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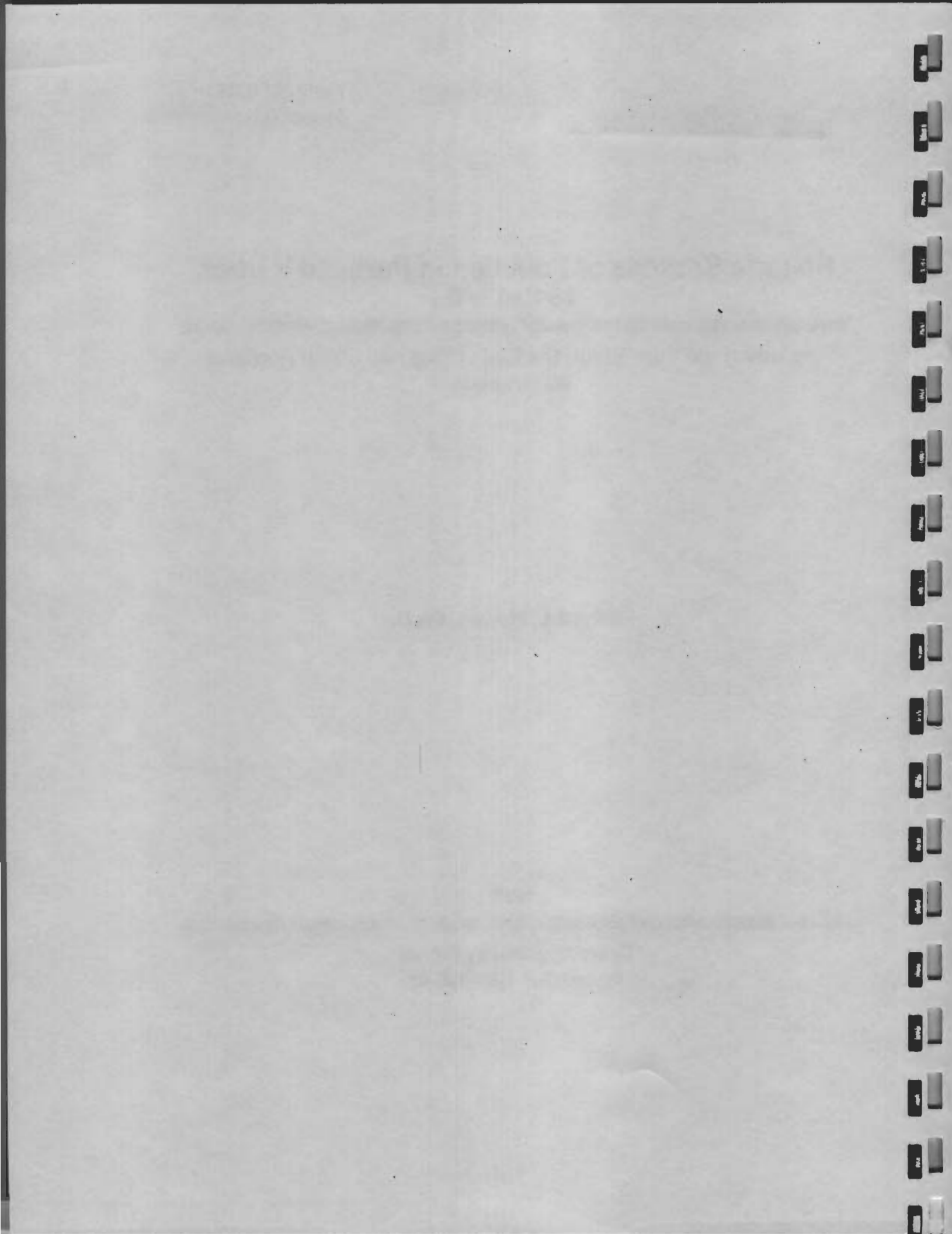
Historic Sources of Pollution in Portland Harbor, 1840-1970

**Including the Fore River, the Back Cove and South Portland
Watersheds**

Edward L. Hawes, Ph.D.

