownership of property. NHA ordered to remove drums. 1990 - EPA Site Inspection Report - notices that the site has still been used as a junk yard. Property consists of construction debris, used tires, used commercial vehicles, paint cans, 55 gallon drums, roof shingles and other debris. Hazardous substances suspected to be in the soil and drainage ditch. EPA soil samples show high concentrations of metals. 1992 - NJDEP Inspection confirms contaminated debris still present on site. Responsibility for cleanup still being negotiated with NHA. CSL (1992). On January 3, 1994, NJDEP identified this site as a priority site. It intends to use public funds to clean it up. 26 N.J.R. 259-60.
155.	D&L Autoparts	349 Raymond Boulevard	NJL600163752 Lead: BAC-931115	Auto parts	Present	KCSL (1995).
156.	Daily & Ivins	Foot of Doremus Avenue			1910's	May 29, 1916 Fire
157	Darling Delaware Co.	825 Wilson Avenue	NJD986602316 Lead: BUST-0200864	Tallow	1980's to Present	KCSL (1995). Registered Hazardous Waste Generator (1992) UST - 2 tanks, 16,000 gallons total capacity, installed 1944 and 1987. Status: inactive.
158.	Dayco Corp.	133-139 Kossuth Street	NJD064266943		Present	
159.	Delancy Street Landfill (North and South)	Delancy Street	NJPDES Permit No. NJ0061638 (1987 to 1990), NJ0062421 (north) NJL900000803 (north) NJL900001090 (south)	Landfill	Mid 1900's	CSL (1992). Several photographers from the 1940'and 1950's show that these sites were areas of uncontrolled dumping activity. (Zdepski, 1987)
160.	DeLeet Merchandising	26 Blanchard Street	NJD011979945 Lead: BUST-0061328	Paper boxes	Present	KCSL (1995). Spill Report 4/11/91 55 gallons of solvent. **DPCC Plan Filed.** Spill Report 3/2/90 unknown qty of oil. Spill Report 11/14/91 less than 15 gallons liquid hydro-carbon gas. Spill Report 4/13/92 1,400 gallons of metholyne chloride. Registered Hazardous Waste Generator (1992) Company undertook environmental investigation of soil and groundwater. Volatile organic compounds (1,1,1-trichloroethane, 1,1-dichloroethane, benzene, methylene chloride, xylenes, chloroform, toluene, ethylbenzene, and vinyl chloride) were detected in groundwater at

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						concentrations exceeding NJDEP Groundwater Cleanup Standards. Groundwater recovery system and quarterly monitoring occur on site. **Groundwater data available.** UST - 45 tanks, 168,000 gallons total capacity, installed 1972 through 1987. Status: active.
161.	Delisa Pallet Corp.	91-97 Blanchard Street	BUST - 0051662	Pallett Company	Present	UST - 2 tanks, 5,000 gallons total capacity, installed 1972. Status: active.
162.	Daidone Electrick, Inc.	200 Raymond Boulevard	BUST- 0314066			UST-3 Tanks, 13,500 Gallons Total Capacity Installed 1945, status active.
163	Delancy Street Industrial Complex	164 Delancy Street	BUST 0178239			UST - 1 tank, 3,000 gallon total capacity, installed 1988. Status: active.
164.	Devino Landfill	845 Doremus Avenue	SWF0714E1SP01	Landfill	1980's	Solid Waste Facility Landfill - Not operating (Authorized Wastes: 13)
165.	Dewey's Garage		NJD011488012	Auto service		
166.	DIA Trucking Company, Inc.	233 Wilson Avenue	BUST 0179175	Trucking Company	Present	UST- 1 tank, 1,000 gallon total capacity, installed 1984. Status: inactive.
167.	Diamond Shamrock (Lister Avenue Site)	80-120 Lister Avenue	NJD981131576 NJD980528996 Lead: BFCM	Chemicals	1950's to 1980's	KCSL (1995). Registered Hazardous Waste Generator (1992) **Superfund Site. Cleanup underway.** This site is the source of significant dioxin releases. Cleanup has been underway for ten years. Surrounding soils have been cleaned up. Impact to the Passaic River is still being investigated. The Company signed an ACO with NJDEP March 1984 and December 1984. The Company has posted a Letter of Credit for approximately $16,000,000 This Site is ranked 77th of 108 on the National Priorities List. Diamond Shamrock facility is a Superfund site. Environmental site investigation revealed spoil and ground water contamination. Surface water study revealed site operations have not impacted the Passaic River. Volatile organic compounds (accetone, chloroform, chlorobenzene, venzene, toluene, ethylbenzene, xylenes, vinyl chloride, trichloroethene, methylene chloride, 1,2-dichloroethane, and 1,1,1-trichloroethane), semi-volatile organic compounds (phenols, 2,4-D, and dioxin), metals (arsenic, nickel, lead, zinc, mecury,

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						cooper, chromium, and cadmium), and pesticides (4,4'-DDT, 4,4'-DDD, 4,4'-DDE, alpha-BHC, and gamma-BHC) were detected in ground water and concentrations which exceed their respective NJDEP Ground Water Quality Standards. A ground water remediation system was installed. **Ground water data available.**
168.	Direct Environmental, Inc.	164 Blanchard Street	NJD0384773245 Lead: BEECRA-E84301	Environmental consulting	1990's	KCSL (1995).
169.	Diversified Packaging Corp.	222 Thomas Street	NJD980484919	Paper/packaging	Present	
170.	Duralac Chemical Corp.	84 Lister Avenue	NJD002150225; BUST 0018489	Chemicals	1930's to 1990's	Well Search. UST-3 Tanks, 5,000 Gallon Total Capacity, Installed 1967 to 1982. ECRA Case. This Company ceased operations in 1991 and triggered ECRA. It submitted proposed soil and groundwater sampling plans but then went bankrupt and did not execute those plans. NJDEP (Chris Gibbons) recently transferred the case to EPA (Eric Wilson). No sampling taken yet. CSL (1992).
171.	Eagle Picher Lead Co	120 Lister Avenue	Lead	1910's to 1960's		May 11, 1922 Fire - electricity. July 11, 1922 fire - electrity.
172.	Edward Simon & Brothers	77 St. Francis Street and Main Street		Leather Tanning, trunks, bags, valises, shawls straps, trimmings and bag ornaments. Also, brass, gold, silver, nickel plated hardware.	1863 to early 1900's	This Company manufactured military belts, pistol holsters, saddle bags, cartridge boxes, shot belts, gun cases, bullet pouches, dog collars, fishing tackel and other leather items. Business increased during the civil war when they were awarded government contracts. In 1869, they built their plant on St Francis Street. (Prior to that it was on Market Street). The firm also made everything in the trunk and bag lines. The plant also had its own saw and planing mills and it manufactured its own hardware and plating.
173.	Elan Chemical Co.	268 Doremus Avenue	NJD042895680			Spill Report 9/25/88 100 gallon #4 fuel oil. Registered Hazardous Waste Generator (1992). Company undertook environmental investigation of soil in the former drum storage area per NJDEP request of 1991 Base neutral compounds (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene) and metals (chromium) were detected in soils. Remediation was the

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						encapsulation of the former drum storage area with an impermeable asphalt cover.
174	Elizabethtown Smelting Co.	88 Paris Street		smelting work - iron, steel	1910's to 1920's	October 17, 1918 Fire - "miscellaneous" May 13, 1919 Fire - unknown June 15, 1921 Fire - boiler explosion
175	Emco Steel, Inc.	357-391 Wilson Avenue	NJD052204906	Iron and Steel	Present	
176	Engelhard Corporation	429 Doremus Avenue	NJD064274657 Lead: BEECRA-E85689 NJPDES Permit No. NJ0001171 (1993-1998) TSDF - NJD064274657 BUST 0099570	Chemicals	1960's to 1990's	KCSL (1995). Spill Report 1/26/87. 100 gallons - sodium hydroxide. Spill Report 6/2/87 90-gallons hydrochloric acid. Spill Report 5/3/87 8 gallons hydrochloric acid. Spill Report 6/4/87 10-gallons hydrochloric acid. Spill Report 6/10/87 25-gallon hydrochloric acid. Spill Report 5/16/88 unknown qty of oil. Spill Report 3/14/88 unknown qty oil. ECRA Cleanup undertaken. No Further Action Letter for both soils and groundwater will soon be issued. TSD Facility - large quantity generator (treatment and storage). CSL (1992). Company triggered ECRA in 1985. Company undertook environmental investigation of soil and groundwater. Metals (cadmium, chromium, lead, and zinc), volatile organic compounds (benzene, ethylbenzene, and chlorobenzene) and total petroleum hydrocarbons were detected at elevated concentrations in the groundwater. Contaminant concentrations decreased over time due to cessation of operations and excavation of petroleum contaminated soils. Metal concentrations, although decreased, remained above NJDEP Groundwater Cleanup Standards. Company proposed a Classification Exception Area (CEA) for the shallow groundwater in 1995. **Groundwater data available.** UST - 9 tanks, 112,550 gallons total capacity, installed 1951 through 1974. Status: inactive.
177	ENSI, Inc.	94 Avenue L	NJD981075468	Environmental consulting/contracting	1990's	
178	Erie Railroad	Manufacturers Place Railroad spur		Railroad	Early 1900's	August 22, 1918 Fire - "locomotive spark"

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
179.	Essex & Hudson Gas Co.	665 Ferry Street		Gas - chemicals	1900's	January 10, 1900 fire of unknown origin.
180.	Essex Chemical Co.	330 Doremus Avenue	NJD002153898	Sulfur dioxide	1940's to 1990's	Registered Hazardous Waste Generator (1992). Ground water data unavailable.
181.	Essex County Resource Recovery Facilities	66 Blanchard Street	SWF0714X1SP01 NJD982280497	Resource Recovery	1990's	Resource Recovery Facility. Spill Report 10/4/90 one gallon #2 fuel oil.
182.	Essex Generating Station	155 Raymond Boulevard	BUST - 0053002	Generating Station		UST - 17 tanks, 7,000 gallons total capacity, installed 1944 through 1952. Status: inactive.
183.	Essex Industrial Chemical Corp.	351 Doremus Avenue	NJL500011069 Lead: BEECRA-E89240, E88903	Chemicals	1990's	KCSL (1995). Spill Report 9/12/89 100 gallons of molton sulfur.
184.	Eureka Spring Co., Inc.	9-15 Manufacturers Place	BUST 0223210			1 tank, 275 gallons total capacity, installed 1966. Status. inactive.
185.	Express Container Corp.	105 Avenue P	NJD002150605; BUST 0010847	Containers	1940's to Present	UST-5 Tanks, 40,000 Gallon Total Capacity Installed 1987.
186.	F.J. Kastner Brewing Co	69 Magazine Street		Brewing	1900's to 1920's	March 28, 1911 fire - "careless use of matches."
187.	Fairmount Chemical Co.	117 Blanchard Street	NJD002151322 NJPDES Permit No. NJ0033430 (1986-1991)	Organic chemicals	1930's to 1980's	**DPCC Plan Filed.** Registered Hazardous Waste Generator (1992). Well Search CSL (1992).
188.	Farmer's Feed Co.	467 Raymond Boulevard	NJD003913662 BUST 0144696	Cattle feed	1950's to 1990's	UST - 3 tanks, 22,000 gallons total capacity, installed 1947 through 1975. Status: active.
189.	Farmer's Product Co.	236 Doremus Avenue		Farm products	1910's to 1920's	August 22, 1913 fire - incendiary. January 25, 1922 fire - auto backfire.
190.	Federal Bronze Products, Inc.	50 Wheeler Point Road	BUST 0083982	Non-Ferrous Metals	Present	UST - 5 tanks, 8,500 gallons total capacity, installed 1944 through 1977 Status: active.
191.	Federal Pacific Electric Co	150 Avenue L	NJD002146272 Lead. BEECRA-E86407, E87970, E89318 NJPDES Permit No.: NJ0061271 (1986-1991) 84-11-30-04C Administrative Consent Order executed June 26, 1986.	Electrical equipment	1930's to 1980's	In 1984/85, a former employee notified NJDEP that he believed that this Company was dumping a PCB contaminated transformer oil on site. Investigation revealed no evidence of dumping of this material but there was evidence of dumping of paint sludges. The ECRA Investigation for this property included underground storage tanks, transformers and circuit breakers, drum storage areas, sumps, swales, flooring and groundwater. KCSL (1995). CSL (1992). Company triggered ECRA in 1986. They undertook environmental investigation of soils and groundwater. Volatile organic compounds (tetrachloroethene, trichloroethene, 1,2-dichloroethene, and vinyl chloride) were detected in groundwater at concentrations exceeding the

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						NJDEP Groundwater Cleanup Standards. Remedial action includes a groundwater treatment system and quarterly groundwater monitoring. **Groundwater data available.**
192.	Federal Storage Warehouses	320 Elizabeth Avenue	BUST 0157340	Warehouse	Present	UST - 5 tanks, 60,000 gallons total capacity, installed 1961. Status: active.
193.	Federated Metals Corp.	150 St. Charles Street	NJD079320495 Lead: BEECRA-E84193 NJPDES Permit No., NJ0099058 (1985 to Present) TSDF-NJD079320495 BUST 0045001	Non-ferrous metal	1930's to Present	KCSL (1995) TSD Facility - large quantity generator (land disposal). CSL (1992). Federated Metals ceased operations in 1984 and filed a Closure Plan wit the NJDEP. They undertook environmental investigation of soil, groundwater and building interiors. Metals (arsenic, barium, lead, cadmium, and selenium) were detected in groundwater. Remedial action includes soil and sludge removal. Quarterly groundwater monitoring still occurrs on site. **Groundwater data available.** UST - 3 tanks, 12,000 gallons total capacity, installed 1954 through 1966. Status: inactive.
194.	Feigenspan Brewery	Christie Street		Brewing	1900's to 1940's	October 20, 1914 fire - overheated pitch. March 20, 1915 fire - defective gas fixture. October 14, 1927 fire - matches.
195.	Feigenspan Brewing Co.	90 Ferry Street		Brewing	1900's to 1940's	July 8, 1908 Fire of unknown origin.
196.	Fencello & Attrili	508 Ferry Street			1910's	June 18, 1912 fire - electric wires.
197.	Ferry Auto	460 Ferry Street	BUST 0172398	Auto Sales	Present	UST - 5 tanks, 25,000 gallons total capacity. installed 1989. Status: active.
198.	Fiberflex Co.	574 Ferry Street	NJL500045273 Lead: BEECRA-E93475	Plastics	1990's	KCSL (1995).
199.	Fine Pigments, Inc.	80 Blanchard Street	NJD053522801	Chemicals	1940's to 1980's	
200.	Fiore Demolition	Rutherford Street	SWF0714B1SP01	Solid Waste	1980's	Solid Waste Facility Landfill - Terminated
201.	Fiore Estate	200-206 Delancy Street	BUST- 0238197			1 tank, 2,000 gallons total capacity, installed 1944. Status: inactive.
202.	Fiore Estate	209 Malvern Street	BUST- 0238205 -			1 tank, 10,000 gallons total capacity, installed 1944 Status: active.
203.	Firmenich Co.	928 Doremus Avenue	NJ0000281410	Chemicals	Present	
204.	Fiske Brothers Refining Co.	Lister Avenue	NJD002153070	Petroleum	Est. 1870 to Present	At their inception, the business engaged in refining and as an oil merchant. In 1879, it established a lubricating grease department. Business grew steadily and in 1890, the

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						business was incorporated. They established their Newark Foundry in 1890. The business covered several acres including 5 buildings constructed for the manufacturer and handling of lubricating oils and greases. Their products included all lines and grades of lubricating oils and greases for every purpose including harness dressings and soluble oils. The company also dealt extensively in animal and vegetable oils.
205.	Flexcraft Industries	527 Avenue P	NJD002150928	Solvents	1960's to 1990's	CSL (1992).
206.	Flockhart Foundry	83 Polk Street	NJD002148641	Iron and steel	Present	
207.	Flower City Kid Works	Magazine and Frankfurter Streets		Leather	1890's to 1910's	September 28, 1901 Fire of unknown origin. February 24, 1906 fire caused by "sparks from buffing wheel and dust box."
208.	Foltzer Service Center, Inc.	303 Raymond Boulevard	BUST 0079428	Vehicle Service	1980's	UST - 5 tanks, 25,000 gallons total capacity, installed 1959 through 1977. Status: inactive.
209.	Foundry Street Complex	185 Foundry Street	NJL000010967 Lead: BSCM	Chemicals	1980's	KCSL (1995)
210.	Frazer & Burchenal	Hamburg Place			1900's to 1910's	June 30, 1914 fire - overheated boiler.
211.	Freddy's Service Station	157-161 Wilson Avenue	BUST 0087780	Service Station	Present	UST - 5 tanks, 10,000 gallons total capacity, installed 1947. Status: active.
212.	Friedmans Express	Avenue P and Foundry Street		Freight	1990's	Spill Report 11/4/87 - Unknown qty of MEK. The Friedman's Express facility is situated on Avenue P in the city of Newark. The company undertook environmental investigation of soil and groundwater as a result of a pending real estate transaction. Volatile organic compounds (benzene, chlorobenzene, xylenes, and vinyl chloride), semi-volatile organic compounds (phenanthrene), and metals (lead) were detected in groundwater at concentrations exceeding the NJDEP Groundwater Cleanup Standards. Company maintains groundwater contamination originates on adjacent property. The establishment of a Classification Exception Area for the Friedman's Express site is still pending. **Groundwater data available.**
213.	G.J. Chemical Co.	128 Doremus Avenue	071400407000 NJPDES Permit No. NJ0066974 (1988 to Present)	Chemicals	1980's to Present	**DPCC Plan Filed**
214.	Gallagher Power Plant	10 Mary Street	NJD981081078		Present	

No	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
	Services					
215	Garden State Associates	357 Wilson Avenue	BUST 0205742			UST - 3 tanks, 16,000 gallons total capacity, installed 1966. Status: inactive.
216	General Foundaries	9 Albert Street		Iron, Steel	1980's	Spill Report 7/22/88 unknown qty preservative coatings.
217.	General Lead Battery Company	Lister Avenue and Chapel Street		Lead batteries non-ferrous	1910's to 1920's	January 18, 1921 Fire - smoking January 21, 1921 Fire - smoking
218.	Georgia Pacific Corp.	290 Ferry Street	NJD062036892 Lead: BEECRA-E8456A BUST 0107219	Chemicals	Present	KCSL (1995). Spill Report 2/10/92 4-10 gallons transformer oil. Registered Hazardous Waste Generator (1992). CSL (1992). Georgia-Pacific Corporation operated a plastic film and sheet manufacturing facility on 11.7 acres. The company triggered ECRA in 1984. Environmental investigation of soil, groundwater and building interiors revealed site wide contamination. Volatile organic compounds (methylene chloride, acetone, methanol, trans-1,2-dichloroethene, and ethylbenzene) were detected in groundwater. Remedial action includes installation of groundwater pump-and-treat system and removal of 32 underground storage tanks and 9000 tons of soil. Company maintains the groundwater treatment system and performs quarterly groundwater sampling. **Groundwater data available.** UST - 32 tanks, 225,000 gallons total capacity, installed 1957. Status: inactive.
219.	Getty Refining & Marketing Corp.	86 Doremus Avenue	071400404000 NJD986604544 Lead: BEECRA-E84455 NJPDES Permit No NJ0026034 (1989 to 1991) NJD049850910		1930's to Present	KCSL (1995). This oil terminal was construction in 1930 and was operated as a petroleum storage facility by the Atlantic Richfield Company (ACRO) until 1950 at which time it was acquired by Getty. Getty also operated the terminal as a petroleum storage facility from 1950 to 1985. Texaco had acquired Getty and in 1984 the U.S. Government required Texaco to release some of its holdings so as to not violate anti-trust regulations. Consequently, in July 1984, Texaco sold the property to Power Test Corporation. This triggered ECRA and Texaco entered into an ACO with NJDEP to permit the sale to proceed forward prior

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						to compliance with ECRA. In 1988, during the groundwater investigation and remediation phase of the ECRA work, one to four foot of free floating petroleum products was found in the shallow groundwater. Spill Report 1/14/88. 300 gallons #2 fuel oil. Spill Report 7/22/88 2,000 gallons gasoline. Spill Report 2/02/87. Oil sheen. **DPCC Plan Filed.** Spill Report 7/24/88 unknown qty gasoline.
220	Goldsmith Leather Co.	117 Paris Street		Leather	1930's to 1970's	Bernard Goldsmith established a tannery for reptile skins. In 1934, he imported 800,000 reptile skins including alligator, lizard, ermine (deep sea water snakes from Vietnam), Karung (river snakes from Dutch East Indies), South American Rajh lizards, boa constrictors, South American Anacondas and pythons from Dutch East Indies and Vietnam. In the 1960's/early 1970's, the Company moved to Mulberry Street then closed in 1980.
221	Granty Manufacturing Co	12 Delancy Street			1910's	February 6, 1918 fire - "backfire"
222	Graphic Vinyl Products, Inc.	400 Ferry Street	NJD986602332	Plastics	Present	
223	Graver Chemical	70 Lockwood Street	NJD056707866	Chemical	Present	
224	Grignard Chemical Co.	185 Foundry Street	NJD002201093 Lead: BEECRA-E90624	Lubricants and greases	1970's to 1980's	KCSL (1995). Well Search. CSL (1992).
225	Guard Chemical Co.	One Avenue L	NJD982186421	Chemicals	Present	
226	Gulf Oil Chemicals Co.	652 Doremus Avenue	NJD038478277	Petroleum	Present	
227	Gulf Refining Co.	Avenue L and Mary Street		Petroleum	Present	November 27, 1917 fire - backfire from truck.
228	H.F. Muselbach & Bro.	St. Francis Street			1910's	October 31, 1917 fire - "needless."
229	H F Sommer & Co.	215-237 Hamburg Place		Leather Factory		April 15, 1918 fire - "miscellaneous" August 23, 1921 Fire - boiling kettle
230	H J Hoerner & Sons	Lister Avenue				February 21, 1908 fire - unknown
231	Hahne & Co.	Lister Avenue			1910's	March 9, 1915 fire - friction.
232	Hartz Mountain Industries	601 Doremus Avenue	BUST 0125435			UST - 4 tanks, _____ gallon total capacity, installed 1976 through 1982. Status: inactive.
233	Harvey Steel Co.	Plum Point Lane		Iron, steel	1890's to 1910's	July 29, 1902 fire caused by matches.
234	Hay Foundry & Iron Co.	Plum Point Lane		Iron and steel	Mid 1890's to 1930's	This Foundry operation began as the Eagle Iron Foundry on Alling Street near Market Street (just east of today's Penn Station) in the 1830's. It had a successful growth period during the Civil War and by 1884 operated two divisions

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						- the foundry and the iron railing works - employing approximately 50 men producing a wide variety of castings in different forms of iron railings. The Company later changed its name to Hay Foundry and Iron Works Co. and in 1889 acquired the Harvey Steel Works located on Plum Point Lane (now Roanoke Avenue) near the Central Railroad of New Jersey line in the Newark Meadows. It retooled in the mid 1890's as a combined Wrought & Cast Iron Foundry and Steel Works. Production increased during the First World War. The business eventually closed in the 1930's. Bristol-Donald Co. presently occupies the site. November 29, 1904 fire caused by "overheated oven." April 14, 1908 Fire caused by sparks from core room. May 29, 1908 fire - "spark from casting." October 19, 1908 Fire resulting in "burning meadows." November 12, 1908 Fire caused by spark by casting. June 7, 1910 fire "spark from cupola." August 31, 1912 fire - "electric wires." May 27, 1915 fire - matches March 1, 1916 Fire caused by electric wires September 13, 1918 Fire - locomotive spark September 29, 1921 Fire - smoking
235.	Heller & Merz	338 Wilson Avenue		Ultra marine blue	1872 to 1930 Founded 1879.	This Company was the first successful manufacturer of artificial ultramarine blue in the U.S. Pigment was made from finely ground lapis lazuli, an expensive precious stone. The Company moved to Hamburg Avenue (now Wilson Avenue) in 1872 and grew to cover 32 acres. Its ultramarine blue was used in the manufacturing of paint, paper, printing inks and for laundry purposes. American Cyanamid bought the Company in 1930. Raw materials included sulfur, soda ash alkali, clay and charcoal, pitch or resin that was mixed in a high heat furnace. Pigments were washed to remove water soluble compounds and dried. Most buildings are