1993

Casco Bay Estuary Project
Contract No: CBCE 001553-01



Historic Sources of Pollution in Portland Harbor, 1840-1970

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Submitted to the U.S. Environmental Protection Agency as part of the National Harbor Assessment Program

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Executive Summary

How to Use This Report

Executive Summary

How to Use This Report

Historic Sources of Pollution in Portland Harbor, 1840-1970: Including the Fore River, Back Cove, and South Portland Watersheds

Dr. Edward L. Hawes

Executive Summary

Part I: Historic Sources of Pollution

1. Introduction

What is historic pollution investigation and why do it?

People are becoming aware that in decisions about land use, development and resource protection, it is helpful not only to know about present sources of pollution and their nature, but historic sources as well, for they may still have impacts. Because of this, scientists, environmental planners, people in the financial world and developers will find the data useful, and the results can help generate a watershed consciousness in the general public.

Background

Presence of heavy metals in sediments and mussels in what seemed to be a "clean control," Boothbay Harbor on the Maine coast, led to the first systematic investigation of possible historic sources on the Atlantic coast. Scientists at the Gulf of Maine conference at Woods Hole in 1991 found the results useful in explaining why the toxics were there, and if the sources were still active.

Role in the Casco Bay Estuary Project

The State of the Bay report published by the Casco Bay Estuary Project in 1992 noted that "pollutants from past activities" could be released by development along the shores and further up in the watershed. Two related studies were funded in part to yield data about the issue of "pre-existing long term contaminants" (p. 24). The Assessment of Sediment Contamination in Casco Bay was the first to appear (College Station: Texas A & M Univ., 1992). It presents the results of investigation of pollutants found in sediments in the Bay as a whole in 1991. The present report, Historic Sources of Pollution in Portland Harbor presents the results of the second investigation funded.

2. Why this study was carried out

The main purpose of the investigation embodied in Historic Sources was to locate and map sites of industrial and commercial activities where pollutants possibly remain from the period 1840-1970, to describe the activities, and characterize them from a watershed perspective. In addition it was to

locate and describe sites to which pollution could have been moved, dumps and landfills, and the outfalls of sewers. The geographic scope was much more limited than that of the Assessment, only including the most industrialized sections of the Inner Harbor, the Fore River and the Back Cove watersheds.

This report based on the study will assist in accomplishing four of the Project goals set forth in the preliminary Comprehensive Conservation and Management Plan (CCMP) of October, 1992: (1) Minimize impacts from development, especially through protecting habitat, (2) minimize impacts from stormwater runoff and CSOs, (3) determine effect of existing sediment contamination on the health of the Bay and (4) promote responsible stewardship.

3. The nature of the Investigation

Scope

This report documents the results of a pioneering investigation of the historic sources of pollution and the likely pollutants in four large watersheds that were defined in the study area. These are named as follows: the Fore River, the Back Cove, the Portland City Harbor, and the South Portland Watersheds.

Organization of the data

The data then are organized under what are termed "Historic Development Areas" that fall within the four large watersheds. These areas, designated as "HDAs" for short, are definable in terms of a watershed or sub-watershed topographically, in terms of similar continued and sometimes closely related industrial and commercial activities, and of past and present identity. An alpha-numeric site designation system was devised to identify sites by municipality, HDA, site type (industrial or commercial activity), the number of that site type in the specific HDA, and period of activity. Each site described in the data package, Part II of this report, and entered into the Casco Bay Estuary Project GIS data base has such an identifying code associated with it, enabling data retrieval in various ways.

4. Four hypotheses

The first relates to historic periodization, providing a means of organizing the data in time meaningfully. It seemed likely that serious long lasting and wide-spread pollution went back at least to 1840. After this year, patterns observable elsewhere suggested a three-period scheme would be useful. In the final report, titles chosen to designate these periods were as follows: The Foundations of Industry: 1840-1899; The Economy Matures, 1900-1969; The New Era, 1970-present. The second hypothesis was that water in various ways was important in determining the location and size of individual industrial facilities up to 1970.

The third hypothesis was that spatial and temporal patterns of development on a watershed basis would emerge because of the importance of water in industrial and commercial siting. Comparison of a succession of historic maps would reveal these patterns. The fourth hypothesis was that to manage the data and to make it understandable, Historic Development Areas could be identified and described.

5. Resources Used In the Study

Three categories of local primary evidence were used. The first, documentary resources, included USGS topographic maps, detailed historic maps, and contemporary sewer system maps, all for "Level One" investigations of watersheds. For important specific sites, resources for a "Level Two" investigation were drawn upon: newspapers, photographs and city directories. The second category of evidence was the cultural landscape, including former factory buildings, foundries and remains of railroad yards and shipyard structures. Third were the records of the municipal Industrial Pretreatment Programs required under the Clean Water Act of 1977.

Three categories of resources were used to expand a documented data base on historic processes and related pollutants, a parallel investigation not formally part of the grant-supported work. First was the relatively thin scholarly literature. Second were histories of industrial chemistry, and third were primary sources. This is a new field of investigation, and no one has apparently looked systematically at the industrial chemistry resources before for these purposes. This investigation, carried out largely parallel to the grant-supported study, was very fruitful.

6. Methodology

Six steps were taken in this study based on earlier experience in historic pollution source investigations. (1) Recording the local documentary evidence on draft base maps and in written notes; (2) field study of the remnant evidence in the cultural landscape; (3) analysis of the data, allowing a feedback process to occur between steps 1 and 2; (4) determination of the boundaries of the larger watersheds and of the Historic Development Areas within them; (5) determination of probable pollutants that were associated with the industrial and commercial sites described in the notes and located on the draft base maps; (6) analysis and synthesis.

7. Perspectives

Time perspectives

Industrial development in the Portland Harbor watersheds falls into three periods. To provide the needed perspective and supply a means to understand the data, three time slices are discussed in this section. The first examines what happened in the watersheds between 1840 and 1860. The second looks at evidence that 1900 was a turning point when the economy began maturing. The third demonstrates how 1970 marked the beginning of an era of renewal in the region.

Patterns of Watershed Development

Access to water was important for many industries. Four needs are analyzed in the report to account for the patterns of location revealed in the investigation. (1) Ship and boat yards, as well as canneries, needed water-level sites for their operations. (2) Commonly there was a need for water-level sites by many industries for ship and railroad access to transport raw materials, fuel and finished goods. (3) Some industries needed water in their processes. (4) Many industries needed flowing water for waste disposal, either in sewers or directly in rivers and streams, or larger bodies of water.

A hidden history that ties pollutions sources together and to the harbor is discussed. The development and use of dumps, often in marshes and former quarries and brickyards, meant transfer of pollutants to new locations, as did the expansion of Portland and South Portland by landfilling on the shores. The sewer systems of the two cities can be seen as human-created watersheds that moved pollutants from industrial and commercial sites down to the harbor.

8. Applications

The last section of this report suggests uses of the study for the CBEP and its audiences. For natural scientists the data raises some questions about sediment transport, indicates some answers about locations of historic sources of pollution, and points to some future research directions. For environmental planners and managers it presents data useful for planning development and resource protection. For investors and others, the study provides additional data for consideration in planning development along the waterfront and in the Harbor watersheds.

Part II. Characterization: Overview of Historic Development Areas

Four larger watersheds are discussed in the report: They are divided into a total of twenty HDAs, including one in Westbrook and one in Gorham containing parts of the upper Stroudwater River watershed. Each HDA characterization has three sections. First, the boundaries and cultural-geographic features are described, then, second, follows a synopsis of the environmental history of that HDA based on data in Part III. Third, the industrial and commercial activities and probable pollutants are set forth. For each of the four larger watersheds there is a GIS map to show the outlines of the HDAs composing it.