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						now demolished. Dewey Auto Salvage Company occupies this site now. February 3, 1902 fire caused by overheated chimney. September 14, 1906 fire - "overheating of drying box." December 24, 1911 fire - "kettle of material." May 3, 1920 Fire in the blue works - "acids and chemicals" November 2, 1922 fire - in vacant lots.
236.	Heller Truck Body Corp.	222 Thomas Street	NJC876013665 Lead: BEECRA-E90403	Truck bodies mfg. - metal work	Present	KCSL (1995). Heller Truck Body has operated its truck manufacturing facility. The company triggered ECRA in 1990 after vacating the leasehold property. Environmental investigation revealed soil and groundwater contamination. Chlorinated solvents (trichloroethene, tetrachloroethene, and cis-1,2-dichloroethene) were detected in groundwater in excess of NJDEP Groundwater Quality Standards. Underground storage tank and soil removal eliminated contamination source. Company proposed a Classification Exception Area for the shallow groundwater in 1996. **Groundwater data available.**
237.	Henry Lang Co.	Plum Point Lane			1890's to 1910's	December 23, 1903 Fire caused by "defective flue." November 7, 1906 fire caused by "sparks from brush fire."
238	Heracus	65 Euclid Avenue	NJD002449262	Non-ferrous smelting	1980's to 1990's	Registered Hazardous Waste Generator (1992)
239	Hertz Corporation	900 Doremus Avenue	NJD981876824 BUST - 00290188	Equipment rental	Present	Spill Report 12/2/91 50-100 gallons of motor oil. 1987 unknown qty of gasoline. Registered Hazardous Waste Generator (1992) UST - 2 tanks, 1,000 gallons capacity, installed 1972. Status: active.
240.	Hertz Equipment Rental	41-85 Doremus Avenue	NJD986615425	Car Rental		Registered Hazardous Waste Generator (1992)
241.	Hess Corp.	1111 Delancy Street	NJD053510152 BUST 0165260	Petroleum	Present	Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** Spill Report 12/13/90 one gallon gasoline. UST - 1 tank, 2,000 gallons total capacity, installed 1987. Status: inactive.
242.	Hess Corp.	148-182 Doremus Avenue	NJD030254874	Petroleum	Present	Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** Spill Report 12/5/89 50-75 gallons of fuel oil.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Spill Report 11/27/90 400 gallons #6 fuel oil Spill Report 3/25/91 unknown qty #2 fuel oil. Spill Report 10/2/91 3 gallons of gasoline. Spill Report 12/6/91 10 gallons of gasoline. Spill Report 3/24/92 unknown qty of oil sheen. Spill Report 4/23/92 75 gallons of gasoline. Spill Report 10/20/92 10-15 gallons of gasoline.
243.	Hewitt's Steel Works	Chapel Street and Lister Avenue		Manufacturers Steel, Iron	1910's to 1920's	April 27, 1917 fire - electricity.
244	Hilton Davis Chemical Co.	120 Lister Avenue	NJD000537274 Lead: BEECRA-E86941, E88240 ACO executed January 3, 1989. NJD000537274	Manufacturer of pigments for the automobile, textile, drug and cosmetic industries.	1980's	KCSL (1995). Three different pigments are produced by this Company - phthalo blue (automobile industry), transoxide (textile industry) and D&C Colors (cosmetic industry). Sterling Drug, Inc. formerly owned and operated Hilton Davis Chemical Company, a pigment manufacturer. Sterling triggered ECRA in 1986. The company undertook investigation of soil and ground water. Volatile organic compounds (toluene, ethylbenzene, and chlorobenzene), semi-volatile organic compounds (naphthalene, fluorene, phenanthrene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and phenol) and metals (chromium. lead, arsenic, and zinc) were detected in ground water. Company cited adjacent industrial facilities (Diamond Shamrock, Stanley Tools) as source of VOC and SVOC contamination. Subsequent semi-annual ground water monitoring reveals static, and in some cases, decreasing contaminant concentrations. **Ground water data available.**
245.	Hoechst Celanese Chemical Co.	354 Doremus Avenue	NJL000061135, Lead: BFO-IN-E94136 BEECRA-E86973 NJD980530299	Chemicals	1990's	KCSL (1995). Spill Report 2/2/87. 4,000 gallons pelargonic acid. Spill Report. 8/16/87 unknown qty. Formic acid. Spill Report 12/2/87. 48-50 gallons of acetone. Spill Report 2/6/88 unknown

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						qty of formaldehyde. Spill Report 8/11/88 20 gallons 50% formaldehyde solution. Spill Report 9/27/88 100 gallons of ethyl acryalte Spill Report 6/18/90 500 gallons acrylic acid. Spill Report 4/6/92 unknown qty butyl acrylate. **DPCC Plan Filed.**
246.	Hoechst-Celanese Chemical Co.	Rome & St. Charles Streets	NJD9866610848 Lead: BSCM	Chemicals	1990's	KCSL (1995). CSL (1992). Hoechst Celanese Corporation occupies 27 acres. The site is situated on the west bank of the Passaic River. Company triggered ECRA in 1986. They undertook environmental investigation of soils, sediments, surface water and groundwater. Volatile organic compounds (benzene, chlorobenzene and methylene chloride), PCBs and cyanide were detected in groundwater at concentrations exceeding NJDEPE Groundwater Cleanup Standard. Based on findings, company proposes natural remediation as a permanent groundwater solution and establishment of a Classification Exception Area for the site. **Groundwater data available.**
247.	Hollander Brothers	232 Ferry Street		Store	1920's	February 3, 1922 fire "suspicious".
248.	Honig Chemical Corporation	414 Wilson Avenue	07140101568000 NJD05509161			**DPCC Plan Filed.** This site may have been filled prior to 1940. (Zdepski, 1987)
249.	Hudson Leather Co	15 Margareta Street		Leather	1900's to 1920's	April 12, 1915 fire - explosion of lantern.
250.	Hudson Tool & Die Co, Inc.	18 Malvern Street	NJ002142453 Lead: BEECRA-E90A12 BUST - 0176286		Present	KCSL (1995). Spill Report 4/10/91 5 gallons #2 fuel oil. UST - 3 tanks, 8,000 gallons total capacity, installed 1966 through 1979. Status: inactive.
251.	Hudson Tool & Die Co., Inc	59 Wall Street	NJD080620040 Lead: BEECRA-E94116 NJD002142453	Metal Work	Present	KCSL (1995).
252.	Hummel Chemical Co., Inc.	185 Foundry Street	NJD002174712	Chemicals	Present	Well Search.
253.	Hummel Lanolin (CWC Ind.)	185 Foundry Street	ECRA Case No. 86732 NJD002175016 BUST 0142977	Chemicals	Present	NJDEP has noticed a heavy fluorescein dye in groundwater at the property. CSL (1992). Hummel Lanolin facility occupies 1 acre. The company triggered ECRA in 1986. They undertook environmental investigation of soil and ground water. Petroleum hydrocarbons and volatile

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						organic compounds were detected in soil near the former fuel oil underground storage tank. **Ground water data available.** UST - 2 tanks, _____ gallons total capacity, installed 1975. Status: active.
254	Hurley Forge, Inc.	70-82 Manufacturers Place	NJL500015417 Lead: BEECRA-E90A55 BUST 0123310	Non-ferrous	Prensent	KCSL (1995). Hurley Forge, Inc. occupies 1 acre. Company triggered ECRA in 1990. They undertook environmental investigation of soil, ground water, and building interiors. Volatile organic compounds (benzene and xylene) were detected in ground water at concentrations above NJDEP Ground Water Quality Standards. A free product layer was present in 1 of 5 monitoring wells. Free product recovery system installed in 1992. All sources of contamination remediated. Status of ground water remediation is no further action. Site designated a Classification Exception Area in 1996. **Ground water data available.** UST - 4 tanks, 21,000 gallons total capacity, installed 1944 through 1975. Status: inactive.
255	Hi Product Feed, Inc.	305 Doremus Avenue	NJD000538561	Feed	Present	
256	Illinois Leather & Hair Co.	Blanchard Street		Leather	1890's to 1910's	February 7, 1901 Fire "supposed from dry room."
257	IMC Chemicals Group	96 Blanchard Street	NJD011484888	Chemicals	Present	
258	Imperial Leather Co.	Chapel Street		Leather	1900's	April 6, 1904 fire to grass.
259	Industrial Hard Chromium, Inc.	7 Rome Street	NJD986627081 NJD011501798 BUST - 0237981			Registered Hazardous Waste Generator (1992) 1 tank, 6,000 gallons total capacity, installed 1944. Status: inactive.
260	Industrial Petro-Chemicals, Inc.	128 Doremus Avenue	NJD986589927 Lead: BEECRA-E86317; BUST-0021322			KCSL (1995). UST-2 Tanks, 5,000 Gallons Total Capacity, Installed 1990 Industrial Petrochemicals, Inc. triggered ECRA in 1986. Company undertook environmental investigation of soil and ground water Volatile organic compounds (benzene, methylene chloride, xylenes, vinyl chloride, and toluene), base

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						neutral compounds (isophorone, 2-methylnaphthalene, and bis(2-chloroethyl)ether), and chloride were detected in ground water at concentrations which exceed their respective NJDEPE Ground Water Quality Standards. Company proposed no further action for ground water remediation. **Ground water data available.**
261.	Industrial Waste Technologies	8 Lister Avenue	NJD986593028	Waste Services	Present	
262.	Industrial Welding	Ferry Street	NJD982183147			Spill Report 5/4/87. Unknown qty. #2 fuel oil.
263.	International Metallurgical Services	196 Blanchard Street	NJD982273559	Non-Ferrus metals	1980's to 1990's	CSL (1992). International Metallurgical Services entered into Memorandum of Agreement with NJDEP in 1994. Company undertook environmental investigation of soil and ground water. Metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected in ground water at concentrations exceeding NJDEP Groundwater Quality Standards. **Ground water data available.**
264.	International Motor Co.	560 Ferry Street		Machine shop	1910's	September 12, 1913 fire - can of gasoline.
265.	Interport Maintenance Co., Inc.	797-829 Doremus Avenue	BUST- 0255909			UST-5 tanks 9,000 Gallons Total Capacity Installed 1975-1987, status active.
266.	Ironbound Amusement Co	128 Wilson Avenue		Movie Theater	1910's to 1930's	December 25, 1920 Fire - miscellaneous
267.	Ironbound Cleaners	131 Ferry Street	NJD980536742	Cleaners	1990's to Present	Registered Hazardous Waste Generator (1992)
268.	Ironbound Transportation Park	435 Wilson Avenue	BUST 0218513			UST - 1 tank, 1,500 gallons total capacity, installed 1959. Status: inactive.
269.	J.B. Gruman & Co.	77-79 St. Francis Street		Pharmaceuticals - chemicals	1910's to 1950's	January 29, 1915 fire - spark in grinding machine.
270.	Jefferson Printing Co.	97 Ferry Street		Printing	1910's	January 15, 1912 fire - "spontaneous combustion of oily rags."
271	Jersey Millwork Co.	38 Blanchard Street	BUST 0171209	Mill works	1990's	Spill Report 3/14/90 50 gallons of diesel fuel. UST - 3 tanks, 12,000 gallons installed 1980 through 1982. Status: inactive.
272.	John Brown Engineers	35 Blanchard Street	NJD986610624	Engineers	Present	Registered Hazardous Waste Generator (1992)
273.	John L. Armitage & Company	245 Thomas Street	NJD002141711 Lead: BSM-9307164	_____ and thinners - paints	1870's to 1960's	KCSL (1995). J.L. Armitage Company occupied 2.5 acres. Company triggered ECRA in 1986. Environmental investigation

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						revealed soil and groundwater contamination. Elevated levels of volatile organic compounds (toluene, xylenes, ethylbenzene, methylene chloride, and trans-1,2-dichloroethene), PCBs and petroleum hydrocarbons were found in groundwater samples. Groundwater recovery system installed on site in 1988. Monthly groundwater monitoring followed. **Groundwater data available.**
274.	Joseph Hensler Brewing Co.	165 Ferry Street 53 Hamburg Place		Brewery	1890's to 1950's	This brewing company was another one of the well known brewing companies in New Jersey Its facility was composed of six buildings. July 4, 1900 Fire caused by firecrackers. November 3, 1908 Fire caused by defective flue. August 1, 1910 fire - "supposed from smoking." April 14, 1912 fire - "spontaneous combustion." July 23, 1914 fire - defective flue. March 20, 1915 fire - sparks from bond fire. December 11, 1917 fire - matches. December 25, 1927 - short circuit.
275.	K. Oswald, Jr. & Co.	322-324 Ferry Street		Bags, purses, satchels, frames, metal working	1900's to 1910's	December 12, 1903 fire of unknown origin. August 30, 1906 fire caused when "carboy of vitriol exploded." October 23, 1906 fire caused "spontaneous combustion." July 20, 1914 fire - rubbish in yard.
276.	Kaufherr & Seigel	200-4 Magazine Street		Leather	Est. 1908	The Company was a very successful business in Newark producing calf, goat and sheepskins, skivers and buffings, bag, pocket books, belts and hat leathers. November 25, 1922 fire.
277.	Keith Industries	238 Delancy Street	NJD986567691 1996 MOA executed. Incident No. 8608020300 Administrative Order issued 10/16/87.	Chemicals	1980's to 1990's	1988 - Discharges of hazardous substances from drums generated an enforcement action. Keith Industries formerly operated a drum recycling facility on .25 acres. Numerous complaints from adjacent residents regarding odors prompted a NJDEP site investigation. Soil quality investigation revealed contamination.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Company entered into a Memorandum of Agreement with NJDEP in 1993 to excavate contaminated soil.
278.	Kelly & Co.	Manufacturers Place and Horatio Street		Wasting and reclaiming rags - recycle	1900's to 1920's	February 4, 1910 fire - "spark from locomotive." March 19, 1921 Fire - locomotive sparks ignite the storage of burlap March 24, 1921 Fire - rekindled June 15, 1921 Fire - matches
279.	Kester Solder (Litton Systems)	88 Ferguson Street	NJD986592129 BUST 0098283	Solder, flux - chemicals	1980's to 1990's	KCSL (1995) Registered Hazardous Waste Generator (1992). Kester Solder has operated in the city of Newark since 1931. Cessation of operations in 1992 triggered the ECRA review of the facility. The company undertook environmental investigation of soil and groundwater. Volatile organic compounds (vinyl chloride, methylene chloride, toluene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene, tetrachloroethane, acetone, chloroethane, and ethylbenzene) were detected in groundwater. Company continues quarterly groundwater monitoring. **Groundwater data available.** UST - 3 tanks, 6,000 gallons total capacity, installed 1975. Status: inactive.
280.	Kil-Tome Chemical Co.	169 Malvern Street		Chemicals	1910's	May 24, 1916 Fire in boiler room caused by smoke stack. May 20, 1918 Fire - "miscellaneous"
281.	Klaus & Co.	541 Ferry Street		Forging iron & steel	1910's	December 27, 1911 fire - "from forge."
282.	Kozie's	349 Raymond Blvd.	BUST- 0258096			UST-6 Tanks, 20,00 Gallons Total Capacity Installed 1971-1989, status active. UST-5 Tanks, 32,500 gallons total capacity Installed 1944, status active.
283.	Krouse-Hindes Lighting, Inc.	84 Foundry Street	NJD980764443	Lighting	Present	Registered Hazardous Waste Generator (1992)
284.	Krueger Brewing Co.	113 Delancy Street		Brewery	1862 to 1972	May 25, 1908 fire - "kitchen range too close to woodwork." August 8, 1911 fire - unknown. April 18, 1912 fire - "from cigarette."
285.	Kuebeck & Kellover	Avenue L			1890's	August 1, 1894 Fire caused by "explosion of powder"
286	Laiblin Company	56 Ferry Street			1910's	March 15, 1915 fire - spontaneous combustion.
287.	Larry's Tank Cleaning Services, Inc.	169 Blanchard Street	NJD986578805	Tank cleaning	1990's	Registered Hazardous Waste Generator (1992)

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
285	Lehigh Portland Cement Company	194 Doremus Avenue	BUST 0069113	Cement Company	1990's	UST - 2 tanks, _____ gallons total capacity, installed 1963. Status: inactive.
289	Lehigh & Wilkesbarre Coal Co.	96 Ferry Street		coal/petroleum	1890's to 1900's	December 5, 1903 fire of unknown origin. July 8, 1919 Fire - locomotive sparks ignite coal yard July 9, 1919 Fire - locomotive sparks
290	Lehigh Valley & Central Railroad			Railroad	1860's to 1950's	March 21, 1916 Fire - freight car caused by unknown source - Doremus February 18, 1919 Fire - stove in breakman's shanty - Wilson August 6, 1922 fire - hot coals.
291	Lewis Reback Business Factory	132 Ferry Street (rear)			1910's	March 19, 1918 Fire - unknown
292	Liberty Union Charcoal Company	Manufacturers Place		Coal/petroleum	1910's to 1920's	May 26, 1920 Fire - "suspicious"
293	Lily Truck Leasing Co.	474 Wilson Avenue	NJL6000231179 Lead: BUST-0155360 NJD986585164	Freight	Present	KCSL (1995). Registered Hazardous Waste Generator (1992). Lily Truck Leasing occupies a portion of the leasehold property known as Ironbound Transport Park. Company undertook environmental site investigation following removal of 5 underground storage tanks in 1994. Volatile organic compounds (trichloroethene, cis-1,2-dichloroethene, chlorobenzene, 1,1-dichloroethene, vinyl chloride, and methyl tertiary butyl ether) and lead were detected in ground water at concentrations exceeding NJDEP Ground Water Quality Standards. Company proposed a Classification Exception Area be established for the site. **Ground water data available.** UST - 5 tanks, 34,000 gallon total capacity, installed 1982-83. Status: inactive.
294	Linde Gases of the Mid-Atlantic, Inc.	360 Avenue P	NJD080621881 Lead: BEECRA-E90254	Gases - chemicals	1990's	KCSL (1995). Well Search. Linde Gases of the Mid-Atlantic occupies 10 acres. Company triggered ECRA in 1990. They undertook environmental investigation of soil, ground water, and building interiors.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Ground water sampling analytical results indicate ground water has not been impacted by facility operations.
295	Lister Agricultural Chemical Works	Lister Avenue		Fertilizers - chemicals	Est. 1850 to 1920's	This Company was one of the "backbone" businesses in Newark engaged in the manufacturer of bone fertilizers, bone black, glue, grease, etc. and its products were sold all over the world. Its fertilizers were considered to be of the finest quality The plant covered 18 acres. May 11, 1907 fire - "overheating of dyer." December 12, 1908 Fire caused by pot of tar on stove. September 2, 1914 fire - spark from grinding machine. March 25, 1916 Fire - entire Asset Department - cause unknown. April 27, 1916 Fire in fertilizer conveyer area caused by friction. September 28, 1916 Fire caused by tar kettle. May 21, 1917 fire. December 18, 1919 Fire - miscellaneous
296	Lockwood Street Site	Lockwood Street and Raymond Boulevard	NJD982273484	DEP response		Well Search.
297	Lou Bole Carpet Carriers	445 Wilson Avenue	NJD085650935 Lead: BUST-0023582	Carpet - textiles	1990's	KCSL (1995). Spill Report 9/19/88 50-100 gallons of diesel oil. Spill Report 12/26/90 5 gallon of oil. CSL (1992). Lou Bole Carpet Carriers undertook environmental investigation of soil and ground water in 1984. Volatile organic compounds (ethylbenzene, tetrachloroethene, toluene, 1,1-dichloroethane, 1,1,1-trichloroethane, and total xylenes) were detected in ground water. Status of site remedial investigation unknown. UST - 2 tanks, 12,000 gallon total capacity, installed 1986. Status: inactive.
298	Louie Dreyfuss Energy	678 Doremus Avenue			1990's	Spill Report 4/18/90 50 gallons orthoxylene.
299	Louis Sacks Foundry	Hamburg Place Road		Iron casting	1890's to 1930's	October 19, 1908 Fire described as "bond fire." March 12, 1914 fire - overheated oven May 4, 1916 Fire caused by hot metal.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						February 14, 1916 Fire caused by Japan kettle. November 27, 1916 Fire caused by Japan oven January 8, 1918 - Fire. September 15, 1918 Fire - smoking October 20, 1918 Fire - "overheated oven" October 16, 1922 fire - furnace.
300.	Lyon Brewery Co.	28 Chapel Street		Brewery	1900's to 1910's	October 29, 1907 fire - unknown
301.	M&M Trucking Co.	St. Charles Street and Kossuth Street		Freight	1910's to 1920's	August 26, 1919 Fire - backfire
302.	Maas & Walstein	Riverside Avenue		Cellulose solutions - chemicals	1910's to 1950's	June 1, 1916 Fire in chemical works caused by fume blower. June 3, 1916 Fire in chemical works and shed area caused by acid fumes. January 4, 1917 fire - storage of cotton ignited due to friction. May 6, 1919 Fire - miscellaneous
303.	Marden Orth & Hastings Co.	Doremus Avenue		Analine dyes - chemicals	1910's to 1930's	September 26, 1919 Fire - smoking
304.	George A. Mathewson Co., Inc.	415 Raymond Blvd.	BUST-0273017			2 Tanks, 4,000 Gallons installed 1959 and 1982, status active.
305.	McKesson Enviro Systems Co.	600 Doremus Avenue	NJD002153922 SWF0714U1HP01 NJD002153922 TSDF-NJD002153922		Present	KCSL (1995). Registered Hazardous Waste Generator (1992). Compost Facility - Not Operating (1988) (Authorized Wastes: 76, 77) TSD Facility - large quantity generator (treatment and storage). CSL (1992). McKesson Corporation facility is situated between Newark Bay and Doremus Avenue. Following a RCRA inspection in 1985, company undertook environmental investigation of soil and groundwater. Volatile organic compounds (chloroform, methylene chloride, trichloroethene, tetrachloroethene, 1,1-dichloroethane, toluene, vinyl chloride, and total xylenes), semi-volatile organic compounds (1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, bis(2-ethylhexyl)phthalate, and dimethylphenol) and metals (lead, arsenic, antimony, cadmium, manganese, iron, nickel, and sodium) were all detected in shallow groundwater at concentrations exceeding NJDEP Groundwater Quality Standards. Company

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						attributes metal contamination to historic filling of the site. They propose no further action for metals. More than a decade of groundwater monitoring revealed VOCs have been removed from the groundwater by natural attenuation. Monitoring continues to confirm natural attenuation. **Groundwater data available.**
306.	McMullin Co.	Doremus Avenue and Newark Bay			1910's	December 15, 1916 Fire. Origin is "miscellaneous".
307.	Meadow Paper Boxboard Co.	Blanchard Street		Paper	1900's to 1910's	March 26, 1910 fire - "spark from locomotive." June 20, 1911 fire - "sparks from locomotive."
308.	Meadows Industries, Inc.	28 Paris Street	NJD056347941	Plastic coatings	1980's to 1990's	Well Search.
309.	Monahan Stone Co.	Plum Point Lane		Blue stone, granite and other stones used in the building industry.	Founded 1898 to 1930's.	This Company was a great saw mill that cut monster slabs of stone for building purposes. Some of the buildings this Company helped construct include the Public Library in Elizabeth, the Armory in East Orange and the St. Joseph's Church of Palisades, West New York. October 24, 1908 fire - "overheated boiler." December 7, 1921 Fire due to backfire.
310.	Monoplast Chemical Corp.	106 Rutford Street	BUST- 0254009	Chemials	Present	2 tanks 8,000 gallons total capacity, installed 1988. Status: inactive.
311.	Morrison Flockhart Foundry	Rome and St. Charles Streets		Foundry - iron, steel	1916 to 1930's	This Foundry was built around World War I. In the late 1920's, Sacks-Barlow Foundries, Inc. took over the operation and enlarged it. The complex is presently used by Grammar-Dempsey & Hudson, Inc. - a steel concern.
312.	Mothers Food Products	88 Avenue K	NJD986634749	Food	1950's to Present	Registered Hazardous Waste Generator (1992)
313.	Moyer Plating, Inc.	175 Christie Street	NJD002197614	Metal plating	1960's to Present	Registered Hazardous Waste Generator (1992)
314.	N.F.O. Technologies, Inc.	298 Delancy Street	07140039000		Present	**DPCC Plan Filed**
315.	N.Y. & N.J. Construction Co.	Avenue R		Contractors	1900's	August 13, 1918 Fire
316.	Naporano Iron & Metal Co.	Foot of Hawkins Street	NJD011515665 BUST 0096465	Scrap metal	Present	Registered Hazardous Waste Generator (1992) UST - 7 tanks, 23,000 gallons total capacity, installed 1975 through 1990. Status: active.
317.	National Car Rental	15 Stockton Street	BUST 0122159	Car Rental	Present	Spill Report 3/31/88 unknown qty gasoline. Spill Report 8/16/88 200 gallons of diesel fuel. UST - 6 tanks, 22,000 gallons total capacity , installed 1977 through 1987. Status: inactive.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
318.	National Distillers and Chemical Corp.	300 Doremus Avenue	NJD002447860	Chemicals	1990's	Well Search. CSL (1992) - "also known as U.S. Industrial Chemical Corp."
319.	National Tank Cleaning Co.	525 Raymond Boulevard	NJD991290933	Tank Cleaning	1990's	Registered Hazardous Waste Generator (1992)
320.	Navin Linoleum Co.	30 Hamburg Place		Textile	1900's	March 27, 1908 Fire of unknown origin.
321.	Newark Boxboard					UST - 3 tanks, 34,000 gallon capacity, installed 1962 through 1967. Status: active.
322.	Newark Bus Complex	601 Doremus Avenue	BUST- 0219675	Bus Repair	Present	UST - 3 tanks, 42,000 gallons total capacity, installed 1941. Status: active. 5 tanks, 21,500 gallon total capacity, installed 1991. Status: active.
323.	Newark Shops	703 Ferry Street	BUST 0117533		Present	UST - 6 tanks, 23,000 gallons total capacity, installed 1957 through 1985. Status: active.
324.	New Jersey Transit Bus Operations	601 Doremus Avenue	NJD981485667	Bus service/repair	Present	Registered Hazardous Waste Generator (1992)
325.	New Jersey Turnpike Authority	Interchange 15E Ramp Avenue	NJPDES Permit No. NJ0077640			Ground water data unavailable.
326.	New Jersey Zinc Company	Chapel Street		Paint	1852 to the late 1940's	This Company was the first American Company to produce zinc oxide and pioneered the manufacturer of zinc paint. Zinc paint was common in the later half of the 19th century but superseded by other paint formulas in the 1920's. Superfine zinc oxide particles are mixed with drying oil to make a serviceable white paint. Zinc based paint is non-toxic and is particular good for protecting metals. It does not discolor when exposed to hydrogen sulfide and has a good hiding power. It is also relatively cheap to make. Natural deposits of zinc were discovered in Sussex County after the Civil War and provided the raw ore for New Jersey Zinc Company and its paint factory. Samuel Wetherill experimented with zinc oxide production processes in the 1980's to develop a method that did not require the smelting of the ore (very expensive) prior to paint production. He developed a successful method that is still used today. By 1874, the Company was the largest manufacturer of zinc oxide in the United States and covered 17 acres at the Foot of River Street (the edge of the Newark marsh) with 80 furnaces to produce product.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						The Company also made ceramics and rubber products. In World War I, zinc oxide was used as an antidote to German poison gases. March 15, 1913 fire - "broken carboy of acid."
327.	New York City Dock Commission	Foot of Doremus Avenue				July 16, 1916 Fire of scow on river caused by spontaneous combustion.
328.	New York Plow Company	Foot of River Street		Plows, plow castings for manufacturers, feed cutters, sider mills, agricultural implements and iron castings, iron, steel.	Organized 1826	The Company moved to Newark in 1869. It was regarded as a premier company in the manufacture of plows and other agricultural implements. They sold all over the world. In its hey day during the late 1800's, the Company used 3,500 tons of iron annually.
329.	Newark Abandoned Trailer Site	411 Wilson Avenue	EPA Response			Trailer was found to contain approximately 800 bags of oxalic acid, and acid used as an analytical reagent in the manufacturer of materials such as dies, inks, bleaches, paint removers, varnishes and metal cleaners. EPA undertook a removal action in 1993/94.
330.	Newark Baseball Park	Foot of Hamburg Place Road		Baseball park	1900's to 1940's	April 24, 1912 fire - "rubbish under bleachers." September 30, 1913 meadows on fire - careless use of matches. March 1, 1914 fire - crossed wires. April 20, 1915 fire.
331.	Newark Bay Co-Generation Plant	414-462 Avenue P	071400108003 NJPDES Permit No. NJ0082279	Power plant	Present	**DPCC Plan Filed.** Ground water data unavailable.
332.	Newark Bleaching Co.	Avenue L and Mary Street		Chemicals	1890's to 1900's	February 4, 1900 Fire - "brush fire by boys."
333	Newark Boxboard Co.	17 Blanchard Street	NJD000556837 Lead: BUST-0106607		1910's to Present	KCSL (1995). Spill Report 4/5/90 unknown qty oil contaminated sand April 23, 1914 fire - sparks from locomotive May 10, 1916 Fire ignited by locomotive spark ignites rubbish in yard. September 27, 1917 fire - locomotive spark ignite paper storage and freight cars. August 3, 1920 Fire - bails of paper ignited due to locomotive sparks. August 3, 1920 Fire - previously fire rekindled. October 30, 1920 Fire - "suspicious" June 15, 1921 Fire - smoking May 17, 1922 Fire.
334.	Newark Charcoal Co.	62 Chapel Street		Charcoal	1900's to 1930's	February 22, 1913 fire - "careless use of matches." June 11, 1913 fire - "incendiary".
335.	Newark Chemical	130 Malvern Street		Chemicals	1890's	February 22, 1894 Fire