Part III: Data Package: Industrial and Commercial Activities by Historic Development Area Keyed to GIS Maps

Eighteen HDAs in Portland and South Portland are treated comprehensively. Twenty-seven types of polluting sites in the study region have been designated in the site type system set up for this report. These include such sites as foundries and machine shops, commercial laundries and shipyards, as well as dumps and landfills, and sewer and CSO outfalls. Under the specific HDA detailed

characterizations, in alphabetical order by type of site, data about each site derived from the resources described above are presented. Each site is located by a point on a GIS map for that HDA with its alpha-numeric designation code. All sites have been entered into the Casco Bay Project GIS data base and can be called up and used as overlays in different kinds of analysis.

Part IV. Annotated Resource List of Local Resources for Investigation of Historic Pollution Sources

In the interest of conserving space, Part III, the data package, does not have formal footnoting. However, there are ample indications in the data of the resources used (by author or short title) so that the bibliographical references can easily be found in this part of the report. All resources are listed and described with indications of where to find them in libraries, museums, archives or private collections in Portland, South Portland, Brunswick or Augusta. The most consistently useful primary sources for this study are listed first, the maps required for Level One investigations. They are followed by the records of the municipal Industrial Pretreatment Programs. Then come the Level Two primary resources: newspapers and periodicals, places where photographs and other graphic images may be found, and town, city and state directories. This section concludes with listings of town annual reports and town ordinances that could be useful for investigations in the future.

The second section of Part IV lists local histories of Portland, South Portland and Westbrook that were drawn upon for this study, plus others on Portland and Casco Bay that might be useful in later work. Also listed are planning documents that could be part of an expanded study.

Appendices

Appendix I contains the data collected and analyzed about the twenty-seven site types in the Portland Harbor region where pollution possibly was produced between 1840 and 1970. Drawing from primary and secondary resources, it presents information about pollutants, and, where relevant, about processes and dangers to health of workers. This forms the base for the data listed in the "Key to Industry and Pollutants" at the beginning of Part III and for the discussions of industries and associated pollutants in the HDA characterizations in Part II. The second appendix lists with annotations the secondary and primary resources used for Appendix I.

Appendix III contains the script for a slide talk entitled "Industries and Pollutants," prepared for CBEP staff to present to the general public. Six pollution-creating activities are described for the 1840 to 1899 period, and four in the years between 1900 and 1970. Slides of sites from the 1876 Bird's Eye, and Sanborn Insurance and city atlas maps, old photographs and shots of the sites today illustrate the talk. GIS maps showing HDAs with sites before and after 1900, and waterfront landfilling and sewer outfalls are included in the visuals.

How to Use This Report

1. If you want to know about the nature and scope of this investigation, the resources used and the methodology, read Part I, sections 1-6.
2. If you want a summary of the perspectives developed in the investigation and of applications of the report, read Part I, sections 7 and 8.
3. If you want an overview of the environmental history about one or more of the four larger watersheds in the Portland/South Portland region, including industrial, commercial and transportation activities and possible pollutants, read Part II.
4. If you want to know about a specific industrial, commercial or transportation site, there are two choices. (1) Find the site on the relevant HDA map in Part III, note its alpha-numeric designation code, and in the text, look up the designation code under that site type. Or, (2), if you know the HDAs well enough, look up the site type directly, and see if you can find the specific site under its street address or firm name.

Three periods are covered in each of the HDAs: 1840-1899, 1900-1969 and 1970 to the present. The data in the third period includes only sites regulated under the Industrial Pretreatment Programs. Inclusion of any other data after 1969 was beyond the scope of the study. If you use the first method to find a specific site, going to the relevant HDA map first, note that the designation code indicates what period(s) the site was active. If you use the second, looking in the descriptive material, then make sure to check the entries under that site type *for each period*.