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
	Company					caused by carboy of acid.
336	Newark City Dump	Avenue L		Landfill	1890's to 1930's	July 16, 1910 fire - "dumps on fire." September 15, 1910 fire - "rubbish in lots." July 26, 1914 fire - boys and matches. September 2, 1916 Fire. The cause was identified as "needless."
337	Newark City Dump	Foot of Delancy Street		Landfill	1890's to 1930's	August 5, 1917 fire - "spontaneous combustion" September 4, 1920 Fire - brush fire April 11, 1922 fire.
338	Newark City Dump	St. Charles Street		Landfill	1890's to 1930's	September 13, 1921 Fire
339	Newark City Dump	Plum Point Lane (Ash dump)		Landfill	1890's to 1930's	December 10, 1915 fire. May 6, 1918 Fire March 22, 1919 Fire August 4, 1920 Fire - brush fire. October 30, 1920 Fire January 22, 1921 Fire May 4, 1921 Fire May 10, 1921 Fire May 31, 1921 Fire June 28, 1921 Fire July 25, 1921 Fire September 5, 1921 Fire November 8, 1921 Gfire December 20, 1921 Fire March 18, 1922 fire. April 29, 1922 Fire - Plum Point Lane at Foundry Street.
340	Newark City Dump	Old Meadow Road (Ash dump)		Landfill	1890's to 1930's	November 16, 1917 fire - locomotive sparks. July 22, 1918 Fire February 27, 1920 Fire - bond fire April 25, 1921 Fire
341	Newark Cleaning and Dying Works	26 Brown Street		Chemicals	1910's to 1920's	September 8, 1921 Fire - electricity
342	Newark Coal Gas (PSE&G)	155 Raymond Boulevard	NJD0000574004	Gas	Present	Well Search.
343	Newark Drive-In	104-108 Foundry Street	NJD986578151 Lead: BFO-CA-838 Enforcement File 07-14309	Movie theather	1950's to 1960's	KCSL (1995). CSL (1992) - "Edel Realty Landfill/15 E Sanitary Landfill". Ground water data unavailable.
344	Newark Industrial Spraying	12-20 Amsterdam Street	NJD002156248	Metal paint finishing	1970's to 1990's	Registered Hazardous Waste Generator (1992).
345	Newark Meadows	Various areas in the meadows - fires				November 27, 1917 fire - "brush fire on meadows near Blanchard Street." December 7, 1917 fire near Bay Avenue and Wheeler Point Road July 18, 1919 Fire - Foot of Meadows Street December 3, 1919 Fire September 1, 1921 burning rubbish fire. September 19, 1921 Fire near Meadow Street. September 23, 1921 Fire near Plum Point Lane. September 25, 1922 Fire - Lister Avenue and

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Lockwood Street
346.	Newark Motor and Export Corp.	573-589 Ferry Street	NJD078595949	Freight	Present	Registered Hazardous Waste Generator (1992)
347.	Newark Police Academy	Avenue P	NJL000031666 Lead: BSCM		Present	KCSL (1995).
348.	Newark Recycling & Composting Co.	360 Avenue P		Recycling	Present	
349.	Newark Redevelopment & Housing Authority "Avenue P" Landfill	549 Avenue P	NJD980504831. Lead: BSCM-9476146. SWF0714K1SP01 NJD980529424 Lead: BFO-M	Landfill	Present	KCSL (1995). Landfill Disruption Permit - Terminated
350.	Newark Sign Co.	334-336 Ferry Street		Metal work	1900's to 1910's	October 2, 1913 fire - backfire on motor.
351.	Newark Tube & Metal Works	556 Ferry Street		Tube manufacturing, metal work	1900's to 1920's	February 8, 1910 fire - "spark from stack.": December 6, 1916 Fire of building caused by friction.
352.	Newark Vacant Lots	Fires				April 12, 1922 fire - April Avenue and Chapel Street. April 13, 1922 fire - Wilson Avenue and Stockton Streets. April 25, 1922 fire - Ferry and Meadow Streets May 9, 1922 Fire - Manufacturers Place May 11, 1922 Fire - "burning rubbish" September 17, 1922 fire - Magazine and Linden Streets. September 26, 1922 fire - Niagara Street. September 27, 1922 fire - Wilson Avenue and Stockton Street. October 30, 1922 fire - Magazine and Paris Streets November 26, 1922 fire - 116 Brill Street. November 26, 1922 fire - Manufacturers Place and Ferry Street. December 2, 1922 fire - 238 Wilson Avenue. December 6, 1922 fire - 661 Ferry Street "burning rubbish."
353.	Newark Varnish Works	976 Delancy Street		Varnish and coatings - paints	1900's to 1930's	June 6, 1900 fire caused by "varnish kettle overheating." March 7, 1901 Fire caused by "kettle of varnish boiling over." July 5, 1906 fire caused by "overheating daub kettles." February 7, 1908 fire -"boys and matches". September 16, 1910 fire - unknown. February 26, 1917 fire - smoke stack.
354.	Nimco Shredding Co.	252 Doremus Avenue	BUST 0093981	Scrap metal	Present	Spill Report 4/10/90 15 gallon oil transformer. Ground water data unavailable. UST - 3 tanks, 10,000 gallons total capacity, installed: 1975 through 1990. Status:

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						active.
355.	NJ Bell Telephone	268 Doremus Avenue	NJL840001556 Lead: BFO-M	Telephone service	Present	KCSL (1995).
356.	NJ Transit Bus Operations, Inc.	703 Ferry Street	NJD980779417 Lead: BFO-M	Bus service	Present	KCSL (1995).
357.	NJ Turnpike Expansion	NJ Turnpikes Exits 11-18	NJD991290925 Lead: BFCM			KCSL (1995).
358.	NL Chemical Industries	400 Doremus Avenue		Chemicals	1980's to 1990's	Spill Report 2/3/88 20 gallons castor oil.
359.	Non-Fluid Oil Corp.	298 Delancy Street	NJD001224005 Lead: BFO-M BUST 0138738	Lubricants	1960's to 1990's	KCSL (1995). Non-Fluid Oil, Inc. undertook environmental investigation of ground water. Metals (arsenic, cadmium, lead, nickel, and silver) were detected at concentrations exceeding NJDEP Ground Water Quality Standards. All ground water monitoring wells have been properly abandoned. **Ground water data available.** UST - 5 tanks, 26,000 gallons total capacity, installed 1977. Status: inactive.
360.	Norpak Corp.	70 Blanchard Street	NJD056700487 BUST - 0209450	Paper	1970's to 1990's	Registered Hazardous Waste Generator (1992) CSL (1992). Norpak undertook environmental investigation of soil and ground water in 1995. Volatile organic compounds (1,1-dichloroethane, cis-1,2-dichloroethene, 1,2-dichloroethane, trichloroethene, benzene, and chlorobenzene), metals (arsenic, chromium, lead, nickel, and zinc) and PCB 1248 were detected in ground water at concentrations exceeding the NJDEP Ground Water Quality Standards. Site remedial investigation ongoing. UST - 2 tanks, ____ gallons total capacity, installed 1981. Status: active.
361.	Northern Feather, Inc.	31-39 Bickus Street	BUST- 0238430	Feathers	Present.	UST - 1 tank, 10,000 gallons total capacity, installed 1994. Status: inactive.
362.	Oak Island Solid Waste Landfill	Delancy Street	SWF0714A1ST01	Landfill	1960's to Present	Solid Waste Landfill - Terminated CSL (1992).
363.	Optical Industries	9 Delancy Street	BUST 0180083			UST - 2 tanks, 4,000 gallons total capacity, installed 1990. Status: inactive.
364.	Ottilio & Sons	18-60 Blanchard Street	NJD980529861 Lead: BFO-IN SWF0714D1ST01	Landfill	1970's to Present	KCSL (1995). Solid Waste Landfill - terminated. Ground water data unavailable.
365.	P. Pepe Sons, Inc	27 Malvern Street	BUST 0214652			UST - 1 tank, 2,000 gallons

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						total capacity, installed 1979. Status: active.
366.	Palmer Industries, Inc.	8 Lister Avenue	BUST- 0264882			UST - 2 tanks 6,000 gallons total capacity, installed 1982, status inactive.
367.	Passaic Chemical Works	Foot of River Street		Sulfuric acid and refined sulfur, chemicals.	Est. 1835. To 1910's	This Company sold its products to oil refiners, chemical works, match factories and others. During the late 1800's, its annual production of acid was 6,000,000lbs and 2.4 million pounds of sulfur. This was one of the largest businesses of its kind in the United States during its time.
368.	Passaic Valley Sewer Commissioners	Doremus Avenue (600 Wilson Avenue)	NJPDES Permit No. NJ0021016 SWF0714H1SP0I NJD065816969	Sewage treatment	1900's to Present	April 15, 1919 Fire in carpenter shop. Spill Report 12/18/89 500 gallons of oil. Solid Waste Facility Disruption Permit - Operating. Solid Wasste Facility Disruption Permit - Operating. Spill Report 2/15/90 unknown qty of chlorine. Spill Report 12/29/87 unknown qty of gasoline. Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** The Passaic Valley Sewerage Commissioners (PVSC) undertook an underground storage tank closure program for the sewage treatment facility. Environmental investigation of soil and ground water followed the removal of 11 tanks. Volatile organic compounds (chloroethane, benzene, xylenes, 1,1-dichloroethane, 1,1,1-trichloroethane, tert-butyl alcohol, and methyl-tert-butyl ether), semi-volatile organic compounds (naphthalene), and pesticides (alpha-BHC) were detected in ground water at concentrations which slightly exceed their respective NJDEP Ground Water Quality Standards. PVSC proposes no further action for ground water remedial investigation. Status of investigation unknown. **Ground water data available.**
369.	Passaic Valley Sewer Commissioners	600 Wilson Avenue				
370.	Passaic Valley Sewerage Authority		BUST - 0039035 BUST - 0151021 BUST - 0167808			UST - 17 tanks, 138,500 gallons total capacity, installed 1983 through 1987. Status: active. UST - 2 tanks, ____ gallons total

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						capacity, installed 1983. Status: inactive. UST - 18 tanks, 210,550 gallons total capacity. Installed 1961 through 1985. Status: active.
[illegible]	Pennsylvania Railroad Co.			Railroad	1850's to 1950's	February 15, 1904 fire caused by "sparks from locomotive." Blanchard and Ferry Streets December 10, 1904 fire of unknown origin - Meadow Lane. July 31, 1906 fire caused by "freight wreck." Backus Street September 26, 1907 - fire spark from railroad - "meadows" May 4, 1910 fire - "sparks from locomotive." - St. Francis Street June 18, 1912 fire - "sparks from locomotive." Blanchard and Ferry Street November 23, 1912 fire - from bond fire. - St. Francis Street May 20, 1913 fire - sparks from locomotive - Magazine Street June 24, 1913 fire - sparks from locomotive - Niagara Street. August 31, 1913 fire - sparks from locomotive - Niagara Street. April 21, 1915 fire of railroad bridge caused by hot coal - Meadow Lane September 3, 1915 fire - spark from locomotive - Niagara Street. June 16, 1918 Fire - St. Charles Street bridge due to hot coal. October 15, 1918 Fire - railroad ties Fire due to engine sparks near Plum Point Lane August 6, 1920 Fire at St. Charles Street due to locomotive sparks April 29, 1922 Fire - Railroad bridge at Plum Point Lane and Lentz Avenue September 15, 1922 fire - railroad bridge at Lentz Avenue and Plum Point Lane. November 9, 1922 fire - hot ashes at Plum Point Lane bridge. December 13, 1922 fire - bridge at Wilson Avenue and Rome Street - "needless" December 19, 1922 fire - bridge at Wheeler Point Road due to hot ashes.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
372	Peridot Chemicals	352 Doremus Avenue	NJPDES Permit No. NJ0002283 (1988 to 1993) BUST 0107138	Chemicals	Present	Spill Report 4/24/91 60 gallons oleum. **DPCC Plan Filed.** Ground water data unavailable. UST - 4 tanks, 44,300 gallons total capacity, installed 1972 through 1982. Status: inactive.
373	Peter Pan Industries		BUST - 0026679			UST - 5 tanks, 22,000 gallons total capacity, installed 1951 through 1987. Status: active.
374.	Peter Pan Industries	320 Ferry Street	BUST - 0206921			UST - 1 tank, 3,000 gallons total capacity, installed 1966. Status: inactive.
375	Pfaff & Kendall	84 Foundry Street		Aluminum	1910's to 1980's	June 3, 1915 fire - sparks set roof afire.
376	Pitt-Consol Chemical Co	191 Doremus Avenue	NJD004948188 NJPDES Permit No NJ0060704 (1986 to 1991)	Rubber - Chemicals	1960's to 1980's	Registered Hazardous Waste Generator (1992) CSL (1992) - "Conoco, Inc. - Reilly Tar & Chemical Co." Pitt-Consol facility occupies 37 acres. In May 1983, industrial operations ceased. All above ground structures were removed from the site. Final closure of the facility was performed under RCRA. Company undertook environmental investigation of soil and ground water. Volatile organic compounds (benzene, toluene, chlorobenzene, and methylene chloride), semi-volatile compounds (acenaphthene, anthracene, fluoranthene, fluorene, phenols, and pyrene), metals (arsenic chromium, and nickel), and other compounds (total dissolved solids and cyanide) were detected in ground water at concentrations above their respective NJDEP Ground Water Quality Standards. Status of site remedial investigation unknown. **Ground water data available.**
377	Polarome Manufacturing Co.	361 South Street	NJD000765123	Plastic	Present	Registered Hazardous Waste Generator (1992) CSL (1992).
378	Power Concrete Co., Inc	497 Raymond Blvd.	BUST- 0311212			UST - 3 tanks, 20,000 gallons total capacity, installed 1944. Status: active.
379	Power Oil, Inc.	15 Stockton Street	BUST 0195276			UST - 5 tanks, 35,000 gallons total capacity, installed 1990. Status: active.
380	Prefix Products Corp.	53 Rome Street		Factory	1910's to 1920's	December 10, 1920 Fire - stove
381	Prestolite Co	351 Doremus Avenue	NJDEP Enforcement File 07-1450	Acetylene - chemicals	1920's to 1940's	November 24, 1928 fire - "explosion." This sitealso had settling lagoons and a large landfill.
382	Printer Services	26 Blanchard Street		Printing	Present	Spill Report 8/6/91 15 gallons of oil lube.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
383.	Public Service Corp.				1903 to Present	This Company has had a major impact on Newark, its industries, business and citizens since it was formed. It provides gas and electric for all of New Jersey and has four power generating plants in the Newark area - Hudson (1964), Linden (1957), Essex (1915), and Kearny (1926). Until the 1970's, the Company was also the major public transit company in the state with its main terminal building and electric rail maintenance shops in Newark. The Company was originally created in 1903 because existing street railways were in disarray, the electric properties were erratic and the gas facilities had exhausted their capacity for new capital. Public Service successfully remedied these problems with $10,000,000 in capital. Shortly after forming in 1903, the Company formed the Public Service Railway Company (1907), the Public Service and Gas Company (1909) and the Public Service Electric Company (1910). In 1924, Public Services Gas and Electric Companies, together with United Electrical Company of New Jersey merged to form Public Service Electric & Gas (PSE&G) which continues to this day. Located at the East end of Ferry Street, most of the companies maintenance shops survive (NJ Transit) for bus repair and storage. The shop also includes a massive paint shop. January 29, 1915 fire - crossed electric wires. May 17, 1908 fire - "defective wires." Magazine & Ferry Streets. April 17, 1910 fire - "crossed wires." Magazine & Ferry Streets. June 19, 1910 fire - unknown - Magazine & Ferry Streets. June 10, 1911 fire - "short circuit on trolley pole." Magazine & Ferry Streets. August 12, 1911 fire - "crossed wires." January 30, 1913 fire - telephone pole afire - Napoleon Street February 13, 1913 fire at carbons from stove - 40 Delancy Street.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						September 25, 1914 fire - defective insulation - Ferry Street opposite Magazine Street. November 28, 1916 Fire of trolley car at Magazine Street near Ferry Street caused by electric wires August 14, 1917 fire - rubbish in car - Ferry Street opposite Magazine Street. September 29, 1917 fire - feed wire - Ferry Street opposite Magazine Street. June 17, 1918 Fire - electricity - Doremus Avenue March 14, 1921 Fire in a creosote tank - Doremus Avenue October 11, 1922 fire at Telegraph pole on Ferry and Oxford Streets caused by auto backfire.
384.	Purex Corp./Turco Products Division	120 Lister Avenue	NJD980530224	Chemicals		CSL (1992).
385.	Quantum Chemical Corp.	300 Doremus Avenue	NJL600163513 Lead: BEECRA-E93412. BUST-0257763	Chemicals	1990's to Present	KCSL (1995). Spill Report 4/17/91 250 gallons of ethyl alcohol. **DPCC Plan Filed.** 1 UST - 1 tank 5,500 gallons total capacity, installed 1959. Status: inactive.
386.	R. & C. Harness Trimming Co.	56 Ferry Street		Metal Work	1900's to 1910's	September 11, 1910 fire - "unknown explosion." September 12, 1910 - fire - "rekindling of previous fire." June 7, 1912 fire - "friction in machinery."
387.	R. Forman & Co.	9 St. Francis Street		Leather	1910's	July 15, 1916 Fire of rubbish in yard caused by spontaneous combustion.
388.	R. Neuman & Hardware Co.	9 St. Francis Street		Hardware	1900's	December 17, 1908 fire - "overheated oven."
389.	Radel & Mentz	Hamburg Place Road		Leather	1900's	November 25, 1906 fire caused by unknown origin.
390.	Rauchbach - Goldsmith Co	83 St. Francis Street		Trunks - Leather	1910's	April 21, 1914 fire - incendiary
391.	Raymond Petroleum	303 Raymond Boulevard	BUST 0205634			UST - 5 tanks, 23,000 gallons total capacity, installed 1963 through 1981. Status: active.
392.	Redal Leather Mfg. Co.	445 Wilson Avenue		Leather	Est. 1904 to Present	This site occupied many acres and included 10 buildings. The Company produces principally automobile, carriage and furniture upholstery leather shipped throughout the United States and Europe. The Company employed about 100 people. This Company is only a handful of leather manufacturers still operating in Newark. When the Company first started, 100 men helped manufacturer automobile, carriage and furniture upholstery leather.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Goods were exported to Europe as well as sold in the U.S. Redal became a division of Seton Leather Co. around 1969 and moved to the Seton address. The Company also had a large facility on Wilson Avenue. May 24, 1908 fire - "unknown." December 13, 1912 fire - electric wires. July 25, 1918 Fire - "miscellaneous" June 13, 1907 fire - "kettle of material overheating." September 6, 1922 fire in boiler house by hot of daub.
393.	Reddaway Manufacturing, Inc.	32 Euclid Avenue	BUST 0207010			UST - 2 tanks, 1,100 gallon total capacity, installed 1944. Status: inactive.
394.	Red Star Express	400 Delancy Street	BUST- 0072669	Transportation	Present	UST - 10 tanks, 19,000 gallons total capacity, installed 1984. Status: active. UST - 7 tanks, 102,000 gallon total capacity, installed 1985. Status: active. Constructed on an old dump site. (Zdepski, 1987)
395.	Reichhold Chemical	46 Albert Avenue	NJD048797195 NJL600184196 Lead: BUST-0226253 TSDF -NJD092217892	Chemicals	1990's to Present	KCSL (1995) **DPCC Plan Filed.** Registered Hazardous Waste Generator (1992). Spill Report 10.23/90 two pounds polamer. Spill Report 4/1/91 3,000 to 6,000 gallons of xylene. Spill Report 4/3/91 1,600 gallons butyl alcohol. Spill Report 6/11/91 10 gallons butyl alcohol. Spill Report 7/31/91 100 gallons of formaldehyde. TSD Facility - large quantity generator (storage). 6 tanks, 5,500 gallons total capacity, installed 1966-1975. Status: inactive.
396.	Reichhold Chemical	400 Doremus Avenue	NJD092217892 NJD986598126 Lead: BEECRA-920269 BUST 0159221	Chemicals	1990's to Present	KCSL (1995). **DPCC Plan Filed.** Registered Hazardous Waste Generator (1992) Company undertook environmental investigation of soil and ground water. Volatile organic compounds (benzene, ethylbenzene, and xylenes) were detected in ground water at concentrations exceeding NJDEP Ground Water Quality Standards. Status of site remedial investigation unknown. **Ground water data available.** UST -3 tanks, 11,000 gallon total capacity, installed 1944 through 1987. Status: inactive.
397.	Resistol Hats	53 Rome Street	NJL500027420	Leather	Present	KCSL (1995).

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
			Lead: BEECRA-E92358			
398	Reiseil Corp.	84 Lister Street			1990's	Spill Report 6/4/92 less than 2 gallons transformer oil.
399.	Reusche & Co. of TWS., Inc.	2 Lister Avenue	NJD002195519	Chemicals	Present	Registered Hazardous Waste Generator (1992)
400.	Rex Imperial Leather Co.	28 Chapel Street		Leather	1900's to 1910's	March 27, 1906 Fire caused by "overheated ovens."
401.	RFE Industries, Inc.	185 Foundry Street	NJD981131006		1990's	Registered Hazardous Waste Generator (1992)
402.	Right-O-Way	57 St. Charles Street	NJD154279525 Lead: BUST-0230690	Freight	Present	KCSL (1995). Registered Hazardous Waste Generator (1992) 5 tanks, 11,500 gallons total capacity, installed 1979. Status: inactive.
403.	Riverbank Service Station	638 Raymond Boulevard	BUST - 0041221	Gas Station	Present	UST - 6 tanks, 5,500 gallons total capacity, installed 1984 through 1985. Status: active.
404.	Roanoke Avenue Site	Roanoke Avenue	NJD980529747			CSL (1992).
405.	Rokeach Food Corp.	80 Avenue K	NJL800038549 Lead: BFO-IN-0263946 BUST- 0263946	Food	Present	KCSL (1995). Company undertook environmental investigation of soil and ground water pursuant to the November 1993 Underground Storage Tank (UST) Closure Plan. Total petroleum hydrocarbon (TPH) contaminated soil reported. Status of remedial investigation is no further action (letter from NJDEP dated 5/10/95). Ground water data unavailable. 2 tanks, 11,000 gallon total capacity, installed 1968 and 1979. Status: inactive.
406.	Rollins Leasing Corp.	299 Roanoke Avenue	NJD067519025 BUST 0136910	Truck Leasing	Present	Registered Hazardous Waste Generator (1992) UST - 5 tanks, 17,500 gallons total capacity, installed 1976 through 1981. Status: inactive
407	Ronson Metals Corp.	45-65 Manufacturers Place	NJD002137313 Lead. BEECRA-E890022 BUST - 0221447	Rare earths - non-ferrous	1960's to Present	The Ronson Pocket Lighter is a familiar American product. The Company, initially known as Art Metal Works, was begun in 1896 by a metallurgical engineer named Louis V. Aronson who was awarded a large money prize by the Belgium government who offered the prize to anyone who could develop a non-poisonous wooden safety match. Aronson's pocket lighter became very successful when the up surge in cigarette smoking began during World War I. KCSL (1995). CSL (1992). Company triggered ECRA in 1990. They undertook environmental investigation of soil, ground water, and building interiors. Volatile

No	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						organic compounds (trichloroethene, 1,1,2,2-tetrachloroethane, and bromogform) and metals (lead) were detected in ground water at concentrations which exceed NJDEP Ground Water Quality Standards. Status of site rememdial investigation unknown. **Ground water data available.** 1 tank, 500 gallons total capacity, installed 1944. Status: inactive.
408	Rossendale Reddaway Belting & Hose Co.	Euclid Avenue		Belting - textiles	1900's to 1910's	May 27, 1900 fire caused by spontaneous combustion. October 3, 1907 fire - unknown.
409	Rossenfeld & Broder	278 Ferry Street			1900's	January 25, 1904 fire caused by "hot ashes."
410	Routes 1 & 9 Section 2AG, 2AJ, 2AL	Routes 1 & 9	NJD986577930 Lead: BFCM			KCSL (1995).
411	Rubber and Celluloid Product Co.	411-43 Wilson Avenue		Plastic	1910's to 1920's	March 19, 1920 Fire - miscellaneous
412	Rubberset Mfg. Co.	Doremus Avenue and Ball Lane		Rubber and celluloid products - plastic	1910's to 1940's	October 14, 1918 Fire - "explosion" October 28, 1918 Fire in the meadows
413	Ruby Light Ball & Gun Co	Avenue L		Forging iron, steel	1890's	March 2, 1894 Fire caused by friction.
414	Runn, Kelley & Co.	56 Ferry Street			1910's	April 29, 1915 fire - friction.
415	Sacks-Barlow Foundries, Inc.	Wilson Avenue		Iron casting	1930's to 1950's	In the 1930's the Lewis Sacks Iron Foundry and the Barlow Foundry Co. merged to form the Sacks-Barlow Foundries, Inc. John H. Barlow took control of the old Boyden Foundry, founded by Seth Boyden in the early 1800's. Seth Boyden was the first person in the country to invent the manufacturing process for malleable iron casting. John Barlow operated the enterprise during the later half of the 19th century and billed himself as "the oldest malleable iron foundry in the country." In the 1930's, Barlow Foundry Co. took over the management of the New Jersey Railroad Avenue Foundry and the former Sacks Malleable and Gray Iron Foundry on Wilson Avenue east of Avenue L were remained active until the 1950's. The Company was actively filling land adjacent to its operation in 1940. (Zdepski, 1987)
416.	Sal-Mar Auto Body, Inc.	50 Bruen Street	NJD981184062	Auto Repair	Present	Registered Hazardous Waste Generator (1992)
417	Salor Compound Corp.	Stockton and Delancy Streets		Chemicals	1910's to 1920's	October 7, 1920 Fire - miscellaneous
418	SCA Chemical Services	100 Lister Avenue	SWF0714JIHP01 NJD089216790 Lead: BFCM	Chemicals	1990's	Spill Report. 2/26/87. Unknown quantity Tolune di-isocyanat.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Spill Report 4/3/87. 5 gallons. Petroleum hydrocarbons. Chemical P&T - Operating (Authorized Wastes: 17, 18, 26, 70, 72, 76 and 77) KCSL (1995). CSL (1992) - "Earthline Division - Chemical Waste Management of New Jersey."
419.	Schlesinger Furniture Co.	184 Ferry Street		Wood	1910's	January 24, 1912 fire - "spontaneous combustion."
420.	Scientific Chemical Processing, Inc.	411 Wilson Avenue	NJD054050703 Lead: BFO-CA-931277	Chemicals	1970's to 1980's	KCSL (1995). CSL (1992) - "also known as Energall, Inc. or Presto, Inc."
421.	Sherry Cokery.	33 Delancy Street				Spill Report. 12/16/86. 50 gallons - #2 fuel oil.
422.	Sherwin Williams		NJD002451870	Paint	1901 to the Present	Sherwin Williams' Newark Plant if the Company's major manufacturing and distribution facility linked to its worldwide markets by rail and shipping. August 3, 1901 Fire caused by "spontaneous combustion in rubbish." Registered Hazardous Waste Generator (1992) May 6, 1915 fire - backfire. March 27, 1916 Fire caused by gasoline August 21, 1916 Fire caused by ignition of dry paint. June 6, 1918 Fire - "smoking" June 29, 1907 fire - unknown. November 24, 1919 Fire - friction July 12, 1920 Fire - friction December 20, 1920 Fire - friction August 7, 1922 fire in drying room - spontaneous combustion. September 27, 1922 fire - friction in the grinding room. CSL (1992).
423.	Shofar Kosher Foods, Inc.	124 Malvern Street	BUST 0148520	Foods	Present	UST - 1 tank, 500,0[illegible] gallons total capacity, installed 1981. Status: active.
424.	Sobin Chemical Co.	120 Lister Avenue	NJD000590042	Chemicals		CSL (1992) - "also known as Montrose Chemical/Chriscraft Industries."
425.	Siloo		BUST - 0023410			UST - 8 tanks, 49,000 gallons total capacity, installed 1957 through 1987. Status: inactive.
426.	Sleep Master Products Co., Inc.	280 Wilson Avenue	BUST 0165675	Sleeping Products	1990's	UST - 1 tank, 10,000 gallons, installed 1971. Status: inactive.
427.	Standard Leather Co.	83-87 Malvern Street				November 15, 1903 Fire caused by "stepping on match."
428.	Standard Tallow Co.	Blanchard Street		Tallow - grease	1910's to 1990's	August 18, 1918 Fire in yard.
429.	Stanley Tools	140 Chapel Street	NJD002454049	Iron/steel -	1950's to Present	KCSL (1995). 8 tanks,

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
			Lead: BEECRA-E85178. BUST-0263360	hammers		34,000 gallons total capacity, installed 1944 through 1985. Status inactive.
430.	Star Enterprise/Texaco	909-910 Delancy Street	NJD065808875 Lead: BFCM NJPDES Permit No. NJ0002160 (1988 to 1993); BUST-0015536	Petroleum	Present	KCSL (1995). This site was filled with New York garbage in 1907. (Zdepski, 1987) Registered Hazardous Waste Generator (1992). UST-16 Tanks, 90,000 Gallon Total Capacity Installed 1967 through 1983. Spill Report 8/23/91 unknown qty. of oil waste. Star Enterprise's bulk petroleum storage and distribution facility occupies 80 acres near the confluence of Newark Bay and the Passaic River. Products stored at the site include fuel oil and gasoline. A total of 135 monitoring wells and 14 recovery wells exist at the site. Liquid phase hydrocarbon (LPH) and dissolved phase hydrocarbons (benzene, toluene, ethylbenzene, xylenes, methylt-butyl ether, and t-butyl alcohol) were detected in ground water. LPH recovery and ground water remediation efforts have been ongoing since the early 1980's. A ground water remediation system exists at the site but has not been operational since 1991 UST - 2 tanks, 9,000 gallons total capacity, installed 1983. Status: active.
431.	Stengel & Rothschild	Main and Kossuth Streets		Leather	1880' s to 1920's	This Company produced patent and enameled leather for the automobile, carriage, furniture and saddlery trades. In the late 1920's, the Company was replaced by the Merit Strap Co. In the mid 1960's, the Mutual Briefcase Co. shared the address. Merit produced pouches, straps, men's luggage and briefcases. July 16, 1912 fire - unknown. September 12, 1912 fire - from smoking. June 13, 1913 fire - unknown. June 25, 1913 fire - incendiary. July 7, 1919 Fire - matches January 24, 1922 fire - spontaneous combustion in coal pile. March 11, 1894 "fire breaking out again." June 19, 1894 Fire of unknown origin.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						June 20, 1894 "fire in Kossuth Street breaking out." March 1, 1900 Fire "floor over boiler." July 13, 1903 fire "kettle daub fire." January 12, 1904 fire "varnish kettle in yard overheated." September 22, 1904 fire of unknown origin. October 24, 1904 fire - "varnish kettle took fire." March 19, 1906 fire caused by chimney. June 18, 1906 fire of unknown origin. December 15, 1906 fire caused "from smoking." February 15, 1907 fire of unknown origin. November 24, 1911 fire - "spontaneous combustion." December 1, 1911 fire - "children and matches." November 26, 1922 fire - spontaneous combustion in the leather storage shed.
432.	Storm & Co.	Komorn & Vessy Streets		Elevator manufacturer - metal work	1910's to 1920's	November 19, 1916 Fire. The cause was identified as "needless."
433.	Stratus Petroleum Corporation	678 Doremus Avenue	071400427003	Petroleum	Present	**DPCC Plan Filed**
434.	Sun Chemical Corp.	185 Foundry Street	071400521006 NJD002458842	Chemicals	**1960's to Present**	**DPCC Plan Filed.** Registered Hazardous Waste Generator (1992). Sun Newark Terminal occupies 20 acres. A total of 47 monitoring wells esixt at the site. Ground water data unavailable.
435.	Sun Dic-Acquisition Corp.	185 Foundry Street	NJD002458842 Lead: BEECRA-E86960, E90690	Petroleum	1990's	KCSL (1995).
436.	Sun Refinery & Marketing Co.	436 Doremus Avenue	071400418001 NJD001722511 Lead: BFO-M NJPDES Permit No. NJ0002771 (1988 to 1993) NJPDES Permit No. NJ008475 (1992 to 1993) BUST 0135560	Petroleum	Present	KCSL (1995). **DPCC Plan Filed.** Spill Report 2/15/88 300 gallons of gasoline in water Spill Report 10/18/91 60-70 gallons of #2 fuel oil. Spill Report 11/11/91 10 gallons of gasoline. Spill Report 1/21/92 20 gallons phosphoric acid. 1/18/88 unknown qty of oil and gas. Spill Report 1/30/88 75-100 gallons of oil and gasoline. Spill Report 10/6/88 one gallon oil. Spill Report 3/15/91 200 gallons #2 fuel oil. Spill Report 3/15/91 15 gallons of gasoline. Spill Report 4/7/91 20-25 gallons of kerosene Spill Report 5/25/91 less than one gallon gasoline. CSL (1992) - "also known as Sunmark Industries ".

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						UST - 5 tanks, 18.550 gallons total capacity, installed 1982 through 1986. Status: active.
437.	Sun-Dic Acquisition Corp.	185 Foundry Street	NJD002458842			CSL (1992) - "also known as Sun Chemical Corp."
438.	Sunoco Service Station	63-69 Wilson Avenue	NJD986572667 BUST 0148322	Gas Station Petroleum	Present	Registered Hazardous Waste Generator (1992) UST - 5 tanks, 26,000 gallon total capacity , installed 1971 through 1985. Status: active.
439.	Sussex Realty, Inc.	128 Paris Street	BUST 0185150			UST - 1 tank, 550 gallon total capacity, installed 1950. Status: inactive.
440.	Sutterlich & Co.	Blanchard Street			1920's	September 14, 1928 fire - unknown.
441.	Synfax Manufacturing, Inc.	441-459 Avenue P	SWF0714N1SP01 Enforcement File No. 07-1427	Chemicals	1980's	Landfill Disruption Permit - Operating (1988).
442.	Synthetic Dye Co.	Avenue R (Doremus Avenue)		Chemical and dye stuff	1910's to 1920's	August 20, 1916 Fire caused by acid. February 21, 1917 fire - gas. March 6, 1917 fire - electric wires. April 1, 1917 fire - "acids and chemicals." September 16, 1917 fire - smoke stack. September 25, 1917 fire - smoking. October 15, 1918 Fire - "acids and chemicals"
443.	T. Fiore Demolition Contractors	152 Rutherford Street	SWF0714B1SP01 NJD980769475	Solid Waste	1980's	Solid Waste Facility Landfill - Terminated CSL (1992) - "also known as PVSC Sanitary Landfill."
444.	Tenax Finishing Products Co.	390 Adams Street	NJD002141596 07140005200 NJD002141596 Lead: BUST-0001766	Paint	1990's	Spill Report 4/27/92 40 gallons solvent based paint. Registered Hazardous Waste Generator (1992). KCSL (1995). **DPCC Plan Filed**
445.	Tennaco Oil Company	678 Doremus Avenue	NJD085661999 Lead: BEECRA-E89020; BUST 0021025 BUST 0134237	Petroleum	Present	KCSL (1995). UST-3 tanks, 17,300 gallons total capactiy, installed 1967-1986. Spill Report. 5/23/87. 20 gallons fuel oil. Spill Report 5/22/88 100 gallons #2 fuel oil. Spill Report 12/5/88 unknown qty of #2 fuel oil. Spill Report 12/29/89 300-400 gallons of orthoxylene Spill Report 4/18/90 10-15 gallons of xylene. UST - 1 tank, 2,000 gallons, installed 1957. Status: inactive.
446.	Texaco Gas Station	185-87 Wilson Avenue	BUST-0005942	Gas Station	Present	UST-7 tanks, 10,000 gallons total capacity installed 1974 through 1987.
447.	Toys "R" US	888 Doremus Avenue	BUST-0009335	Toy Manufacturer	1980's	UST-2 tanks, 10,550 gallons total capacity, installed 1986.
448.	Texaco Refining and Marketing	909 Delancy Street	NJD065808875 BUST 0064893			CSL (1992). The Getty Newark Terminal occupies 14.5 acres.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Texaco Refining and Marketing Inc. triggered ECRA in 1984 when it sold its petroleum storage facility to Power Test Corporation. Texaco undertook environmental investigation of soil and ground water. Volatile organic compounds (benzene, chlorobenzene, ethylbenzene, toluene, and total xylenes) were detected in ground water. Remediation includes contamination source removal, namely, soils excavation, and semi-annual ground water monitoring. UST - 5 tanks, 35,000 gallons total capacity, installed 1967 through 1981. Status: inactive.
449	Texas Oil Co.	Plum Point Lane		Petroleum	1910's to 1930's	December 18, 1912 fire - "back fire."
450	Textile Leather Co.	Lister Avenue and Brown Street		Leather	1910's	Leather
451	Thatcher Furnace Co.	36 St. Francis Street		Boilers - iron castings	1900's to 1910's	March 26, 1903 Fire caused "from hot casting." September 29, 1906 fire caused by "overheated stove." June 31, 1913 fire - sparks from cupola. March 24, 1915 fire - spark from locomotive. August 13, 1917 Fire.
452	Thomas Popola & Son, Inc.	72 Delancy Street	NJL600212013 Lead: BUST-0181208	Barrels - metal work	1940's to Present	KCSL (1995). Thomas Popola & Sons undertook environmental site investigation following removal of 3 underground storage tanks in 1992. Volatile organic compounds (benzene, toluene, and total xylenes) were detected in ground water at concentrations exceeding the NJDEP Ground Water Quality Standards. Company remediated contaminated soils and implemented a ground water monitoring program. **Ground water data available.** UST - 1 tank, 1,000 gallon total capacity, installed 1975. Status: inactive.
453	Tide Water Bailing Corp	26 St. Charles Street	NJD011534708 Lead: BFCM, BUST - 0023032	Scrap iron	1950's to Present	KCSL (1995). UST - 2 tanks, 4,000 gallons total capacity, installed 1944.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Status: inactive.
454.	Titan Steel Casting Co.	Lister Avenue and Chapel Street		Steel iron casting	1910's	October 11, 1910 fire - unknown. March 12, 1911 fire - "heat from coke oven." February 12, 1912 fire - "sparks from chimney."
455.	Titan Storage Battery Co.	Foot of Chapel Street		Lead battery non-ferrous	1910's	August 21, 1915 fire.
456.	Todard Co.	84 Niagara Street			1900's	May 20, 1902 Fire from chimney.
457.	Tony's Autobody	23-24 Foundry Street	NJD980787220	Auto repair	Present	Registered Hazardous Waste Generator (1992)
458.	Tower Chemical Co.	Doremus Avenue		Dye and chemical plant	1910's to 1930's	November 30, 1920 Fire - acids and chemicals February 21, 1921 Fire - friction July 23, 1921 Fire - friction
459.	Transcope Realty Corp.	145 Blanchard Street	BUST 0087564	Realty Corp.		UST - 2 tanks, _____ gallon total capacity, installed 1987. Status: inactive.
460.	Transfer Metal Casting Co.	Doremus Avenue		Central Railroad Transfer - Foundry - iron	1920's	January 11, 1922 fire - chimney.
461.	Trautz Co	10-12 Delancy Street		Refining		April 16, 1922 fire - "stove." May 17 1919 fire - chimney.
462.	Triangle Towing Services, Inc.	666 Ferry Street				UST - 3 tanks, ____ gallons total capacity, installed 1987. Status: active.
463.	Troy Chemical Corp.	1 Avenue L.	NJD002144517 Lead: BFCM NJPDES Permit No. 0031453	Chemicals	1960's to Present	KCSL (1995). Spill Report. 2/5/87. Mineral spirits near stream. Spill Report 2/12/87. 40 gallons mineral spirits. Registered Hazardous Waste Generator (1992). **DPCC Plan Filed.** Troy Chemical has been at this 6 acre site since about 1956. Prior operators included American Cyanamid/Calco, Heller & Merz and Emulated Dye Stuff & Chemicals. Each manufactured a variety of chemicals and dyes. Troy Chemical Company has owned and operated its paint manufacturing facility on 6 acres since 1956. Numerous violations of NJPDES and RCRA regulations resulted in environmental investigation of soil, ground water, and surface water (Pierson's Creek). Volatile organic compounds (benzene, chlorobenzene, 1,1,2-trichloroethane, 1,2-dichloroethane, trichloroethene, tetrachloroethene, and 1,1,1-trichloroethane), metals (arsenic, copper, lead, and mercury), chloride, cyanide, and PCB-1254 were detected in ground water at concentrations exceeding their NJDEP Ground Water

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						Quality Standards. Status of site remedial investigation unknown. **Ground water data available.** Troy primarily manufactured non-mercurial biocides, however, the Company did previously make mercury based compounds. The Company has wastewater treatment systems. Various enforcement actions were undertaken by NJDEP at this facility during the 1970's and 1980's. CSL (1992).
464.	Truck Renting Corp.	169 Blanchard Street	BUST 0087555	Vehicle Rental	Present	UST - 2 tanks, _____ gallon total capacity, installed 1987. Status: inactive.
465.	U.S. Airmail Warehouse	Manchester Place, Heller Field		Warehouse	1920's	January 1, 1922 fire - locomotive sparks.
466.	Union Ice Co.	Hamburg Place and Stockton Street		Ice	1910's	November 29, 1912 fire - sparks from engine.
467.	Union Smelting & Refining Co.	St. Charles Street & Avenue L		non-ferrous	1910's to 1920's	April 25, 1920 Fire - brush fire April 3, 1921 Fire October 26, 1921 Fire
468.	Universal Caster & Foundry Co.	574 Ferry Street		Manufacturer of furniture and piano casters including steel roller, wood roller and ball bearing. Large business in gray iron castings.	Incorporated 1903 1910's	This Company occupied 5½ acres on Ferry Street with 5 buildings. May 20, 1915 fire.
469.	US EPA Region II - Harvey Trail	Rutherford/600 Wilson Avenue	NJD986610905			Registered Hazardous Waste Generator (1992)
470.	US Spray Finishing Co.	70 Blanchard Street	NJD002449866	Paint	Present	Registered Hazardous Waste Generator (1992)
471.	Valvoline Oil Co.	Manufacturers Place		Petroleum	1910's	November 21, 1912 fire - "spontaneous combustion."
472.	Viking Freight	580 Delancy Street	BUST 0190208	Freight	Present	UST - 1 tank, 550 gallons total capacity, installed 1989. Status: active.
473.	W.I. Moore & Co.	72-78 River Street		Hat manufacturer - leather	Est. 1872 to 1900's	This Company made stiff and soft fir hats for men Custom trade only. Sales were throughout the Country.
474.	Ware Industries Limited	61 Avenue K	NJD075395160 BUST 0056351	Steel _____ - metal working	1980's to Present	Registered Hazardous Waste Generator (1992) UST - 1 tank, 1,000 gallons total capacity, installed 1987. Status: active.
475.	Wax & Novelty Co.	67 Paris Street		Factory - plastic	1920's	July 14, 1921 Fire - oil stove
476.	White Rose Meat Corp.	425 Avenue P	NJL600055503 Lead: BUST-0087573	Food	1990's	KCSL (1995). UST - 2 tanks, 20,000 gallons, installed 1983. Status: inactive.
477	Wiedenmeyers Brewing Co.	250 Ferry Street		Brewery	1900's to 1920's	November 30, 1922 fire - stove. Company undertook environmental investigation of soil and ground water pursuant to the Underground Storage Tank Closure Plan of December 1991. Volatile organic compounds (benzene, chlorobenzene.

No.	Name	Address	NJDEP Reference	Type of Business	Years in Operation	Comments
						ethylbenzene, xylenes, vinyl chloride, trichloroethene, trans-1,2-dichloroethane, and tetrachloroethene) and lead were detected in ground water at concentrations exceeding their NJDEP Ground Water Quality Standards. Company proposed natural attenuation for s remedial alternative for ground water contamination.
478.	Weissman Realty Co.	16 Herbert Street	BUST 0185006			UST - 3 tanks, 30,000 gallon total capacity, installed 1989. Status: active.
479.	Witco Company	652 Doremus Avenue	071400426003 NJPDES Permit No. NJ0002241 (1993 to 1998) BUST - 0067980	Chemical	1980's to Present. Ground water data unavailable.	**DPCC Plan Filed.** Spill Report 8/26/88 unknown qty of sulfuric acid. UST - 2 tanks, 2,000 gallons total capacity, installed 1951 through 1967. Status: inactive.
480.	, Eisman & Co.	121 Paris Street		Tannery - leather	1880's to 1960's	Lewis Ziegle and Max Eisman entered into a Partnership in a shoe leather manufacturing business in 1889. The original factory was on Frelinghuysen Avenue. Their specialty was kangaroo and goat skin shoe leather. The Company imported a million kangaroo hides in 1939. A hide took 40 days to process into a piece of finished leather . Kagaroo provided one of the strongest leathers in the world. This Company became a division of Goldsmith Leather Co., Inc., around 1959.
481.	Yellow Freight System, Inc.	335 Delancy Street	BUST - 0094278 BUST - 0146090	Freight Transportation	Present	UST - 5 tanks, 22 gallon total capacity, installed 1961 through 1990. Status: inactive. UST - 1 tank, 10,000 gallon total capacity, installed 1987. Status: active.

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
1	15E Sanitary Landfill	Route 1 & Foundry Street	NK
2	Albert Steel Drum	338 Wilson Avenue	NK
3	Alliance Chemical Company	309-327 Avenue P	RCRA
4	Amerada Hess Terminal	148-182 Doremus Avenue	NK
5	American Adhesives & Coatings Co.	411 Wilson Avenue	ECRA case#88951
6	American Bumper Company, Inc.	209 Parkhurst Street	ECRA case#87264
7	ARCO Newark Terminal	1111 Delancey Street	ECRA case#86649
8	Arkansas Chemical Company	185 Foundry Street	MOA
9	Ashland Chemical Company	221 Foundry Street	ECRA case#88695
10	Bayonne Barrel and Drum Company	150 Raymond Boulevard	NK
11	Bayshore Connection Railroad	332 Doremus Avenue	NK
12	Cardolite Corporation	500 Doremus Avenue	NK
13	CBS Toys	601 Doremus Avenue	ECRA case#85732
14	Central Steel Drum	704 Doremus Avenue	NJDEP #D011482577
15	Chase Chemical Company	290 Chestnut Street	NK
16	Chem Fluer, Inc.	928 Doremus Avenue	NK
17	Chem Fluer, Inc. Pulaski Facility	200 Pulaski Street	ECRA case#89504

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
18	Comet Chemical	410 Adams Street	ECRA case#88766
19	Conrail Oak Island Yard	Foot of Wheeler Point Road	DHWM #88-12-28-2128M
20	Cooper Lighting	84 Foundry Street	ECRA case#95493
21	Courtesy Container Corporation	465 Wilson Avenue	DHWM
22	Craig Adhesives Company	80 Wheeler Point Road	ECRA case#86704 & 86790
23	Crompton & Knowles Corporation	52 Amsterdam Street	BUST #90-07091017 BUST #90-06271604
24	Darling International Inc.	825 Wilson Avenue	BUST #94-03-29-1525
25	Deleet Merchandising	26 Blanchard Street	NK
26	Diamond Shamrock Chemical	80/120 Lister Avenue	Superfund
27	Dockside Urban Renewal	NK	NK
28	E.J. Haefeli Urban Renewal	414 Avenue P	NK
29	Elan Chemical Company	268 Doremus Avenue	NK
30	Engelhard Corporation	429 Delancey Street	ECRA case#85689
31	Essex Chemical	351 Doremus Avenue	NK
32	Federal Pacific Electric Company	150 Avenue L	ECRA case#86407
33	Federated Metals Corporation	150 St. Charles Street	ECRA case#84193 NJPDES #NJ0099058
34	Friedman's Express	241 Avenue P	BUST #93-08-26-1445 UST #0012287

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
35	Garden State Associates	357 Wilson Avenue	NK
36	Georgia-Pacific Corporation	290 Ferry Street	ECRA case#8456A
37	Getty Newark Terminal	86 Doremus Avenue	ECRA case#84455
38	Goldstein Till & Lite	464-514 Avenue P	NK
39	Heller Truck Body	222 Thomas Street	ECRA case#90403
40	Hertz Corporation	Doremus Avenue	NK
41	Hilton Davis Chemical Company	120 Lister Avenue	ECRA case#86941 & 88240
42	Hoechst Celanese Corporation	354 Doremus Avenue	ECRA case#86973
43	Honig Chemical and Processing Corporation	411 Wilson Avenue	NK
44	Hudson Tool and Die Company	18 Malvern Street	ECRA case#90A12
45	Humko Chemical	652 Doremus Avenue	NK
46	Hummel Lanolin Corporation	185 Foundry Street	ECRA case#86732
47	Hurley Forge, Inc.	70-84 Manufacturers Place	ECRA case#90A55
48	Industrial Petrochemicals, Inc.	128 Doremus Avenue	ECRA case#86317
49	International Metallurgical Services	190 Blanchard Street	MOA
50	Ironbound Recreation Center	St. Charles and Berlin Streets	DHWM #87-08-14-12
51	J.F. Henry Chemical Company, Inc.	Foot of Fenwick Street	ECRA case#86890

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
52	J.L. Armitage & Company	245 Thomas Street	ECRA case#86279
53	Keith Industries	236 Delancey Street	BER #93-07-15-1450
54	Kester Solder	88 Ferguson Street	ECRA case#92244
55	Lehigh Portland Cement Company	194 Doremus Avenue	BUST #90-09-10-1329
56	Lily Truck Leasing	474 Wilson Avenue	BUST #94-09-21-1528
57	Linde Gases of the Mid-Atlantic, Inc.	360 Avenue P	ECRA case#90254
58	Lou Bole Carpet Carriers, Inc.	445 Wilson Avenue	NK
59	McKesson Corporation	600 Doremus Avenue	ACO, RCRA
60	Miniature Wire Forms, Inc.	10 Delancy Street	ECRA case#90936 & 90786
61	N.J. Department of Transportation	Rte. 1 & 9	NK
62	N.J. Turnpike Authority	339-355 Avenue P	NK
63	National Amusement Inc.	NJ Turnpike & Foundry Street	NK
64	Newark Bay Cogeneration	414 Avenue P	NK
65	Newark Box Board Company	17 Blanchard Street	NK
66	Newark Drive-In	104-108 Foundry Street	DHWM #86-07-07-02M
67	Newark Housing Authority	291-549 Avenue P	NK
68	Nimco Shredding	254 Doremus Avenue	NK

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
69	Non-Fluid Oil, Inc.	298 Delancy Street	NK
70	Norpak Corporation	Foundry Street & Roanoke Avenue	NK
71	Ottilio Landfill	18-60 Blanchard Street	NK
72	Passaic Valley Sewerage Commission	600 Wilson Avenue	UST #0039035 UST #0167808
73	Peridot Chemical Company	351 Doremus Avenue	NK
74	Peter Pan Industries	61-85 & 88 St. Francis Street	ECRA case#88020 & 87118
75	Pitt-Consol Chemical	191 Doremus Avenue	NJPDES #NJ0060704
76	Quality Color, Inc.	411 Wilson Avenue	ECRA case#88985
77	Quantum Chemical Company	300 Doremus Avenue	NK
78	Reichhold Chemicals	46 Albert Avenue	BUST #92-11-05-1220 UST #0226253
79	Rokeach Food Corporation	80 Avenue K	BUST #94-10-1041-66 UST #0263946
80	Ronson Metals Corporation	45-65 Manufacturers Place	ECRA case#90022
81	Siloo, Inc.	164 Blanchard Street	ECRA case#84301
82	Stanley Works	140 Chapel Street	ECRA case#85178
83	Star Enterprise Newark Terminal	909/910 Delancey Street	DWM #83-01-07-001 ECRA
84	Stratus/Tenneco Oil Company	678 Doremus Avenue	ECRA
85	Sun Chemical Corporation	185 Foundry Street	ECRA case#90690 & 86960

Table 3-2. Sites Within and Adjacent to the Petition Area that Have Undergone Ground Water Investigation or Remedial Activity.