Note exceptions: Two site types are not located on the GIS maps for the HDAs: "Filling stations and repair garages" and "Automobile- and Truck-related." There were so many of them in the Sanborn maps of the 1930s and the 1950s that to list them all would have gone beyond the scope of this report. Instead, all such sites are listed by street address, and where possible under owner and/or firm name, for each HDA under the site type in the period 1900-1969.

No footnotes are included in this text! Sufficient information can be found about the resources used to uncover the data (map subject, publisher or type) to find full bibliographical references in Part IV, "Annotated Resource List" Including footnotes would have been repetitious, doubling the size of the report.

5. If you want to know about possible pollutants associated with an individual site, look up the site type on the "Key to Industries and Pollutants" at the beginning of Part III and read the information there. A more sophisticated retrieval system through the Casco Bay Estuary Project GIS data base is being developed.

6. If you want to know even more about pollutants, find the site type in Appendix I. Sufficient information is contained in the text in Appendix I about the resources used to uncover the data (author or short title with pages), so that full bibliographical references can be found in Appendix II.

7. If you want to know at this time what pollutants might be in sediments close to the outfalls of sewers and CSO outfalls, examine the individual HDA maps with the outfall locations and sewer lines leading to them, and note the alpha-numeric designation codes. Then look up the sites close to the lines that might have discharged into the sewers, and what probable pollutants were associated with the sites. There are plans to produce GIS maps indicating possible pollutants at the outfalls in the future.

Part I

Historic Sources of Pollution in Portland Harbor

Part 1
Historic Sources of Pollution
in Portland Harbor

Part I

Historic Sources of Pollution in Portland Harbor

I. Introduction

What is historic pollution investigation and why do it?

Environmental legislation and regulation have had a powerful effect on the way business is conducted, land is used and marine resources protected. Because of Federal and state law, analysis of the probable and possible pollutants with their historic sources has become part of property transactions. Buyers, sellers, mortgage lenders and insurers have become aware of legal liabilities that can arise when a former industrial or commercial site has hidden pollutants. Modest investigation of historic maps and other resources is undertaken as part of an environmental audit or assessment. However, the concern in such investigations has been with one site and what it may have influenced. The findings do not become part of public knowledge to guide broad decision-making.

People are becoming aware that in decisions about land use, development and resource protection a larger picture is necessary, in terms of present sources of pollution and past sources that may still have impacts. The Casco Bay Estuary Project is in part a product of this awareness. The present investigation was driven specifically by the need for comprehensive data on historic sources of pollution. The intent is to provide data useful for scientists, for environmental managers and town and city officials, volunteer planning and conservation commission members, as well as for developers, bankers and insurance people. With the accompanying GIS maps and slide presentation, it will help the broader public in the Casco Bay region develop a watershed consciousness.

Background

In the early eighties, the Federal Environmental Protection Agency (EPA) looked for clean control sites along the New England seaboard for heavy metals. Boothbay Harbor, Maine, was seen as good candidate, an apparently pristine tourist haven. Benthic biologists including John Sowles and others in the Maine Department of Environmental Protection (DEP) tested sediments and mussels for presence of lead, copper, zinc and mercury. They found surprisingly elevated levels of lead and mercury, and noticeable amounts of copper. This was puzzling, as no polluting industry was there or had been there, it seemed.

In 1989 the present investigator was called upon as an historian to help explain the presence of these heavy metals. Research using various primary map sources yielded the following potential polluting

activities: three shipyards in business since the later 19th century, sardine canneries, at least one machine shop, and forgotten filling stations. All these could have been sources of lead; the shipyards, of copper, also. Coal ashes from an electricity generating plant at one of the canneries, plus the ashes generated from home heating and spread on sidewalks and streets could have contributed some of the mercury. More could have come from the town dump. This was the first historic pollution source analysis undertaken for a watershed on coastal Maine. The work was presented in a series of posters by the investigator and John Sowles at the Gulf of Maine conference at Woods Hole Oceanographic Institution in January, 1991, sponsored by the Urban Harbors Institute of the University of Massachusetts. The abstract appeared in the Proceedings of the Gulf of Maine Conference published by the Urban Harbors Institute in 1992.