No.	Site name	Site address	Lead Program
86	Sun Newark Terminal	436 Doremus Avenue	NJPDES-DSW #NJ0104256
87	Textron, Inc.	400 Doremus Avenue	ECRA case#85403
88	Theurer, Inc.	274-292 Thomas Street	ECRA case#85400
89	Thomas Popola & Sons, Inc.	68-92 Delancey Street	BUST #92-11-24-1136
90	Tidewater Baling Corporation	26 Saint Charles Street	DWM #86-08-12-04M
91	Troy Chemical Corporation	1 Avenue L	NK
92	Waste Management	41-85 Doremus Avenue	NK
93	Welch Holme & Clark Company	7 Avenue L	NK
94	White Rose Meat Corporation	425 Avenue P	BUST #91-07-24-1115 UST #0087573
95	Witco Chemical Corporation	562 Doremus Avenue	NK

NK	Not Known.
ECRA	Environmental Clean-up Responsibility Act.
NJDEP	New Jersey Department of Environmental Protection.
BUST	Bureau of Underground Storage Tanks.
UST	Underground Storage Tank.
DHWM	Division of Hazardous Waste Management.
BER	Bureau of Emergency Response.
NJPDES	New Jersey Pollutant Discharge Elimination System.
DWM	Division of Waste Management.
DSW	Discharge to Surface Water.

Table 4-1. Current Information from the Newark Department of Health Regarding Wells in the Petition Area.

No.	Site Address	Former Occupant	Occupant	Business Type	Depth	GPM	Status of Well	Comments
1	62-90 Ave. K	Mother Foods	N/A	N/A	400 ft.	400	NK	Several vacant buildings and lots on this street.
2	104 Ave. C	Merchants Refrigeration	Newark Refrigeration Warehouse	Cold Storage	650 ft	200	In Use	Well still in use to supply cooling water, but is outside of 1/2 mile radius.
3	37-39 Backus St	Northern Feather Works	N/A	N/A	300 ft	48	NK	Building & lot is abandoned Sign of former owner is still in place
4	140 Chapel St.	Stanley Tool	N/A	N/A	275 ft.	150	NK	Building & lot is abandoned. Sign of former owner is still in place.
5	93-105 Chestnut St	Morris Machinery	Morris Machinery	N/A	800 ft	125	NK	Well is not in use. Pump hasn't worked in many years
6	290 Ferry St. #26	Georgia Pacific	BNB Bank	Bank/Offices	800 ft.	1000	NK	Building is now a bank and offices.
7	40 Hermon St	Vacant Building (1979)	N/A	N/A	N/A	97	NK	Address could not be found Vacant lot is located on this street
8	80 Lister Ave	Vacant #1	Duralac	Chemicals	N/A	N/A	Abandoned	Wells were properly abandoned several years ago.
9	80 Lister Ave.	Vacant #2	Duralac	Chemicals	N/A	N/A	Abandoned	Wells were properly abandoned several years ago
10	120 Lister Ave	Thomasett	Hilton Davis Co.	Colors	N/A	N/A	Abandoned	Well was capped prior to 1962.
11	55 Manufacturers Pl	Ronson Metals	Ronson Metals	Manufacturing	300 ft	150	Abandoned	Well was capped in June 1990.
12	345 Oliver St.	Vacant	Apartment Complex	N/A	N/A	160	NK	Address is now a residential apartment.
13	200 Pulaski St.	Chem-Fleur	N/A	N/A	200 ft.	70	NK	Address could not be found. A vacant lot is located in area on Pulaski St
14	444 Raymond Blvd.	N/A	N/A	N/A	N/A	N/A	NK	Vacant warehouses located in the area of address number.
15	157 Manufacturers Pl. #2	Ronson Metal Corp	Ronson Metals	Manufacturing	210 ft	140	Abandoned	Well was capped in June 1985.
16	154 Manufacturers Pl. #3	Ronson Metal Corp	Ronson Metals	Manufacturing	300 ft	140	Abandoned	Well was capped in June 1985.
17	349 Raymond Blvd.	D & L Auto Parts	N/A	N/A	200 ft	100	NK	Address could not be found.

N/A Not applicable
NK Not known.

Table 5-1. Construction Details for Wells Used to Generate the Ground Water Contour Map.

Site Name	Well ID	TOC Elevation (ft msl)	Depth to Water (ft TOC)	Ground Water Elevation (ft msl)	Date Measured	Total Depth (feet)	Diameter (Inches)	Screen Top (ft TOC)	Screen Bottom (ft TOC)
Albert Steel Drum	MW-10S	9.73	NK	1.66	2/2/93	13.00	4	3.00	13.00
Albert Steel Drum	MW-11S	8.23	NK	3.45	2/2/93	9.00	4	4.00	9.00
Albert Steel Drum	MW-12S	8.26	NK	6.65	2/2/93	8.00	4	3.00	8.00
Albert Steel Drum	MW-14S	7.00	NK	5.64	2/2/93	8.00	4	3.00	8.00
Albert Steel Drum	MW-1S	9 50	NK	1.67	2/2/93	15.00	4	5.00	15.00
Albert Steel Drum	MW-2S	11.30	NK	5.84	2/2/93	8.50	4	3.50	8.00
Albert Steel Drum	MW-3S	12.90	NK	6.07	2/2/93	9.25	4	3.50	9.00
Albert Steel Drum	MW-4S	8.58	NK	6.11	2/2/93	8.50	4	2.50	8.00
Albert Steel Drum	MW-5S	13.47	NK	7.23	2/2/93	10.25	4	3.50	10.00
Albert Steel Drum	MW-6S	9.01	NK	4.92	2/2/93	7.50	4	2.00	7.00
Albert Steel Drum	MW-7S	9.68	NK	6.03	2/2/93	7.00	4	2.00	7.00
Albert Steel Drum	MW-8S	10.69	NK	5.97	2/2/93	10.00	4	3.00	10.00
Albert Steel Drum	MW-9S	6.25	NK	2.28	2/2/93	10.00	4	4.00	9.00
Ashland Chemical Company	MW-1	5.91	1.43	4.48	1/2/96	6.50	4	2.50	6.50
Ashland Chemical Company	MW-12	5.43	1 02	4.41	1/2/96	7.00	4	2.00	7.00
Ashland Chemical Company	MW-13	7 66	4.75	2.91	1/2/96	6.50	4	1.50	6.50
Ashland Chemical Company	MW-16	7 60	3.46	4.14	1/2/96	6.00	4	1.00	6.00
Ashland Chemical Company	MW-17	7.95	3.86	4.09	1/2/96	6.00	4	1.00	6.00
Ashland Chemical Company	MW-18	6.97	2.56	4.41	1/2/96	6.00	4	1.00	6.00
Ashland Chemical Company	MW-2	8.39	3.86	4.53	1/2/96	6.00	4	1 00	6.00
Ashland Chemical Company	MW-21	7.30	4.15	3.15	1/2/96	6.00	4	2.00	6.00
Ashland Chemical Company	MW-22	4.24	2.93	1.31	1/2/96	7.00	4	2 00	7.00
Ashland Chemical Company	MW-26	6.71	4.21	2.50	1/2/96	6.00	4	1.00	6.00
Ashland Chemical Company	MW-27	6.45	4.66	1.79	1/2/96	6.50	4	1.50	6.50
Ashland Chemical Company	MW-28	8.00	3.52	4.48	1/2/96	6.50	4	1.50	6.50

Table 5-1. Construction Details for Wells Used to Generate the Ground Water Contour Map.

Site Name	Well ID	TOC Elevation (ft msl)	Depth to Water (ft TOC)	Ground Water Elevation (ft msl)	Date Measured	Total Depth (feet)	Diameter (inches)	Screen Top (ft TOC)	Screen Bottom (ft TOC)
Ashland Chemical Company	MW-29	8.04	3.50	4 54	1/2/96	6 00	4	1 00	6.00
Ashland Chemical Company	MW-5	6.06	1.45	4.61	1/2/96	7.00	4	2.00	7.00
Ashland Chemical Company	MW-9	8.37	4.06	4.31	1/2/96	6.50	4	1.50	6.50
Ashland Chemical Company	PZ-3	7.90	3.51	4.39	1/2/96	6.50	2	1.50	6.50
Craig Adhesives Company	MW-12	9 44	5.11	4 36	3/22/96	13.00	4	3.00	13.00
Craig Adhesives Company	MW-13	15.32	8.73	6 99	3/22/96	15.50	4	5.00	15.00
Craig Adhesives Company	MW-14	14.96	8.73	7.04	3/22/96	15.50	4	5.00	15.00
Craig Adhesives Company	MW-2A	11 53	4.81	6.60	3/22/96	14.00	4	2.00	14.00
Craig Adhesives Company	MW-3	9.20	4.27	4.17	3/22/96	13.00	4	3.00	13.00
Craig Adhesives Company	MW-4	8.86	4.13	5.22	3/22/96	15.00	4	2.50	15.00
Craig Adhesives Company	MW-5	10.22	4.80	5.46	3/22/96	14.00	4	2.00	14.00
Craig Adhesives Company	MW-6	9 48	4.10	5 03	3/22/96	14.00	4	2.00	14.00
Craig Adhesives Company	MW-7	8.66	2 85	5 93	3/22/96	13.50	4	1.50	13.50
Craig Adhesives Company	MW-8	11.71	4.60	6.03	3/22/96	12.00	4	2.00	12.00
Darling International Inc.	MW-6	6.86	3.26	3.60	6/25/96	12.00	4	1.00	11.00
Federal Pacific Electric Company	MW-1	11 12	7.61	3.92	9/28/94	14.64	NK	4.64	14.64
Federal Pacific Electric Company	MW-2	11 36	5.97	5.23	9/28/94	12 97	NK	2.97	12.97
Federal Pacific Electric Company	MW-3	11.36	5.55	6.35	9/28/94	13.30	NK	3.30	13.30
Federal Pacific Electric Company	MW-4	11.11	6.56	6 01	9/28/94	13.63	NK	3.63	13.63
Federated Metals Corporation	MW-5R	11.92	5.47	6.45	4/1/96	14.43	4	4.56	14.43
Getty Newark Terminal	MW-11	6.69	1 42	5.27	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-12	6 25	2.14	4.11	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-13	6.28	1 49	4.79	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-14	5.75	2.16	3.59	6/27/96	12 00	4	2.00	12.00
Getty Newark Terminal	MW-16	7.85	4 49	3.36	6/27/96	10.00	4	0.75	10.00

Table 5-1. Construction Details for Wells Used to Generate the Ground Water Contour Map.

Site Name	Well ID	TOC Elevation (ft msl)	Depth to Water (ft TOC)	Ground Water Elevation (ft msl)	Date Measured	Total Depth (feet)	Diameter (Inches)	Screen Top (ft TOC)	Screen Bottom (ft TOC)
Getty Newark Terminal	MW-4	6.97	1.58	5.39	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-5	6.86	1.44	5 42	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-6	6 50	1.00	5.50	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-7	8 21	4.20	4.01	6/27/96	10.50	4	0.50	10.50
Getty Newark Terminal	MW-9	6.14	2.21	3.93	6/27/96	5.50	4	0.50	5.50
Heller Truck Body	MW-1	8.22	6.04	2.18	6/15/94	14.00	4	3.58	13.58
Heller Truck Body	MW-2	10.19	8.23	1.96	6/15/94	14.00	4	4.00	14.00
Heller Truck Body	MW-3	10.96	8.87	2.09	6/15/94	14.00	4	4.00	14.00
Hilton Davis Chemical Company	MW-4	5.54	3.62	1 92	10/25/90	12.00	4	2.00	12.00
Hilton Davis Chemical Company	MW-5	5 72	3.90	1.82	10/25/90	12.00	4	2.00	12.00
Hilton Davis Chemical Company	MW-6	6.34	1.52	4.81	10/25/90	12.00	4	2.00	12.00
Hilton Davis Chemical Company	MW-7	7.46	1 57	5 89	10/25/90	12.00	4	2.00	12.00

ft msl	Feet above mean sea level.
NK	Not known
ft TOC	Feet below top of casing

Table 6-1. 57 Sites with Ground Water Data.

No.	Site Name	Site Address	Type of Business
1	15E Sanitary Landfill	Route 1 & Foundry Street	Landfill
2	Albert Steel Drum	338 Wilson Avenue	Drum reconditioning
3	Alliance Chemical Company	309-327 Avenue P	Chemicals
4	American Adhesives & Coatings Co.	411 Wilson Avenue	Adhesives and Chemicals
5	ARCO Newark Terminal	1111 Delancey Street	Petroleum
6	Arkansas Chemical Company	185 Foundry Street	Chemicals
7	Ashland Chemical Company	221 Foundry Street	Chemicals
8	Bayonne Barrel and Drum Company	150 Raymond Boulevard	Drum reconditioning
9	CBS Toys	601 Doremus Avenue	Plastic
10	Central Steel Drum	704 Doremus Avenue	Drum reconditioning
11	Comet Chemical	410 Adams Street	Chemicals
12	Conrail Oak Island Yard	Foot of Wheeler Point Road	Rail line and Landfill
13	Cooper Lighting	84 Foundry Street	Lighting products
14	Craig Adhesives Company	80 Wheeler Point Road	Chemicals
15	Darling International Inc.	825 Wilson Avenue	Tallow
16	Deleet Merchandising	26 Blanchard Street	Paper boxes
17	Diamond Shamrock Chemical	80/120 Lister Avenue	Chemicals
18	Engelhard Corporation	429 Delancey Street	Chemicals

Table 6-1. 57 Sites with Ground Water Data.

No.	Site Name	Site Address	Type of Business
19	Federal Pacific Electric Company	150 Avenue L	Electrical equipment
20	Federated Metals Corporation	150 St. Charles Street	Non-ferrous metal
21	Friedman's Express	241 Avenue P	Freight
22	Georgia-Pacific Corporation	290 Ferry Street	Chemicals
23	Getty Newark Terminal	86 Doremus Avenue	Petroleum
24	Heller Truck Body	222 Thomas Street	Truck bodies mfg. - metal work
25	Hilton Davis Chemical Company	120 Lister Avenue	Pigments
26	Hoechst Celanese Corporation	354 Doremus Avenue	Chemicals
27	Hudson Tool and Die Company	18 Malvern Street	Metal work
28	Hummel Lanolin Corporation	185 Foundry Street	Chemicals
29	Hurley Forge, Inc.	70-84 Manufacturers Place	Non-ferrous metal
30	Industrial Petrochemicals, Inc.	128 Doremus Avenue	Petroleum distribution
31	International Metallurgical Services	190 Blanchard Street	Non-ferrous metal
32	Ironbound Recreation Center	St. Charles and Berlin Streets	Recreation
33	J.F. Henry Chemical Company, Inc.	Foot of Fenwick Street	Chemicals
34	J.L. Armitage & Company	245 Thomas Street	Lacquers and thinners - paints
35	Kester Solder	88 Ferguson Street	Solder, flux - non-ferrous metal
36	Lehigh Portland Cement Company	194 Doremus Avenue	Cement

Table 6-1. 57 Sites with Ground Water Data.

No.	Site Name	Site Address	Type of Business
37	Lily Truck Leasing	474 Wilson Avenue	Freight
38	McKesson Corporation	600 Doremus Avenue	Pharmaceutical distribution
39	Newark Housing Authority	291-549 Avenue P	Landfill
40	Non-Fluid Oil, Inc.	298 Delancey Street	Lubricants
41	Norpak Corporation	Foundry Street & Roanoke Avenue	Paper
42	Passaic Valley Sewerage Commission	600 Wilson Avenue	Sewage treatment
43	Peter Pan Industries	61-85 & 88 St. Francis Street	Plastic
44	Pitt-Consol Chemical	191 Doremus Avenue	Rubber and Chemicals
45	Reichhold Chemicals	46 Albert Avenue	Chemicals
46	Ronson Metals Corporation	45-65 Manufacturers Place	Rare earths - non-ferrous metal
47	Siloo, Inc.	164 Blanchard Street	Automotive products
48	Stanley Works	140 Chapel Street	Iron and Steel - hammers
49	Star Enterprise Newark Terminal	909/910 Delancey Street	Petroleum
50	Stratus/Tenneco Oil Company	678 Doremus Avenue	Petroleum
51	Sun Chemical Corporation	185 Foundry Street	Chemicals
52	Textron, Inc.	400 Doremus Avenue	Paint resins
53	Thomas Popola & Sons, Inc.	68-92 Delancey Street	Barrels - metal work
54	Tidewater Baling Corporation	26 Saint Charles Street	Scrap iron

Table 6-1. 57 Sites with Ground Water Data.

No.	Site Name	Site Address	Type of Business
55	Troy Chemical Corporation	1 Avenue L	Chemicals
56	Waste Management	41-85 Doremus Avenue	Truck repair
57	White Rose Meat Corporation	425 Avenue P	Food

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
1	1,1,1-Trichloroethane	17	47	30	195000	60
2	1,1,2,2-Tetrachloroethane	7	12	2	370	83
3	1,1,2-Trichloroethane	8	13	3	2100	64
4	1,1-Dichloroethane	24	94	70	18000	33
5	1,1-Dichloroethene	10	24	2	320	83
6	1,2,4-Trichlorobenzene	4	10	9	1700	50
7	1,2-Dichlorobenzene	15	45	600	48000	15
8	1,2-Dichloroethane	14	38	2	110000	78
9	1,2-Dichloroethene (total)	9	41	100	220000	50
10	1,2-Dichloropropane	3	4	1	75000	100
11	1,2-Diphenylhydrazine	1	1	0.04	4.2	100
12	1,3-Dichlorobenzene	8	21	600	2700	6
13	1,4-Dichlorobenzene	17	40	75	13000	41
14	2,3,7,8-TCDD	1	5	0.01	0.28	60
15	2,4,5-Trichlorophenol	1	8	700	8800	50

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
16	2,4,6-Trichlorophenol	1	6	20	11000	83
17	2,4-D	2	13	70	27000	62
18	2,4-Dichlorophenol	2	12	20	48000	75
19	2,4-Dimethylphenol	5	25	100	93000	55
20	2-Chlorophenol	2	8	40	4600	63
21	2-Propanone	2	2	700	3900	50
22	4,4'-DDD	2	19	0.1	13000	89
23	4,4'-DDE	1	5	0.1	54	100
24	4,4'-DDT	1	11	0.1	22000	100
25	4-Methyl-2-pentanone	7	13	400	36000	47
26	Acenaphthene	20	80	400	130000	2
27	Acetone	14	80	700	310000	18
28	alpha-BHC	4	9	0.02	180	100
29	Aluminum, total	7	70	200	391000	83
30	Ammonia as N	1	5	500	250000	100

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
31	Anthracene	12	39	2000	84000	4
32	Antimony, dissolved	2	3	20	220	100
33	Antimony, total	18	54	20	3500	56
34	Aroclor-1242	2	2	0.5	16	100
35	Aroclor-1248	4	7	0.5	260	100
36	Aroclor-1254	4	6	0.5	8	83
37	Aroclor-1260	1	1	0.5	5.5	100
38	Arsenic, dissolved	7	23	8	8000	79
39	Arsenic, total	30	202	8	181700	81
40	Barium, dissolved	3	20	2000	2600	5
41	Barium, total	10	76	2000	37000	10
42	Benzene	40	243	1	90000	95
43	Benzidine	3	5	50	100	14
44	Benzyl alcohol	1	1	2000	8000	100
45	Beryllium, total	15	45	20	25	2

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
46	beta-BHC	2	5	0.2	1.9	100
47	Bis(2-chloroethyl)ether	3	8	10	1800	75
48	Bis(2-ethylhexyl)phthalate	26	133	30	15000	14
49	Bromodichloromethane	5	6	1	20	83
50	Bromoform	2	3	4	14	100
51	Cadmium, dissolved	2	4	4	13	75
52	Cadmium, total	18	105	4	68000	84
53	Carbon tetrachloride	3	4	2	86	100
54	Chloride	8	48	250000	7430000	33
55	Chlorobenzene	29	116	4	34000	82
56	Chloroform	18	50	6	170000	58
57	Chloromethane	4	5	30	13000	20
58	Chromium, dissolved	3	8	100	39000	8
59	Chromium, total	23	160	100	12000	23
60	cis-1,2-Dichloroethene	12	55	10	280000	79

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
61	Copper, total	26	177	1000	60000	11
62	Cyanide, total	8	42	200	691	11
63	Dibromochloromethane	4	7	10	3100	43
64	Dieldrin	1	4	0.03	0.045	25
65	Ethylbenzene	40	182	700	95000	14
66	Fluoranthene	17	62	300	210000	5
67	Fluorene	22	70	300	270000	7
68	Fluoride, total	3	23	2000	75000	77
69	gamma-BHC	1	3	0.2	310	100
70	Heptachlor	1	1	0.4	1	100
71	Hexachlorobenzene	2	4	10	79	50
72	Hexachlorobutadiene	1	2	1	9200	100
73	Iron, dissolved	3	18	300	130000	100
74	Iron, total	12	97	300	7200000	71
75	Isophorone	4	6	100	230	29

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
76	Lead, dissolved	8	20	10	530	48
77	Lead, total	29	213	10	120000	85
78	Manganese, dissolved	3	21	50	7900	100
79	Manganese, total	11	90	50	32000	95
80	Mercury, total	21	113	2	25300	47
81	Methylene chloride	29	210	2	61000000	89
82	N-Nitrosodiphenylamine	9	44	20	628	27
83	Nickel, dissolved	2	10	100	180	20
84	Nickel, total	21	135	100	17000	44
85	Nitrobenzene	1	1	10	12	100
86	PCBs	1	5	0.5	1	100
87	Pentachlorophenol	1	4	1	20	75
88	pH	14	140	8.5	11.63	4
89	Phenols	13	99	4000	930000	27
90	Pyrene	19	76	200	150000	6

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
91	Selenium, total	15	48	50	790	36
92	Sodium, dissolved	3	22	50000	1500000	62
93	Sodium, total	12	93	50000	5900000	67
94	Sulfate, dissolved	1	5	250000	1100000	75
95	Sulfate, total	3	21	250000	5980000	21
96	Tetrachloroethene	21	76	1	49000	96
97	Thallium, total	8	32	10	810	55
98	Toluene	44	245	1000	380000000	19
99	Total Dissolved Solids	12	156	500000	28500000	81
100	Total Volatile Organics	3	15	500	26480	40
101	trans-1,2-Dichloroethane	2	2	2	29	50
102	trans-1,2-Dichloroethene	15	40	100	1980	23
103	Trichloroethene	27	99	1	170000	98
104	Vinyl chloride	22	68	5	115000	77
105	Xylenes (total)	32	166	40	48510	58

Table 6-2. 107 Constituents Exceeding Class IIA Ground Water Quality Criteria.

No.	Constituent	# Sites Detected (55 total)	# Wells Detected (593 total)	GWQS (ug/L)	Max Concentration Found (ug/L)	% Detections Exceeding GWQS
106	Zinc, dissolved	6	43	5000	7400	3
107	Zinc, total	32	247	5000	442000	15

Table 6-3. The 22 Pervasive Compounds Within the Petition Area

Number	Pervasive Compound	No. Of Sites Exceeding GWQC
	BTEX	
1	Benzene	38
2	Toluene	22
3	Ethylbenzene	17
4	Xylenes (Total)	24
	VOLATILE ORGANICS	
5	1,1 Dichloroethane	11
6	1,1,1 Trichloroethane	13
7	1,2 Dichloroethane	13
8	Chlorobenzene	26
9	Tetrachloroethene	20
10	Trichloroethene	27
11	Methylene Chloride	28
12	Vinyl Chloride	17
13	Chloroform	11
	SEMI-VOLATILE ORGANICS	
14	BIS (2-Ethylhexyl) Phthalate	10
	METALS (TOTAL)	
15	Antimony	10
16	Arsenic	28
17	Cadmium	13
18	Chromium	12
19	Lead	29
20	Mercury	14
21	Nickel	11
22	Zinc	11

Table 6-4. Natural Degradation Processes Impacting the Pervasive Compounds

Compounds	Adsorptive to Soil	Biodegradation (Aerobic)	Biodegradation (Anaerobic)	Water Soluble	Volatile
Benzene	Yes	Yes	Yes	Yes	Yes
Toluene	Yes	Yes	Yes	Yes	Yes
Ethylbenzene	No	Yes	No	No	Yes
Xylenes	Yes	No	Yes	No	Yes
Trichloroethylene	No	Yes	No	Yes	Yes
1,1,1 Trichloroethane	No	No	Yes	Yes	Yes
1,1 dichloroethane	No	No	Yes	No	Yes
1,2 dichloroethane	No	Yes	Yes	No	Yes
Tetrachloroethane	No	No	Yes	No	Yes
Methylene Chloride	No	Yes	Yes	Yes	Yes
Chlorobenezene	No	Yes	No	No	Yes
Vinyl Chloride	No	No	No	Yes	Yes
Chloroform	No	No	No	Yes	Yes
di (2-ethylhexyl) phthalate	Yes	Yes	No	No	No
Antimony	Yes	NA	NA	No	No
Arsenic	Yes	NA	NA	No	No
Cadmium	Yes	NA	NA	No	No
Chromium	Yes	NA	NA	No	No
Lead	Yes	NA	NA	No	No
Mercury	Yes	NA	NA	No	No
Nickel	Yes	NA	NA	No	No
Zinc	Yes	NA	NA	No	No

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)		Sample date
1,1,1-Trichloroethane					
	Ashland Chemical Company	MW-18			
			5100		3/1/89
			230		4/1/93
			56		4/1/94
			ND		4/1/95
	Industrial Petrochemicals, Inc.	MW-7			
			18000		7/1/91
			7500		12/8/94
1,1-Dichloroethane					
	Ashland Chemical Company	MW-30			
			6500		4/1/93
			2300		4/1/94
			2200		4/1/95
			180	J	4/17/96
	Industrial Petrochemicals, Inc.	MW-7			
			2000		7/1/91
			5450		12/8/94
1,2-Dichloroethane					
	Ashland Chemical Company	MW-30			
			64000		4/1/93
			7800		4/1/94
			3500		4/1/95
			150	J	4/17/96
Antimony, total					
	Engelhard Corporation	MW-21			
			ND		4/27/87
			ND		9/25/87
			11		1/15/88
			9		5/25/88
			ND		10/6/88
			ND		12/1/89
	Sun Chemical Corporation	MW-1			
			ND		9/19/89
			130		11/10/89
			ND		8/23/90

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)		Sample date
Arsenic, total					
	Federated Metals Corporation	MW-2			
			200		12/11/81
			230		5/19/83
			90		2/12/85
			100		1/13/86
			70		1/8/87
			30		1/22/88
			25		1/19/89
			35		1/10/90
			28		1/4/91
			10		1/6/92
Benzene					
	Hoechst Celanese Corporation	MW-02			
			39		1/1/88
			8		5/28/90
			6.9		10/24/91
			2.5		12/4/95
Bis(2-ethylhexyl)phthalate					
	Getty Newark Terminal	MW-11			
			420		6/1/88
			1	J	5/31/90
			1	J	5/15/91
			ND		5/15/92
			1	J	6/15/93
Cadmium, total					
	Federated Metals Corporation	MW-3			
			10500		12/11/81
			11000		5/19/83
			3000		2/12/85
			440		1/13/86
			230		1/8/87
			210		1/22/88
			120		1/19/89
			86		1/10/90
			100		1/4/91
			76		1/6/92
			82		1/6/93
			62.4		1/5/94
			40.4		1/1/95

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)	Sample date
Chlorobenzene				
	Hoechst Celanese Corporation	MW-02		
			82	1/1/88
			26	5/28/90
			25	10/24/91
			18	12/4/95
Chloroform				
	Deleet Merchandising	MW-15		
			23	11/23/93
			5	2/15/94
			ND	5/31/94
			ND	5/31/95
			ND	5/7/96
	Industrial Petrochemicals, Inc.	MW-7		
			2700	7/1/91
			1900	12/8/94
Chromium, total				
	Engelhard Corporation	MW-13		
			420	3/21/87
			230	4/27/87
			48	9/25/87
			ND	1/14/88
			ND	5/25/88
			ND	10/6/88
			27	12/1/89
	Sun Chemical Corporation	MW-3		
			1690	9/19/89
			110	11/10/89
			30	8/23/90
Ethylbenzene				
	Ironbound Recreation Center	MW-12		
			340	10/6/88
			27	10/26/90
	Textron, Inc.	MW-27		
			7170	4/27/93
			7440	8/14/93
			6270	10/18/93
			6200	5/11/95

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)	Sample date
Lead, total				
	Federated Metals Corporation	MW-4		
			740	5/19/83
			40	2/12/85
			80	1/13/86
			ND	1/8/87
			ND	1/22/88
			ND	1/19/89
			ND	1/4/91
			ND	1/6/93
			ND	1/1/95
Mercury, total				
	Engelhard Corporation	MW-20		
			23	3/20/87
			ND	9/25/87
			5	1/15/88
			ND	5/25/88
			ND	10/6/88
			ND	12/1/89
Methylene chloride				
	Georgia-Pacific Corporation	MW-6		
			38955	6/28/88
			80	2/17/93
			2.1	2/28/95
			ND	2/20/96
Nickel, total				
	Engelhard Corporation	MW-13		
			8730	3/21/87
			6230	4/27/87
			2270	9/25/87
			830	1/14/88
			700	5/25/88
			310	10/6/88
			160	12/1/89
Tetrachloroethene				
	Ashland Chemical Company	MW-30		
			8000	4/1/93
			1600	4/1/94
			ND	4/1/95
			ND	4/17/96

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)	Sample date
Toluene				
	Ashland Chemical Company	MW-30		
			24000	4/1/93
			16000	4/1/94
			17000	4/1/95
			1400	4/17/96
	Textron, Inc.	MW-27		
			35200	1/26/93
			22700	4/27/93
			24400	8/14/93
			19800	10/18/93
			ND	5/11/95
Trichloroethene				
	Ashland Chemical Company	MW-30		
			45000	4/1/93
			1800 J	4/1/94
			ND	4/1/95
			ND	4/17/96
	Hudson Tool and Die Company	MW-1		
			250	3/16/92
			180	2/13/95
			ND	8/19/96
Vinyl chloride				
	Ashland Chemical Company	MW-24		
			37000	3/1/89
			3400	10/10/91
			30	4/1/93
			ND	4/1/94
			1000	4/1/95
			ND	4/17/96
Xylenes (total)				
	Ashland Chemical Company	MW-29		
			4200	4/1/93
			450	4/1/94
			24	4/1/95
			25	4/16/96

Table 6-5. Historic Ground Water Data for Pervasive Compounds from Selected Monitoring Wells.

Contaminant	Site name	Well ID	Concentration (ug/L)	Sample date
Zinc, total				
	Federated Metals Corporation	MW-3		
			44200	5/19/83
			36000	2/12/85
			18000	1/13/86
			5500	1/8/87
			5000	1/22/88
			3800	1/10/90
			3200	1/4/91
			2100	1/6/92
			1900	1/6/93
			1960	1/5/94
			1390	1/1/95

ND Not Detected.

J Estimated Value Below Method Detection Limit ,

TABLE 7-1

BENTHIC ORGANISMS
COLLECTED IN NEWARK BAY
MAY 1993 - APRIL 1994

CNIDARIA (Sea anenomes, corals)

Anthozoa

RHYNCHOCOELA (Proboscis worms)

Rhynchocoela

POLYCHAETA (Segmented worms)

Ampharetidae
Asabellides oculata
Eumida sanguinea
Glycera spp.
Glycera americana
Heteromastus filiformis
Hypereteone heteropoda
Hypereteone foliosa
Leitoscoloplos robustus
Leitoscoloplos sp.
Lepidonotus sublevis
Lepidonotus squamatus
Marenzelleria viridis
Mediomastus ambiseta
Microphthalmus sczelkowii
Neanthes succinea
Nephtys incisa
Nereididae
Paranaitis speciosa
Pectinaria gouldii
Podarkeopsis levifuscina
Polydora cornuta
Polydora spp.
Proceraea cornuta
Pygospio elegans
Sabellaria vulgaris
Sabellidae
Spio setosa
Streblospio benedicti
Streptosyllis pettiboneae
Tharyx sp.

TABLE 7-1

BENTHIC ORGANISMS
COLLECTED IN NEWARK BAY
MAY 1993 - APRIL 1994

OLIGOCHAETA (Segmented worms)

Oligochaeta

MOLLUSCA (Clams, mussels, snails, limpets)

Barnea truncata
Cylichnella bidentata
Doradella obscura
Ensis directus
Epitonium sp.
Gastropoda
Macoma balthica
Mulinia lateralis
Mya arenaria
Mytilus edulis
Odostomia sp.
Rictaxis punctostriatus
Tellina agilis

CRUSTACEA (Amphipods, isopods, shrimp, sea urchins, barnacles, crabs)

Ampelisca spp.
Ampelisca abdita
Balanus improvisus
Cancer irroratus
Corophium spp.
Corophium acutum
Crangon septemspinosa
Cyathura polita
Edotea triloba
Elasmopus laevis
Leucon americanus
Melita nitida
Microdeutopus gryllotalpa
Microdeutopus spp.
Monoculodes sp.
Neomysis americana
Oxyurostylis smithi

TABLE 7-1

BENTHIC ORGANISMS
COLLECTED IN NEWARK BAY
MAY 1993 - APRIL 1994

CRUSTACEA (Continued)

Paracaprella tenuis
Parapleustes aestuarius
Rhithropanopeus harrisii
Sphaeroma quadridentata
Unciola serrata
Xanthidae

INSECTA (Insects)

Chironomidae

ECHINODERMATA (Starfish, echinoderms)

Asteroidea
Echinoidea

ASCIDIACEA (Sea grapes)

Molgula manhattensis

Source: USACE, 1995.

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TABLE 7-2

FISH SPECIES COLLECTED IN THE LOWER PASSAIC RIVER 1980

Common Name	Scientific Name
American Eel	*Anguilla rostrata*
Blueback Herring [2]	*Alosa aestivalis*
Alewife [2]	*Alosa pseudoharengus*
American Shad [3]	*Alosa sapidissima*
Gizzard Shad	*Dorosoma cepedianum*
Bay Anchovy	*Anchoa mitchilli*
Rainbow Smelt	*Osmerus mordax*
Goldfish	*Carassius auratus*
Carp	*Cyprinus carpio*
White Sucker	*Catostomus commersoni*
Brown Bullhead	*Ictalurus nebulosus*
Silver Hake	*Merluccius bilinearis*
Atlantic Tomcod	*Microgadus tomcod*
Red Hake	*Urophycis chuss*
Mummichog	*Fundulus heteroclitus*
Tidewater Silverside	*Menidia peninsulae*
Atlantic Silverside	*Menidia menidia*
Threespine Stickleback	*Gasterosteus aculeatus*
Northern Pipefish	*Syngnathus fuscus*
White Perch	*Morone americana*
Striped Bass [2]	*Morone saxatilis*
Pumpkinseed	*Lepomis gibbosus*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
Black Crappie	*Pomoxis nigromaculatus*

Notes:

[1] Sampling site was in the vicinity of the NJ Turnpike Bridge.
[2] Adults and juveniles.
[3] Juveniles.

Source: USACE, 1987

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TABLE 7-3

FISH AND MEGAINVERTEBRATES COLLECTED IN NEWARK BAY MAY 1993 - APRIL 1994

Common Name	Scientific Name
Fish	
Little Skate	*Raja erinacea*
Atlantic Sturgeon	*Acipenser oxyrhynchus*
American Eel *	*Anguilla rostrata*
Conger Eel	*Congridae sp.*
Blueback Herring *	*Alosa aestivalis*
Alewife *	*Alosa pseudoharengus*
American Shad *	*Alosa sapidissima*
Atlantic Menhaden	*Brevoortia tyrannus*
Atlantic Herring	*Clupea harengus*
Gizzard Shad *	*Dorosoma cepedianum*
Bay Anchovy *	*Anchoa mitchilli*
Rainbow Smelt *	*Osmerus mordax*
Atlantic Tomcod *	*Microgadus tomcod*
Red Hake *	*Urophycis chuss*
Spotted Hake	*Urophycis regia*
Striped Killifish	*Fundulus majalis*
Atlantic Silverside *	*Menidia menidia*
Threespine Stickleback *	*Gasterosteus aculeatus*
Lined Seahorse	*Hippocampus erectus*
Northern Pipefish *	*Syngnathus fuscus*
Northern Searobin	*Prionotus carolinus*
Striped Searobin	*Prionotus evolans*
Grubby	*Myoxocephalus aenaeus*
White Perch *	*Morone americana*
Striped Bass *	*Morone saxatilis*
Bluefish	*Pomatomus saltatrix*
Crevalle Jack	*Caranx hippos*
Scup	*Stenotomus chrysops*
Silver Perch	*Bairdiella chrysoura*
Weakfish	*Cynoscion regalis*
Spot	*Leiostomus xanthurus*
Northern Kingfish	*Menticirrhus saxatilis*
Atlantic Croaker	*Micropogonias undulatus*

TABLE 7-3

FISH AND MEGAINVERTEBRATES COLLECTED IN NEWARK BAY MAY 1993 - APRIL 1994

Tautog	*Tautoga onitis*
Cunner	*Tautogolabrus adspersus*
Rock Gunnel	*Pholis gunnellus*
Goby	*Gobiosoma sp.*
Butterfish	*Peprilus triacanthus*
Chub mackerel	*Scomber japonicus*
Smallmouth Flounder	*Etropus microstomus*
Summer Flounder	*Paralichtys dentatus*
Fourspot Flounder	*Paralichthys oblongus*
Windowpane	*Scophthalmus aquosus*
Winter Flounder	*Pleuronectes americanus*
Hogchoker	*Trinectes maculatus*
Planehead Filefish	*Monacanthus hispidus*
Northern Puffer	*Sphoeroides maculatus*
Megainvertebrates	
American Oyster	*Crassostrea virginica*
Softshell Clam	*Mya arenaria*
Longfin Squid	*Loligo pealeii*
Horseshoe Crab	*Limulus polyphemus*
Mantis Shrimp	*Squilla empusa*
Spider Crab	*Libinia emarginata*
Atlantic Rock Crab	*Cancer irroratus*
Blue Crab	*Callinectes sapidus*
Lady Crab	*Ovalipes ocellatus*

Notes:

* Also collected in the Lower Passaic River in 1980 (see Table 7-2).

Source: USACE, 1995.

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Table 7-4. Vegetation Within the Petition Area

Common Name	Scientific Name
	Trees
Quaking Aspen	Populus tremuloides
Big Tooth Aspen	Populus grandidentata
Red Mulberry	Morus rubra
Black Locust	Gleditsia triacanthos
	Shrubs
Smooth Sumac	Rhus glabra
Common Elder	Sambucus canadensis
Spice Bush	Lindera benzoin
Japanese Knotweed	Polygonum cuspidatum
	Herbs
Comfrey	Symphytum officinale
Common Millweed	Asclepias syriaca
Daisy Fleabone	Erigeron anmuus
Fire Weed	Epilobium angostifolium
Cattails	Typha latifolia
Common Rag Weed	Amrosia artemisiifolia
	Grasses
Giant Reed	Phragmites australis

Table 7-5. Ground Water Model Estimates of Concentrations and Travel Times for the 22 Pervasive Compounds.

Where:

Average Hydraulic Conductivity, K (ft/day) =	10	(from previous reports, equivalent to 3.54 x 10^{-3} cm/sec for fill)
Average Hydraulic Gradient, i (ft/ft) =	0.005	(from previous reports)
Average Effective Porosity, n_e =	0.35	(assumed)
Average Groundwater Seepage Velocity, v_s (ft/day) =	0.143	(calculated as Ki/n_e)
Average Bulk Density of formation, rho (g/mL) =	1.5	(assumed)
Average Fraction of Organic Carbon in soil, f_{oc} =	0.005	(assumed)

Parameter	1 Highest Conc., C0 (ug/L)	2 Shortest Distance from Well to River (ft)	3 Soil-Water Partition Coeff., Koc (mL/g)	4 Distribution Coeff., Kd (mL/g)	5 Retardation Factor Rd	6 Parameter Transport Rate vpt (ft/day)	7 Parameter Travel Time, t (day)	8 Parameter Travel Time, t (year)	9 Parameter Half-life, t1/2 (day)	10 Rate Constant k (day-1)	11 Concentration at River Bank C (ug/L)
1,1,1-Trichloroethane	195000	1590	155	0.78	4.3	0.033058	48096	132	546	0.0012692	0.00000000
1,1-Dichloroethane	18000	3280	45	0.23	2.0	0.072727	45100	124	360	0.0019250	0.00000000
1,2-Dichloroethane	110000	3280	36	0.18	1.8	0.080645	40672	111	360	0.0019250	0.00000000
Benzene	90000	4310	97	0.49	3.1	0.046404	92881	254	720	0.0009625	0.00000000
Tetrachloroethene	49000	370	303	1.52	7.5	0.019066	19407	53	720	0.0009625	0.00037654
Trichloroethene	170000	1500	152	0.76	4.3	0.033557	44700	122	1653	0.0004192	0.00123538
Methylene chloride	61000000	1690	25	0.13	1.5	0.093023	18166	50	56	0.0123750	0.00000000
Vinyl chloride	115000	3280	2.45	0.01	1.1	0.135731	24165	66	2875	0.0002410	340
Xylenes, total	48510	370	519	2.60	12.1	0.011786	31395	86	360	0.0019250	0.00000000
Bis(2-ethylhexyl)phthalate	15000	6840	12200	61.00	262.4	0.000544	12565080	34425	389	0.0017815	0.00000000
Chlorobenzene	34000	1310	318	1.59	7.6	0.018282	71657	196	300	0.0023100	0.00000000
Ethylbenzene	95000	6000	622	3.11	14.3	0.009970	601800	1649	228	0.0030395	0.00000000
Toluene	380000000	3750	242	1.21	6.2	0.023095	162375	445	28	0.0247500	0.00000000
Chloroform	170000	1500	34	0.17	1.7	0.082645	18150	50	1600	0.0003850	157
Antimony, total	3500	1500	NA	45	193.9	0.000737	2035500	5577	NA	NA	NE
Arsenic, total	181700	5440	NA	200	858.1	0.000166	32678080	89529	NA	NA	NE
Cadmium, total	68000	6090	NA	6.4	28.4	0.005025	1211910	3320	NA	NA	NE
Chromium, total	12000	1500	NA	37	159.6	0.000895	1675500	4590	NA	NA	NE
Lead, total	120000	1500	NA	900	3858.1	0.000037	40510500	110988	NA	NA	NE
Mercury, total	25300	5810	NA	10	43.9	0.003257	1783670	4887	NA	NA	NE
Nickel, total	17000	7410	NA	150	643.9	0.000222	33396870	91498	NA	NA	NE
Zinc, total	442000	6190	NA	38	163.9	0.000872	7099930	19452	NA	NA	NE

Notes:

Reference for half-lives: *Handbook of Environmental Degradation Rates by Philip H Howard et al., 1991, Lewis Publishers, Inc* Reference for Koc: *Applied Hydrogeology by C W. Fetter, 3rd edition, 1994, pp 467-469, Prentice Hall, Inc,* and *Groundwater Chemicals Desk Reference by J H. Montgomery and L. M. Welkom, 1990, Lewis Publishers, Inc*. Reference for K_d values for inorganic parameters: *Soil Screening Guidance: Technical Background Document, May 1996, EPA/540/R-95/128*

The retardation factor, $R_d = 1 + ((K_d * rho)/n_e)$ The parameter transport rate, $v_{pt} = v_t/R_d$

A first-order degradation model given by $C = C_0 e^{kt}$ was assumed for the organic parameters for concentration estimation purposes (where $k = 0.693/t_{1/2}$)

NA = Not Applicable.

NE = Not estimated.

Table 7-6. Comparison of Estimated Concentrations of Pervasive Compounds at River Bank with Toxicity Reference Values (TRV)

Contaminant	Concentration at River Bank [1] (ug/l)l	Aquatic TRV [2] (ug/l)	Hazard Quotient (unitless)
Chloroform	157	8,150 [3]	1.93E-02
Tetrachloroethene	0.00038	450 [4]	8.41E-07
Trichloroethene	0.00124	200 [4][5]	6.18E-06
Vinyl Chloride	340	99 [6]	3.87E+00

Notes:

NA = Not Available

[1]Concentrations at river bank on Table 7-5

[2] TRV = Toxicity Reference Value

[3] LC50 value for pink shrimp (Penaeus duorarum) (USEPA, 1980) divided by 10

[4]USEPA Ambient Water Quality Criterion (USEPA, 1991). Marine chronic criteria used.

[5]Acute criterion (USEPA, 1991) divided by ten

[6]Tier II secondary chronic value (fresh water) (Suter and Mabrey, 1994).

Table 8-1
Distribution of Remediation Units Used in Estimating Remediation Costs

Remedial Type Unit	Number of 2 acre sites	Number of 5 acre sites	Number of 10 acre sites	Number of 20 acre sites	Total Acreage
LNAPL's only	5	1	2		35
DNAPL's only	4		1		18
Metals only	5	2	1		30
LNAPL's and DNAPL's	2	1	2	4	109
LNAPL's and Metals		1			5
DNAPL's and Metals			1		10
LNAPL's, DNAPL's and Metals		6	3	3	120
Totals	16	11	10	7	327

Table 8-2
Summary of Estimated Costs for Ironbound Reclassification Petition Area

Remediation Unit Type	Sub-unit	Cost per acre (millions)	Total Acreage	Total Cost (millions)
LNAPL's only	North East West	7.8 4.9 5.9	0 19 16	0 92 94
DNAPL's only	North East West	7.8 5.9 9.5	10 4 4	78 24 38
Metals only	North East West	3.0 3.0 3.7	0 15 15	0 46 56
LNAPL's and DNAPL's	North East West	7.8 5.9 9.5	20 69 20	157 407 189
LNAPL's and Metals	North East West	10.7 7.3 9.4	5 5 5	53 0 0
DNAPL's and Metals	North East West	10.7 8.7 12.0	0 0 10	0 0 120
LNAPL's, DNAPL's and Metals	North East West	10.7 8.8 12.0	25 75 20	267 657 239
Totals			327	2,520

APPENDIX A
CERTIFICATION OF APPROPRIATE PUBLIC NOTIFICATION

To be Provided in Final Petition

APPENDIX B
INDUSTRIAL DEVELOPMENT IN THE PETITION AREA

The following is a description of the Primary Industry Groups and how they developed in the Petition Area. Figure 2-2 are drawings and photos of some of the earlier factories in the area showing their large-size and many smoke stacks.

The following industries are described herein:

i. Chemical and Allied Products
ii. Paints and Varnishes
iii. Plastics
iv. Iron and Steel
v. Non-Ferrous Metals
vi. Fabricated Metal Products
vii. Petroleum
viii. Leather
ix. Paper/Cardboard
x. Motor Freight Transporation and Warehousing
xi. Truck/Auto-Equipment Sales/Service/Leasing
xii. Scrap Metal
xiii. Landfill and Dump Sites

i. Chemicals and Allied Products. Chemicals are New Jersey's number 1 industry. Prior to World War I, Germany was the leading manufacturer of chemicals. However, when World War I broke out, the United States needed to develop its own expertise in the area. The country quickly acquired that expertise and developed its own chemical industry to rival that of Germany's. Not surprisingly, that development began in Newark and, more particularly, in the Petition Area.

New Jersey's chemical industry actually got its start in Newark in the 1850's when James J. Mapes developed the first good quality synthetic fertilizer. Newark had seven chemical companies by the 1870's including Passaic Carbon & Agricultural Chemical Works (established by Alfred and Edwin Lister in the 1850's to make fertilizers) - located in the Petition Area, and Passaic Chemical Works (one of only three chemical companies in the U.S. making sulfuric acid in the 1870's), see Figure 2-6.

By World War I, given the availability of the recently reclaimed Newark Salt Marsh, the Petition Area exploded with the growth of chemical companies. These companies make and use virtually every kind of chemical including the following:

- Alkaline and chlorine including caustic soda and soda ash.
- Industrial gases including acetylene and others.

- Inorganic pigments including black pigments, boneblack, chrome pigments, color pigments, iron oxide, lead pigments, metallic pigments, paint pigments, pearl essence, titanium pigments, ultramarine pigments, zinc oxide pigments and others.
- Industrial inorganic chemicals including compounds of aluminum, ammonia, barium, calcium, chromium, cooper, cyanides, hydrochloric acid, inorganic acids, laboratory chemicals, magnesium, mercury, nickel, perchloric acid, phosphates, potassium, rare earth metals, reagent grade chemicals, sodium, sulfate, sulfuric acid, tanning agents, tin and zinc.
- Organic and inorganic medicinal chemicals and their derivatives and processed botanical drugs and herbs.
- Pharmaceutical preparations.
- Soaps and other detergents.
- Specialty cleaning, polishing and sanitation preparations including degreasing solvents, disinfectants, leather dressings, paint cleaner, saddle soap, stain remover, etc.
- Industrial organic chemicals including non-cyclic organic chemicals; solvents; polyhydric alcohols; synthetic perfume and flavoring materials; rubber processing chemicals; plastizers; synthetic tanning agents; esters, amines, etc. of polyhydric alcohols and fatty and other acids; cyclic crudes and intermediates; cyclic dyes and organic pigments and natural gum and wood chemicals.
- Agricultural chemicals.
- Adhesives and sealants.
- Printing inks.
- Other chemical preparations used for foundry supplies, heat installation, metal treating compounds, plating compounds and other chemicals.

These manufacturers are classified as Industrial Group No. 281 as identified in the Standard Industrial Classification (SIC) Manual published by the Office of Management and Budget. These businesses are required to comply with the Industrial Site Recovery Act (ISRA). See Table 2-2 and 3-1 for a description of the chemical companies in the Petition Area.

ii. Paints and Varnishes. The paint and varnish industry began in Newark in the 1840's. Newark had ten (10) varnish manufacturers before the Civil War producing varnish and Japans for buggies, coaches and furniture. By the end of the 19th Century, the City became a major manufacturing center for paint and varnish given its excellent location, rail service and shipping facilities.

The earliest paint companies in Newark,were New Jersey Zinc Company (1850's) - located within the Petition Area, Boyland & Tuer's Oraton Paint Works (1860's) and Israel Baldwin's Newark Paint Works (1880's). By the early 1900's, Sherwin-Williams, DeVoe & Reynolds Co., Benjamin Moore, Beckwith Chandler, Heller & Merz and others established their facilities within the Petition Area (see Figure 2-6).

These companies manufacture paints; varnishes; lacquers; enamels; shellacs; putties; wood fillers; sealers; paint and varnish removers; primers; asphalts; dispersions; Japans; dryers; stains; waxes; vinyl coatings; zinc oxide paints and allied products. Manufacturers of these products generally fall into SIC Industrial Group No. 285. These businesses are ISRA subject. See Table 2-2 and 3-1 for a description of the historic paint companies in the Petition Area.

iii. Plastics. John Wesley Hyatt invented the first plastic known as "celluloid" (a mixture of pyroxylian and camphor) in the 1860's and set up the first plastics company in Newark in 1873. He developed the product when a New York company that made ivory billiard balls offered a $10,000 prize for anyone who could develop a substitute for elephant ivory since elephant herds were dwindling and ivory demands were increasing. Hyatt won the prize.

Hyatt set up the Celluloid Harness Trimming Co., Celluloid Novelty Co. and Celluloid Collar & Cuff Company in Newark. Hyatt also developed the World's first plastic molding and shaping machinery and with a partner developed the first injection molding machinery.

In the late 1880's, Rev. Hannibal Goodwin invented flexible film in Newark when he was searching for a material to make unbreakable stereo slides for bible scenes. After some minor explosions in the parsonage attic, he invented a billion dollar industry - an accomplishment for which he received no money. Hyatt's Celluloid Company began to produce the first continuous celluloid film for the fledgling motion picture industry by the 1890's.

Celluloid products included knife handles, piano keys, artificial teeth, billiard balls and collar stays, among many other products. By 1915, much of the celluloid products made in the U.S. came

from the Newark area. The popularity of celluloid soon waned when the flammable nature of the material became unacceptable (too many collar stays were literally catching fire).

Bakelite (phenol-formaldehyde) was the second generation of plastic which dominated the market in the 1920's. It was used to make automobile glass. By the 1930's, many varieties of plastic material were being developed for a variety of specific purposes. The Celanese Company, located in the Petition Area, pioneered the manufacture of molding granules which made injection molding practicable.

World War II was a motivating factor for developing new and better forms of plastic including Plexiglas (used as transparent enclosures for military aircraft) and Teflon (remarkably resistant to chemicals and heat).

Like the chemical industry, the plastics industry also had a phenomenal growth in Newark. Businesses in the Petition Area produced a variety of plastics including: synthetic resins; non-vulcanized elastomers; synthetic rubber (vulcanized elastomers); celluloid and other organic fibers including acrylic, nylon, polyester and vinyl, among other things. Manufacturers of these products generally fall into SIC Industry Group No. 282. These businesses are ISRA subject.

Other businesses in the Petition Area manufacture plastic films and sheets; profile shapes; plates; bottles; foam products; plumbing fixtures and other plastic formed products. Manufacturers of these products generally fall into SIC Industrial Group No. 308. These businesses are ISRA subject.

See Table 2-2 and 3-1 for a description of the plastics companies in the Petition Area.

iv. Iron and Steel. Newark became well known for its iron and steel foundries primarily because coal and iron ore could be easily provided to foundries using the Morris Canal. In addition, Seth Boyden invented the process of manufacturing malleable iron in Newark in the 1820's. This spurred the growth of the foundry industry in the City.

The arrival of railroads not only provided Newark with a better mode of transporting manufactured goods than the Morris Canal, but the rails, locomotives, boxcar chassis, and railroad bridges became goods that were manufactured in Newark.

Some of Newark's well known foundries were located in the Petition Area including Atha Tool Company (now Stanley Works); Sacks-Barlow Foundries: Hay Foundry & Ironworks; Universal Casters & Foundry Co. and the Morrison-Flockhart Foundry (see Figure 2-6).

These and other foundries in the Petition Area were primarily engaged in the manufacture of iron and steel castings such as gray and ductile iron castings used to make car wheels, pipes, fittings, ingots, nipples and other castings; malleable castings; steel investment castings and other steel castings.

Manufacturers of these products generally fall into SIC Industry Group No. 332. These businesses are ISRA subject. See Table 2-2 and Table 3-1 for a description of the iron and steel foundries in the Petition Area.

v. **Non-Ferrous Metals.** These metals include cooper, zinc, aluminum, palladium, gold, silver, nickel, tin and other useful and/or precious metals - but not iron or steel. Balbach Smelting & Refining Co., located within the Petition Area, was an example of a well-known secondary smelting company. Balbach was the first company to improve the methods of refining gold and silver from scrap. Soon most of Newark's jewelry manufacturers were sending their precious metal sweeping to Balbach for refining (see Figure 2-6).

The non-ferrous foundry business in Newark engaged in primary smelting; secondary smelting; the rolling, drawing and extruding of non-ferrous metals; and non-ferrous foundry castings.

- Primary smelting involves smelting the metal from the ore itself and refining it using electrolytic or other processes to create bars, blocks, ingots, pigs or slabs.
- Secondary smelting involves recovering the metal from new and used scrap and dross or producing alloys from purchased refined metals.
- Rolling, drawing and extruding non-ferrous metals does not involve smelting, only the shaping of metal into basic shapes such as plates, sheets, strips, bars, tubes and wires.
- Non-ferrous foundries manufacture castings or dye-castings of aluminum, brass, bronze and other non-ferrous metals and alloys. They generally operate on a job or order basis, manufacturing castings for sale to others or for interplant transfer. Establishments which produce non-ferrous castings and which also engage in fabricating products are described in the section below pertaining to Fabricated Metal Products. Very often, machine shops that manufacture fabricated metal products had their own on-site foundry departments to create the castings they required.

These manufacturers are generally classified as SIC Industry Group No. 333, 334, 335, 336 and 339. These business are ISRA subject. See Table 2-2 and Table 3-1 for a description of the non-ferrous metal facilities in the Petition Area.

vi. Fabricated Metal Products. The abundance of foundries in Newark encouraged a variety of manufacturers of fabricated metal products to settle in the City, especially the Petition Area.

These industries fabricated a variety of metal products including the following:

- Metal cans, shipping barrels, drums, kegs and pails.
- Cutlery, hand tools, hand saws, saw blades and hardware.
- Enameled iron, cast iron and pressed metal sanitary ware.
- Plumbing fixtures, fittings and trim.
- Heating equipment such as furnaces, stoves, boilers, radiators and heaters.
- Fabricated structural metal products for bridges, buildings, ships, boats, gates and towers.
- Fabricated plate work (boiler shops).
- Sheet metal work.
- Architectural and ornamental metal work.
- Screw machine products.
- Bolts, nuts, screws, rivets, washers.
- Metal forging and stamping..
- Electroplating, plating, polishing, anodizing and coloring. .
- Industrial and commercial machinery and equipment including engines and turbines; farm and garden machinery; metalworking machinery and special industry machinery; general industry machinery; refrigeration and service industry machinery. Machines powered by built-in or attachable motors.
- Machinery, apparatus and supplies for the generation, storage, transmission, transformation and utilization of electrical energy.

These manufacturers generally fall within SIC Industrial Group Nos. 341, 342, 343, 344, 345, 346, 347, 349, 351, 352, 353, 354, 356, 358, 359, 361, 362, 363 and 364. These businesses are ISRA subject. See Table 2-2 and Table 3-1 for a description of the fabricated metal facilities in the Petition Area.

vii. Petroleum. Bayonne, located just east of the Petition Area, was where the petroleum industry began in New Jersey. As Bayonne became crowded with the petroleum business of Standard Oil, Tide Water and others, the industry expanded to Linden where Standard Oil began its sprawling Bayway Refinery complex in the early 1900's. World War I brought fantastically increased demands for refined petroleum products. The Petition Area, being situated between Bayonne and Linden along the Passaic River became an ideal location for petroleum companies to locate facilities and many did including Getty Oil, Texaco, Arco, Sun Oil and others (see Figure 2-6).

These facilities engage in the following manufacturing activity:

- Petroleum refining. These operations produce gasoline, kerosene, naphtha, wax, solvents, distillate fuel oils, and lubricants through fraction or straight distillation of crude oil, redistillation of unfinished petroleum derivatives, or other processes. Some of these facilities also produced aliphatic and aromatic chemicals as by products.
- Asphalt paving mixtures.
- Lubricating oils and greases.

These manufacturers generally fall within SIC Industrial Group No. 29. These businesses are ISRA-subject. See Figures 2-2 and 3-1 for a description of the petroleum facilities in the Petition Area.

viii. Leather. Newark was known worldwide for its leather industry. Newark's factories engaged in tanning, curing and finishing hides and skins into leather. All kinds of leathers were used in Newark's factories including kangaroo, alligator, horsehide and lizard, among others. Many of these factories were located throughout Newark but a significant portion were located within the

Petition Area including, Redal Leather Mfg. Co., American Leather Mfg. Co., Esta Hat Co. and others (see Figure 2-6).

These manufacturers primarily engage in the following activity:

- Tanning and finishing hides and skins to create bags, belts, bookbinding, chamois leather, handbags, harnesses, saddlery leather, sole leather and other items.
- Boot and shoe cuts.
- Footware.
- Luggage including hat boxes, briefcases, satchels and trunks.
- Personal leather goods including handbags, eyeglass cases, tobacco pouches.
- Other leather goods including embossed leather goods, razor strops, automobile leather and novelties.

These manufacturers generally fall within SIC Industrial Group Nos. 311, 313, 315, 316, 317 and 319. These businesses are ISRA subject. See Table 2-2 and Table 3-1 for a description of the leather facilities in the Petition Area.

ix. **Paper/Cardboard.** Shoes require shoe boxes. Jewelry requires jewelry boxes. Hats require hat boxes. The variety of products being produced by Newark's manufacturing businesses required packages of all kinds and shapes for shipping and display. Consequently, a significant number of manufacturers of paperboard containers and boxes and converted paper and paperboard products located facilities in Newark and in the Petition Area. These businesses were primarily engaged in manufacturing the following:

- Set up paperboard boxes; corrugated and solid fiber boxes; fiber cans, tubes, drums and similar products; sanitary food containers and folding paperboard boxes.
- Converted paper and paperboard products including packaging paper and plastic film (coated and laminated); plastics, foil and coated paper bags; uncoated paper bags; dye-cut paper and paperboard and cardboard; sanitary paper products; envelopes; stationary, tablets and related products; and other converted paper and paperboard products including gift wrap paper, paper rolls, roll paper, etc.

These manufacturers generally fall into SIC Industrial Group Nos. 265 and 267. These businesses are ISRA-subject. See Tables 2-2 and 3-1 for a description of these facilities in the Petition Area.

x. Motor Freight Transportation and Warehousing. While railroads were an efficient means of moving raw material and final product, local and long-distance trucking began to gain popularity soon after World War II when the country's highway systems were improved. Given the tremendous volume of manufacturers in Newark and in the Petition Area, a significant number of trucking companies have located in the area. They engage in the following activity:

- Local trucking without storage.
- Over-the-road trucking.
- Local trucking with storage.
- Courier services.
- Refrigerated warehousing and storage.
- General warehousing and storage.
- Terminal and joint terminal maintenance facilities for motor freight transportation.

These businesses generally fall into SIC Industrial Group Nos. 421, 422 and 423. These businesses are not ISRA subject (see Table 2-2 and 3-1).

xi. Truck/Auto-Equipment-Sales/Service/Leasing. These businesses primarily engage in the following activities: truck rental and leasing (without drivers), passenger car rental and leasing, utility trailer leasing and automotive repair shops. Generally, these businesses fall into SIC Industrial Group Nos. 751 and 753. These business are not ISRA subject (see Tables 2-2 and 3-1).

xii. Scrap Metal. These businesses are primarily engaged in assembling, breaking-up, sorting, and wholesale distribution of scrap metal and iron including the dismantling of automobiles for scrap and the selling of second hand automobile parts. These businesses also wholesale iron and steel scrap, junk, metal waste and non-ferrous metal scrap. They generally fall within SIC Industrial Group Nos. 5093 and 5015. These business are not ISRA subject (see also Tables 2-2 and 3-1).

xiii. Landfills and Dump Sites. As previously discussed, the Newark Salt Marsh was filled with fill material. The area was also historically used for City dumps during the first part of the 20th Century and landfills during the later half of the 20th Century. "City dumps" were generally operated prior to the need to register such facilities or manage them in any particular way, while landfills were often registered and managed in whatever way was appropriate for the time. The City

dumps and landfills in the Petition Area have historically been used to dispose of garbage from Newark and New York City, acid waste, ashes, hazardous waste, refuse, rubbish, sludge, slag, street sweepings and other materials. Generally, these facilities are classified as SIC Industrial Group No. 4953. These businesses are not ISRA subject (see Tables 2-2 and 3-1).

APPENDIX C
HISTORIC DISCHARGE SOURCES

This Appendix describes the historic discharge sources that have or may have impacted the Petition Area. Table 3-1 describes hundreds of the known and suspected sites that have or may have contaminated the Petition Area from a variety of discharges. Those potential discharge sources are described herein. They include the following:

- Historic use of contaminated fill
- On-site burial of waste and use of lagoons
- Historic landfills
- Leaking underground storage tanks
- Scrap metals yards
- Anthroprogenic pollution



1. Historic Contaminated Fill

Much of the Petition Area is located on the former Newark Salt Marsh which was filled in with garbage, refuse, slag, soot, debris and dredge material from the river during the first half of the Century. The use of this material for land reclamation activity was considered good practice at the time. Approximately 21,000,000 tons of this material was used in the area (Zdepski, 1992).

New Jersey now recognizes that the use of this material was not an environmentally sound practice. However, because the use of fill has been so pervasive in New Jersey and because it does not appear to pose a significant threat to human health or the environment, the legislature, in 1993, directed that the Department develop more relaxed standards for it. N.J.S.A. 58:10B-12h(1).

Regulations pertaining to "historic fill material" were proposed by the Department in 1996, but have not yet been adopted. N.J.A.C. 7:26E-3.12 (28 N.J.R. 1098, 1125). The Department did, however, describe in the preamble to these regulations the types of material that constitute historic fill. Much of it is the same kind of material found in the Petition Area. The Department stated:

> Beginning early in the industrial revolution, low lying areas surrounding river and stream corridors and wetlands were filled in New Jersey and elsewhere in the northeast United States. Typically, many of the materials used were industrial by-products and wastes such as fossil fuel ash, cinders, construction rubble, municipal waste, miscellaneous solid waste, such as glass, pottery and plastics or dredge material from nearby waterways. In some circumstances, materials that would currently be classified as contaminated were used as fill material. Due to the lack of knowledge of the potential risks to human health and the environment posed by contaminants in the fill, few controls were placed in the past on the disposition of these materials.

* * *

APPENDIX C
HISTORIC DISCHARGE SOURCES

> The Department has reviewed a great deal of data in the evaluation of historic fill sites which indicate that such fill sites are typically contaminated. The primary contaminants of concern in historic fill are certain metals such as arsenic, beryllium, cadmium, lead and petroleum hydrocarbons related to fossil fuel by-products, such as benzo (a) anthracite, benzo (a) pyrene and dibenzo (a.h) anthracite.

(28 N.J.R.1101). Studies have confirmed that historic fill material such as cinders and coal contain heavy metals in concentration above NJDEP Direct Soil Clean-Up Criteria.[1] The authors prepared the following table to illustrate that heavy metals in cinders and coal exceed clean-up criteria:

In its proposed regulations, the Department originally thought that a ground water investigation would be required to investigate historic contaminated fill. That requirement was later eliminated. Based on "the Department's experience with fill sites and the fact that the primary contaminants of concern in historic fill are relatively immobile [heavy metals], the Department has withdrawn this requirement as a minimal requirement" (28 N.J.R. 1101). The significance of this decision is that the Department believes metals in historic fill are not a significant environmental concern.

Ground water in the Petition Area has been widely impacted by heavy metals. The chart below shows the number of times each metal identified as a Pervasive Compound (see Section 6.0) was detected and the percentage of wells for which the metal was detected. Clearly, the presence of metals in the Petition Area is pervasive.

Metal	No. of Wells Sampled	No. of Detections	%
Antimony	191	54	28
Arsenic	265	202	76
Cadmium	213	105	49
Chromium	223	160	72
Lead	282	213	76
Mercury	215	113	53
Nickel	201	135	67
Zinc	270	247	91

[1] See, Brown, James O. & Zdepski, J. Mark, "Coal-Combustion Cinder Fill; High Metal Concentrations from Low Hazard, Wide-Spread Source," N.J.S.B.A. Environmental Law Section Newsletter (May 1994) (see Table C-1 following Appendix C).

The presence of these metals is not due solely to historic fill material. However, given the shear volume of fill material present in the area for such a long period of time, it is reasonable to expect that some metals from fill material has migrated to impact ground water.

2. On-Site Burial of Waste and Use of Lagoons

In the late 19th and early 20th century, the concern about urban waste focused on managing putrescible waste because it was this waste that was believed to be causing epidemic disease (Melosi, 1981; Tarr, 1984). Little regard was given to industrial waste which was usually just dumped into the nearest water body or used to fill in low ground in and around a factory property (Ingle, 1982). From the factory manager's point of view, the chief concern with regard to managing industrial waste in these early years was to avoid impeding production and to spend as little money as possible (Colton, 1992).

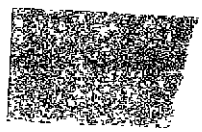
By the 1920s, some industries, such as the chemical industry and iron and steel industry, among others, found some marketable uses for certain wastes. Consequently, this beneficial reuse diverted some waste that would have otherwise been dumped (Thau, 1920; Hull, 1919; Howe, 1919). For example, slag from the iron and steel industry was used for a time in Portland Cement (Guren, 1921:273-5). It was also used as railroad ballast and fertilizer. But, generally, beneficial reuse remained the exception and most industrial wastes in the 1920's were still being "improperly disposed of in open pits, surface impoundments, vacant lots, farmland and water bodies." (Anderson, 1987: 182).

By the 1930s, the scientific community was beginning to recognize the potential hazardous nature of certain industrial wastes. A leading engineer from this era who was studying industrial waste concluded that water pollution was not only being caused by biological waste, but also by the "poisons, color, and obnoxious matter" being discharged by industry. (Besselievre, 1931a:21). However, at the time, few people were concerned about these warnings. This leading engineer characterized the attitude of the day towards the management of industrial wastes as simply a desire to find "a place to put them out of site." (Besselievre, 1931b:51b). Nevertheless, seeking to promote more responsible management, the industrial community did propose the following: (1) incinerate combustible wastes, (2) containerize organic wastes, and (3) use "stabile" material such as slag and ash as fill. (Besselievre, 1931b:51b). (The use of fly ash was later discontinued when it was discovered to contain numerous toxic substances. Roy, 1981).

APPENDIX C
HISTORIC DISCHARGE SOURCES

By the 1940s, the interest in responsible industrial waste management grew. A text on the subject was written, (Eldridge, 1946). Also, annual conferences on the topic had begun at Purdue University beginning in 1947, (Colton, 1992). This new breed of industrial waste manager was even finding ways for municipal sewage treatment plants to treat certain industrial wastes. However, even though this and other waste management techniques were showing promise, uncontrolled dumping of industrial waste was still common practice in the 1940's.

The 1950s and 1960s saw an increased use of lagoons and landfills which were becoming more popular in an effort to minimize dumping into waterways. This was also the case in the Petition Area. See aerial photographs Figures 4-2, 4-3, and 4-4.



The 1951 aerial photograph (Figure 4-2) shows the following activity (Zdepski, 1987):

- The New Jersey Turnpike is completed and has disrupted pre-existing landfills in the area of the drive-in theater (104-108 Foundry Street), the Scientific Chemical Processing site (411 Wilson Avenue), and the South Delancy Street landfill (Delancy Street).
- The Prest-o-Lite property (351 Doremus Avenue) has filled setling lagoons, an active lagoon, and a large landfill adjacent to the Turnpike. Prest-o-Lite was engaged in mineral processing and had discharged mineral muds to the meadows for years (according to Mosquito Commission records). Evidence from NJDEP Enforcement file 07-1450 indicates the landfill was owned by many close neighboring industries - shown on Sanborn map figures in that report, including Lacquer Specialities, Chemical, Ashland Chemical, Reilly Tar, and T. Fiore.
- Both the CBS Toys (601 Doremus Avenue) and Passaic Valley Sewerage Authority (600 Wilson Avenue) sites are being actively filled.
- The Troy Chemical site (1 Avenue L) is filled with material from the Heller-Merz/American Cyanamid (Prentice Drug-Albert Steel Drum) site (338 Wilson Avenue).
- The American Steel Casting Corporation (Avenue L) is maintaining a lagoon on the south side; adjacent to the Sacks-Barlow Foundry (357 Wilson Avenue).
- The Delancy Street dumps are filling. Delancy Street is paved and the Port Authority (Red Star) truck terminal (400 Delancy Street) is constructed on former fill.
- The Federated Metals site (St. Charles and Avenue L) is nearly level, filling is still in progress adjacent to the Naporano property line and a lagoon is in-place.

- The present Ironbound Recreation Center (132 St. Charles Street) is still an industrial property (it is now one of the 95 investigated sites).

See also Table 3-1 for additional information about the facilities listed above.

The 1961 aerial photograph shows the following activity (Zdepski, 1987):

- A proliferation of scrap metal and auto salvage yards in the Wilson Avenue and Doremus Avenue areas.
- Prentiss Drug has added or deepened a tributary to Pierson's Creek which now enters the site.
- New construction on previous dump sites have occurred at the following locations:

  Englehard (429 Delancy Street)
  Drive-In Theater (104-108 Formerly Street)
  Prest-o-Lite Landfill (351 Doremus Avenue)
  Stockton Street (South Street Viaduct Triangle)

- Major landfill operations are included South of Passaic Valley Sewerage Commissioners (600 Wilson Avenue), the Brill yard area - D&J Trucking (Avenue P), and the Avenue P Landfill.

See also Table 3-1 for additional information about the facilities listed above.

By the 1970s, the modern era of environmental protection had begun and the era of unregulated dumping was over. Enforcement activity increased in the succeeding decades to compel compliance with the new laws.

Craig E. Colton has done exhaustive studies of historic waste management practices of various industrial groups in Illinois. (Colton, 1988). His research yielded the following conclusions:

- The iron and steel and non-ferrous metal industries dumped slag and dross. "Slag generally was dumped while at a very high temperature and sometimes other wastes were incinerated by the residual heat. If incompletely burned, the tars and quenching liquids could leach into the ground or remain in the slag." (Colton, 1992: 4).
- Metal fabricators dumped acids, dissolved metals, phenolic oils, cyanides, and other liquid wastes.
- Oil refineries dumped acid sludges, boiler wash, and oily waste water.

- Leather tanneries dumped chromium waste.
- Coal gas works dumped oily sands.
- Breweries dumped brewery slop.
- Fat rendering plants and slaughter houses dumped biological wastes.

As noted above, uncontrolled dumping was also common among the early industrial facilities in the Petition Area, simply because it was considered a reasonable practice at the time. For example, the article in the Newark Sunday Call dated June 18, 1916 (discussed earlier) acknowledges that "Chemical Row" (Doremus Avenue) "was filled in with slag and waste material from furnaces" in the area.

Industrial facilities in the Ironbound are quite similar to the historic facilities studied by Craig Colton in Illinois, i.e., iron and steel foundries, non-ferrous metal foundries, metal fabricators, oil refineries, and others comprise the Primary Industry Groups in the Ironbound (see Table 2-3). It is therefore reasonable to expect that on-site dumping of waste was occurring from these facilities in the Ironbound, given the photographic and other evidence identified in this Petition. As late as the 1980's, illegal dumping activities in the Ironbound were still generating NJDEP civil and criminal enforcement actions. ***See, e.g.,*** Central Steel Drum and D&J Trucking (see Table 3-1).



3. Historic Landfills

The Petition Area has been host to many known and unknown landfills operated by the City, private industries and other entities over the last one hundred years. Many old landfills were registered as solid waste facilities with NJDEP in the 1970's and the 1980's (see Table 3-1). Others were not registered.

Table C-2 (following Appendix C) identifies the known landfill in the Petition Area.

For years, the City of Newark used the former salt marsh area as a city dump. Many of these dumps were later discovered by the New Jersey Turnpike Authority when it built the Turnpike through the Petition Area. While excavating the roadway, the Turnpike Authority found many old sites containing solid waste material (Zdepski, 1987, 1992).

NJDEP has also investigated a number of these landfills including, for example, 15E Sanitary Landfill, Adams Street Landfill, Avenue P Landfill, Courtesy Container Corp. Landfill, D&J Trucking Landfill, Delancy Street Landfills, Oak Island Landfills and Otillio & Sons Landfill. Ground

6. Diffuse Anthroprogenic Pollution

In 1996, the Department proposed the following definition for this type of pollution:

> "Diffuse anthroprogenic pollution" means contamination in soil from non-specific sources, including, without limitation, the deposition of air pollutants from automobile emissions, industrial emissions and residential furnaces.

(28 N.J.R. 1115)

In the preamble accompanying this proposed definition, the Department states that it "recognizes that soil at a site may be contaminated from diffuse anthroprogenic pollution" and that:

> The primary contaminants of concern associated with such sources of diffuse anthroprogenic pollution are lead and polynuclear aromatic hydrocarbons. Typically, other contaminants are present but rarely at concentrations exceeding health-based clean-up levels. All areas of the state have been impacted to some extent by anthroprogenic activity. In fact, it is probably impossible to find a true natural background level in surface soil for these contaminants.

(28 N.J.R. 1100).

While diffuse anthropogenic pollution is not a primary cause of pollution in the Petition Area, it is probably a contributing cause of pollution, especially with regard to the deposition of lead and other metals that have been identified as Pervasive Compounds. These metals may have been deposited in the area as air pollutants from the following sources:

- ***Turnpike and Roadways***. The New Jersey Turnpike, Routes 1 and 9 and the former Route 25 (which preceded the Turnpike) were and are major transportation arteries that run straight through the middle of the Petition Area. Exhaust fumes from the thousands of vehicles that travel these roadways each hour of each day and which have done so for decades, may be responsible for some of the lead contamination found in the Petition Area.

- ***Smokestacks/Furnace Emissions.*** The Petition Area was home to many industrial facilities and foundries that operated at a time when there were no environmental restrictions on smokestack emissions (see Table 3-1). These emissions may be responsible for some of the contaminants found in the Petition Area.

  Smokestack emissions were always a source of discomfit to factory workers in the days when industrial hygiene issues were simply unknown. For example, in the article in the Newark Sunday Call dated June 18, 1916 (discussed earlier), the writer described the smoke in the Petition Area as follows:

> Smoke pouring from the smokestacks in the acid plant assumes a deep orange color, due to the combustion of sulfuric acid, while from the funnels where steam is allowed to mix with the fumes, the color is of a yellow or cream hue. Sometimes, on damp days, when the fumes hang low in the air, the workmen sputter and almost choke, but in time, they become used to breathing the fume-laden air and seem to thrive on it. Occasionally, however, a workman whose daily labor keeps him in the acid room emerges from the plant at night with hair and face the color of chrome yellow. Physicians declare, however, that men who are in good physical condition do not suffer from working in this acid-charged atmosphere.

- ***Fires***. Many fires have occurred over the years at industrial facilities in the Petition Area (see Table 3-1). Fires can obviously destroy raw material and final products which can create ash containing hazardous substances that can be deposited by the winds in and around the area. The air deposition of these particles may be responsible for some of the contaminants found in the Petition Area.

  The Newark Fire Department installed hydrants in the Petition Area early in the century. Since it was common practice for the Fire Department to put out fires using water, water runoff that occurred after a fire was put out may have picked up raw materials and waste products from production floors, raw materials storage areas and waste disposal locations. This, too, may be an additional source of anthropogenic pollution in the Petition Area.

TABLE C-2
LANDFILLS WITHIN PETITON AREA

Name	General Location
15 E Sanitary Landfill	Route 1 & Foundry Street
Adams Street Landfill	Adams Street
Avenue P Landfill	549 Avenue P
Cizo Brothers Landfill	Foot of Plum Point Road
Courtesy Container Corp Landfill	465 Wilson Avenue
D&J Trucking and Waste Co.	310-387 Avenue P
Delancy Street Landfill (North and South)	Delancy Street
Devino Landfill	845 Doremus Avenue
Newark City Dump	Avenue L
Newark City Dump	Foot of Delancy Street
Newark City Dump	St. Charles Street
Newark City Dump	Plum Point Lane
Newark City Dump	Old Meadow Road
Oak Island Landfill	Delancy Street
Otillio & Sons Landfill	18-60 Blanchard Street

TABLE C-3
SCRAP METAL YARDS

No.	Scrap Metal Yard	Address
1.	A&B Trading & Salvage Co.	618 Wilson Ave
2.	A. Fiore & Sons Salvage	Doremus Ave
3.	Airport Used Auto Parts	561 Ave P
4.	Al Napi's Auto Wreckers	127 Doremus Ave
5.	Ardvark Auto Wreckers	553 Ave P
6.	Avenue P Auto Wreckers	553 Ave P
7.	Benjamin Hirsch	561 Ferry
8.	Branchbrook Towing & Auto Wreckers	549 Ave P
9.	Bryan's Auto Wreckers	567 Wilson Ave
10.	Carmine Gardano	106-112 Delancy
11.	City Salvage Company	Wilson Ave
12.	Discount Auto Wreckers	553 Ave P
13.	Fiore Demolition	Rutherford St.
14.	H. Graifman & Son	24 Rome
15.	Ironbound Auto Recycling	553 Ave P
16.	Joe's Auto Wreckers	38 Stockton
17.	Kar King USA, Inc.	553 Ave P
18.	Kevin's Used Auto Parts	555 Ave P
19.	Lacey Used Auto Parts	305 Wilson
20.	Malvern Metals Co, Inc.	204 Malvern
21.	Newark Compressed Steel Corp.	40 Mfg. Place
22.	Nimco Bus Division	354 Doremus
23.	Nimco Shredding Co.	254 Doremus
24.	Ogden Boches Works Co.	1438-40 Ferry
25.	Orlando Son Auto & Truck Parts	73 Joseph St
26.	Sigie's Auto Wreckers	527 Ave P
27.	T. Firoe & Sons	216 Delancy
28.	Tide Water Bailing Corp.	26 St. Charles
29.	Tony's Auto Wreckers	121 Paris
30.	Vulcan Detinning Div.	600 Doremus
31.	Wilson Auto Parts	149 Wilson
32.	World Class Automotive	553 Ave P
33.	Zwigared Metal Recycling	411 Wilson

APPENDIX D
GROUND WATER QUALITY DATA

Computer Disk Available Upon Request

APPENDIX E
LETTERS FROM WATER PURVEYORS

Letters

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

RECEIVED
NOV 15 1996
MALCOLM PIRNIE INC.
NORTHERN N.J.

November 8, 1996

Mr. Kevin Byrne
Passaic Valley Water Commission
1525 Main Avenue
Clifton, New Jersey 07011

Dear Mr. Byrne:

This letter follows up my telephone call with you the other day. As I mentioned, Malcolm Pirnie, Inc., is teaming with 2B Environmental, Inc., to prepare a Groundwater Reclassification Petition (Petition) for the Ironbound section of Newark. Our Petition will request that the New Jersey Department of Environmental Protection (NJDEP) adopt appropriate regulations that will (1) reclassify shallow groundwater in the area as a non-drinking water aquifer (Class II-B) and (2) change the required cleanup remedy for the shallow aquifer from active pump and treat to passive natural attenuation, i.e., let Mother Nature do cleanup over time, as long as it does not pose a significant risk to public health, safety, and welfare. Attached is a may identifying our groundwater reclassification areas.

As part of our Petition, we must provide NJDEP with the following proofs:

1. No ~~public community~~ water supply wells or zones of contribution for such wells exist in the reclassification area;

2. There is no significant potential for the ~~City of Newark~~ to install, operate, or use a public community water supply well in the reclassification area over the next 25 years; and

3. The City of Newark has been importing water to the businesses and residences in the reclassification area since the turn of the century.

ONE INTERNATIONAL BOULEVARD MAHWAH NJ 07495-0018 201-529-4700 FAX 201-529-1415 http://www.pirnie.com

RECYCLED PAPER

MALCOLM PIRNIE

It is my understanding that these three statements are true. We will need to send NJDEP confirmation of these statements as part of our submission. If you agree that they are true, would you please sign the confirmation below and return this letter to me by November 26, 1996 in the return envelope provided for your convenience.

Thank you for you attention to this matter. If you have any questions, please call me.,

Very truly yours,

MALCOLM PIRNIE, INC.

David L. Pry, CPG
Project Manager

Attachment

P:\2422003\BYRNE.LTR

c: A. Telsey, 2B Environmental

CONFIRMATION

The three statements referenced on the previous page are true and accurate to the best of my knowledge and belief.

_____
Name

_____
Title

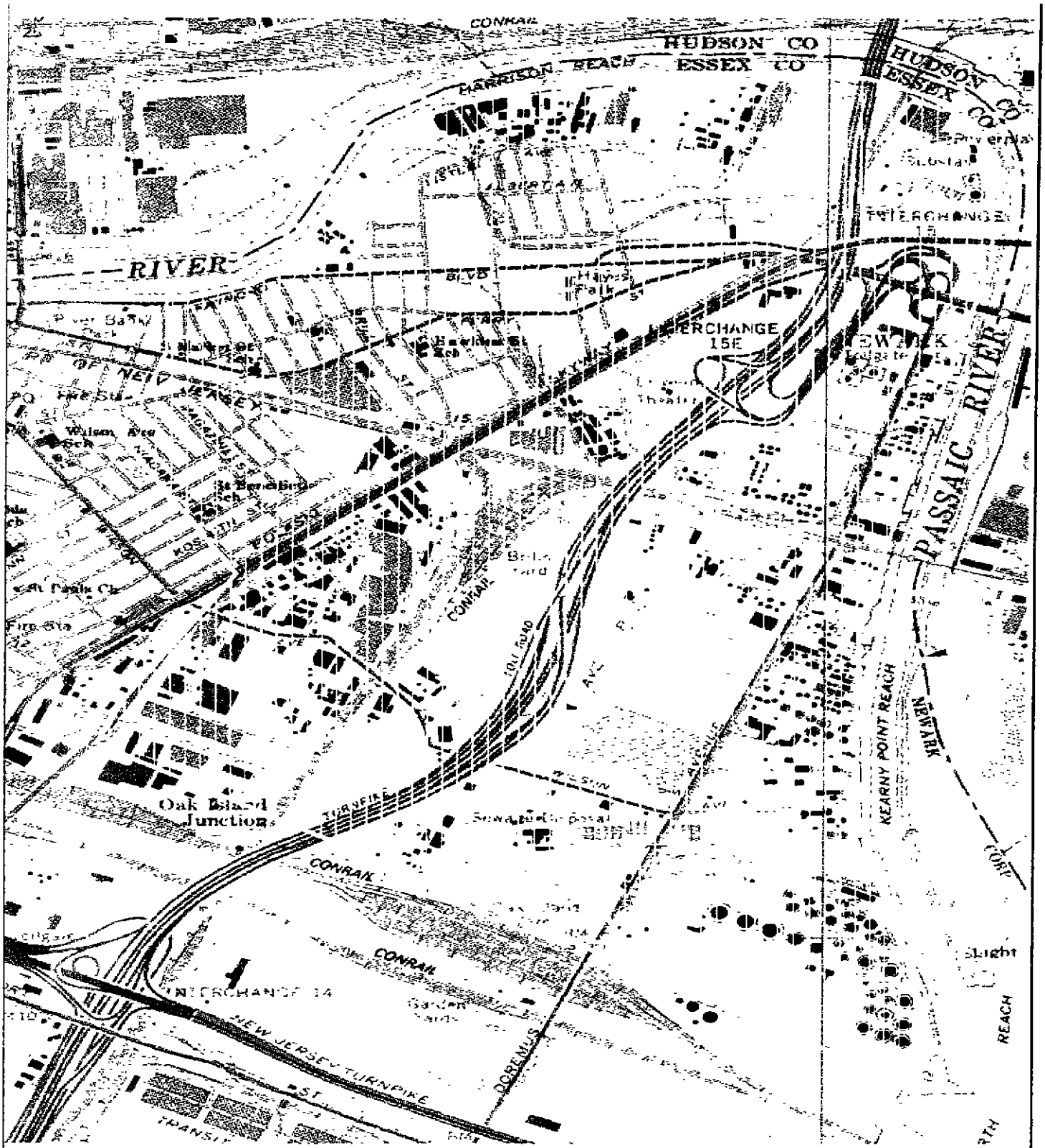
_____
Address

_____

_____

_____
Phone Number

Recycled Paper



MALCOLM PIRNIE	Location of Petition Area	Figure 1-1

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

RECEIVED
NOV 15 1996
MALCOLM PIRNIE INC.
NORTHERN N.J.

November 12, 1996

Mr. Anthony De Barros
City of Newark
Department of ~~Engineering~~ Water and Sewer Utilities
Water and Sewer Utility
1294 McBride Avenue
Little Falls, New Jersey 07424

Dear Mr. De Barros:

This letter follows up my telephone call with you the other day. As I mentioned, Malcolm Pirnie, Inc., is teaming with 2B Environmental, Inc., to prepare a Groundwater Reclassification Petition (Petition) for the Ironbound section of Newark. Our Petition will request that the New Jersey Department of Environmental Protection (NJDEP) adopt appropriate regulations that will (1) reclassify shallow groundwater in the area as a non-drinking water aquifer (Class II-B) and (2) change the required cleanup remedy for the shallow aquifer from active pump and treat to passive natural attenuation, i.e., let Mother Nature do cleanup over time, as long as it does not pose a significant risk to public health, safety, and welfare. Attached is a may identifying our groundwater reclassification areas.

As part of our Petition, we must provide NJDEP with the following proofs:

1. No public community water supply wells or zones of contribution for such wells exist in the reclassification area;

2. There is no significant potential for the City of Newark to install, operate, or use a public community water supply well in the reclassification area over the next 25 years; and

3. The City of Newark has been importing water to the businesses and residences in the reclassification area since the turn of the century.

MALCOLM PIRNIE

It is my understanding that these three statements are true. We will need to send NJDEP confirmation of these statements as part of our submission. If you agree that they are true, would you please sign the confirmation below and return this letter to me by November 26, 1996 in the return envelope provided for your convenience.

Thank you for you attention to this matter. If you have any questions, please call me.,

Very truly yours,

MALCOLM PIRNIE, INC.

David L. Pry, CPG
Project Manager

Attachment

P:\2422003\DEBARROS.LTR

c: A. Telsey, 2B Environmental

CONFIRMATION

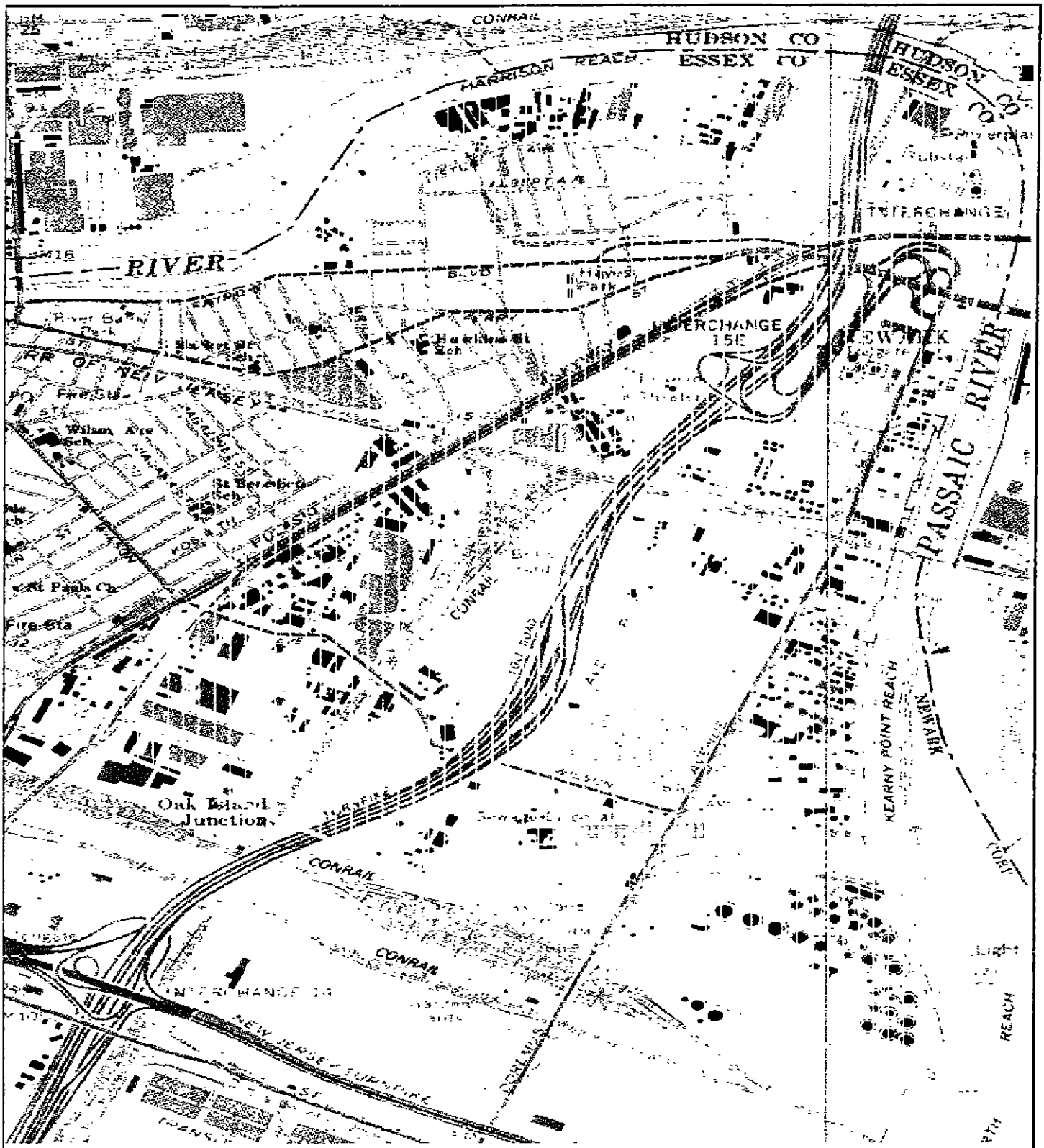
The three statements referenced on the previous page are true and accurate to the best of my knowledge and belief.

Name Anthony DeBarros

Title Acting Manager
Div. of Sewers & Water-Supply
Dept. of Water & Sewer Utilities

Address
1294 McBride Ave.
Little Falls, N.J 07424

(201) 256-4965
Phone Number



MALCOLM PIRNIE	**Location of Petition Area**	**Figure 1-1**

APPENDIX F
DISCUSSION OF MODEL PARAMETERS

The following describes each column on Table 7-5 and provides a discussion of the equations and calculaitons used to determine the travel times and concentrations of the 22 Pervasive Contaminants.

Column 1. ***Highest Concentration***. In order to be as conservative as possible, the highest concentration of each Pervasive Compound was used to determine its fate and transport, even though it may have been from data collected years ago and not representative of the highest concentration today.

Column 2. ***Shortest Distance from Well to River***. A straight line between the well containing the highest concentration of the contaminant and the closest river bank was measured in feet. This was done to create a conservative assumption, i.e., contaminants will travel the shortest distance to the river, even though other factors can affect the movement and travel direction of contaminants in the field.

Column 3. ***Soil-Water Partition Coefficient (Koc)***. The Koc value is the soil/sediment partition, or sorption coefficient, defined as the ratio of adsorped contaminant per unit weight of organic carbon to the aqueous solute concentration. This value provides an indication of the tendency of a contaminant to partition or "attach" to particles containing organic carbon and water. The Koc variable is used in calculating the Distribution Coefficient (Column 4) for each Pervasive Compound.

Column 4. ***Distribution Coefficient (Kd)***. The Kd variable is the ratio between the mass of dissolved contaminant (solute) adsorbed onto soil particles to the concentration of the solutes in water. Kd is proportional to the fraction of organic carbon in soil, the solubility of the compound in water, and the organic carbon/water partition coefficient. The Kd value is important in predicting transport time and concentration levels at various distances.

Kd is expressed by the following equation:

$$Kd = Koc \times foc$$

where: Koc = the soil/water partition coefficient (Column 3)
foc = the fraction of organic carbon in the solid matrix (reference source)

The Kd value for each Pervasive Compound was calculated using the above equation.

Column 5. ***Retardation Factor (Rd).*** The Rd variable is calculated as follows:

$$R_d = 1 + \frac{K_d \, rho}{n_e}$$

where: Rd = retardation factor
Kd = distribution coefficient (mL/g or L/kg) (Column 4)
rho = bulk density of formation
(conservatively assumed to be 1.5 g/mL)
(reference source)
ne = effective porosity (conservatively assumed to be 0.35)
(reference source)

The Retardation Factor describes the rate at which a contaminant in ground water moves within the ground water column. In other words, given the various adsorptive tendencies of each contaminant, they are each expected to move slower than the flow of ground water. The higher the retardation factor, the slower the contaminant tends to move with the water. The contaminant is, in effect, "retarded" in its horizontal movement. For example, Table 7-5 shows high Rd values for metals which is consistent with the fact that metals adsorb readily to soil particles (see Section 6.0). This is an important variable for estimating the expected rate of movement for each contaminant (Column 6).

Column 6. ***Parameter Transport Rate (Vpt).*** Even though each Pervasive Compound is, to some degree, retarded in its horizontal movement, it still may move, at some rate, towards the river bank. The Vpt variable quantifies the rate at which the contaminant is still expected to move in a horizontal direction.

This variable (Vpt) is calculated by dividing Average Ground Water Seepage Velocity (Vs) by the Retardation Factor (Rd) (Column 5). Vs is calculated using the following equation:

$$Vs = \frac{ki}{n_e}$$

where: Vs = average ground water seepage velocity (ft/day)
k = hydraulic conductivity of fill material (10 ft/day)
i = hydraulic gradient (0.005 ft/day)
ne = effective porosity
(conservatively assumed to be 0.35)

The calculation for Vpt was done for each of the Pervasive Compounds.

APPENDIX F
DISCUSSION OF MODEL PARAMETERS

Columns 7 & 8. ***Parameter Travel Time (t).*** This variable is calculated by dividing the Shortest Distance from Well to River (Column 2) by the corresponding Parameter Transport Rate (Column 6). This was done for each of the Pervasive Compounds to estimate how much time in days (Column 7) and in years (Column 8) it may take for each Pervasive Compound to reach the river bank using the shortest distance from well to river.

Column 9. ***Parameter half-life ($t_{1/2}$).*** This variable quantifies how many days it takes for each Pervasive Compound to degrade to 1/2 of its original concentration. This variable presumes that a certain given concentration of the contaminant exists in an ideal environment for degradation. The values were chosen from standard reference sources. To the extent that the reference provided a range of values, e.g., 10 to 100, the highest value was chosen in order to provide the most conservative assumption. The Parameter half-life values have been identified because they are needed to estimate Rate Constant (Column 10).

The parameter half-life for metals was not calculated because metals do not readily degrade over time. Consequently, Table 7-5 does not include values for the Rate Constant (Column 10) or the Estimated Concentration at River Bank (Column 11) for metals. It is assumed, given the significant tendency of metals to adsorb to soil, that they will not migrate to the river bank in a reasonable period of time. As set forth in Column 8 (Parameter Travel), it is expected that metals may not reach the river bank for a period of between 3,320 years (cadmium) to 110,988 years (lead).

Column 10. ***Rate Constant (k).*** This variable (k) is part of the equation used to determine Estimated Concentration at River Bank (Column 11). It was calculated for each Pervasive Compound using the equation set forth below in Column 11.

Column 11. ***Estimated Concentration at River Bank (C).*** This value is calculated using the following equation:

$$C=Coe^{-kt}$$

where:
- k = Rate Constant (Column 10),
- Co = Concentration (Column 1),
- e = an exponential function
- t = Parameter Travel Time (Column 7).

Solving for small k provides the Rate Constant (Column 10).

This value (C) was calculated to seven decimal places for each of the Pervasive Compounds.

Solving for V_s was as follows:

$$Vs = \frac{ki}{n_e}$$

$$.143 = \frac{(10)(.005)}{0.35}$$

The Parameter Travel Time (t) was 48098 days (Column 7) or 132 years (Column 8) calculated as follows:

$$t = \frac{Shortest\ Distance\ from\ well\ to\ river\ (Column\ 2)}{Parameter\ Transport\ Rate\ (Column\ 6)}$$

$$48098\ days\ (132\ years) = \frac{1590}{.033058}$$

The estimated Concentration at River Bank (Column 11) was 0.0000000 calculated as follows:

$$C = Coe^{-kt}$$

$$0.0000000 = (195000) \times e^{(0.0612692)(48098)}$$

Based upon the model, which uses conservative assumptions, the concentration of 1,1,1-trichloroethane is expected to be .0 to seven orders of magnitude, even if the highest concentration of this contaminant found in the Petition Area moves towards the river bank the shortest distance possible.

APPENDIX G
HAZARDOUS RANKING SCORE SHEETS

Score Sheets

SECTION 2: GROUND WATER CONTAMINATION
SUBSECTION A: DOCUMENTED CONTAMINATION
I. CONTAMINANT CHARACTERISTICS
A CONTAMINANTS OF CONCERN
1. CONTAMINANTS OF CONCERN SELECTION

CHART 2.A.1

Analytical Categories/Contaminants	Reference #*	Data (ppb)**	Health-Based Ground Water Quality Criteria (ppb)	Criteria Exceedance**
Volatile Organic				
Methylene Chloride		61,000,000	2	30,500,000
Benzene		90,000	1	90,000
1,2-Dichloroethane		110,000	2	55,000
Toluene		380,000,000	1,000	380,000
Trichloroethene		170,000	1	170,000
Semi-Volatile Organic				
Bis(2-ethylhexyl)phthalate		15,000	30	500
1,2-Dichlorobenzene		48,000	600	80
Inorganic				
Iron, total		7,200,000	300	24,000
Arsenic, total		181,700	8	22,713
Cadmium, total		68,000	4	17,000
Pesticide/Herbicide/PCB				
Dioxin				
Radionuclide				

* If more than one reference is used to complete this section footnote each reference in the order that they are used.
** Use "FP" to indicate the presence of free product.

II. RECEPTORS

CHART 2.A.4

Aquifer	Classification
Glacial	II-B

A. Ground water classification Class II-B 17. 1

B. Type of usage Industrial 18. 1
(specifically identify)

C. Natural resources 19. 0
(briefly describe *[designated natural recourse]* *environmentally sensitive area*)

Calculation for Ground Water Contamination Category II: 20. _____
Receptors = (17 + 18 + 19) x equalization multiplier
(_____ + _____ + _____) x 11.11

References: _____

III. Likelihood of Impact SCORE

A. Distance between Petition Area and Industrial Well is ≥ 1 mile 21. 0

B. Hydraulic conductivity glacial 10 ft/day 22. 5

Calculate the score for Category III: Likelihood of Impact 23. _____
Receptors = (21 + 22) x equalization multiplier
(_____ + _____) x 16.67

References: _____

Calculation for Ground Water - Documented Contamination
16 + 20 + 23
_____ + _____ + _____ Section 2 Score 24. _____

Enter the score for Documented Ground Water Contamination on the final page of the score set.

[If both the Documented and the Potential Ground Water Contamination sections are scored, utilize the section which yields the highest score.]