Positive response to this work and subsequent research for the South Portland Department of Engineering led to the proposal for the present investigation for the Casco Bay Estuary Project. The Project is one of 21 estuarine research and management planning projects funded under the National Estuary Program. This program was set up under Section 32 of the 1987 Amendments to the Clean Water Act, named the "Water Quality Act." The Casco Bay Estuary Project was accepted into the Program in 1990. It is now [1993] into its third year with some research in progress, some research completed and a preliminary Comprehensive Conservation and Management Plan (CCMP) in circulation.

Role in the Casco Bay Project

The State of the Bay Report published by the Project in the summer of 1992 made a number of points relevant to this historic pollution source study. "Pollutants from past activities are present in the sediments of Casco Bay and the soils of the Casco Bay watershed" (p. 47). These can be released by development along the shore, on streams and Rivers, as well as by development further up the watershed. Toxic pollutants can be problematical at the site where they were generated, as well as "further downstream," so to speak. Erosion and movement along the surface or in the groundwater can bring toxic pollutants down to the watercourses and the harbor. There, "erosion of sediments by currents, tides and dredging also expose older sediments." These older toxins can have impacts on critical habitats, on marine life in the water column and in the sediments, and ultimately upon humans, either directly or indirectly through bioaccumulation.

2. Why this study was carried out

Goals

Five goals have been identified for the Casco Bay Estuary Project through discussion processes in the committees of the Project, and in public meetings. They are set forth in the preliminary Comprehensive Conservation and Management Plan of October, 1992. Four of these are related directly to this investigation, and will benefit from it. They are to: (1) Minimize impacts from

development, especially through protecting habitat, (2) minimize impacts from stormwater runoff and Combined Sewer Overflows [CSOs], (3) determine effect of existing sediment contamination on the health of the Bay and (4) promote responsible stewardship.

Audiences

The present study was designed to provide data, analyses, and useful digested information for three audiences and further the goals of the Project. The first audience is composed of natural scientists. Part of data gathering and analysis is related to key actions for several goals in the CCMP requiring scientific inquiry, especially determining the extent and effects of existing sediment pollution. The data will help explain why polluted sediments are where they are, or predict where they may be and guide research.

The second audience is composed of planners and environmental managers, and others interested in preservation and development. Here the information is relevant to the goals in the CCMP regarding minimizing impacts of development on land and in the water. The information can be used facilitate the decision process about where to leave things alone, where to take remedial steps, and where development could take place with few worries.

The third audience is the general public, including all those who live in the Casco Bay region. The investigation was related to the goal of developing responsible stewardship. The study should help all understand the legacy of pollution from the past and that this legacy remains in the watersheds.

3. The Nature and Scope of this Investigation

Scope

This report documents the results of a pioneering investigation of the historic sources of pollution and the likely pollutants for several watersheds. Important watersheds of the "Inner Harbor" of Casco Bay in southern Maine are the focus. The report presents data on industrial and commercial activities, and transportation facilities that likely used and/or produced hazardous or toxic materials. The specific geographical scope includes sites right on the harbor on both the Portland and South Portland sides; the Fore River/Stroudwater watershed in Portland, Gorham and Westbrook; the Back Cove watersheds; and the South Portland watersheds.

The report presents data on "industry" locations and likely pollutants from the 1840s to the 1970s. The terms "industry" or "industrial" when used alone in this report include industrial and commercial sites, as well as transportation facilities. The study creates the needed larger environmental history of the most intensely industrialized portion of the land on Casco Bay. The Presumpscot River watershed

is beyond the scope of this investigation. However, given its importance for Casco Bay, consideration should be given to investigating its historic pollution sources in the future.

Organization of the data

A spatial designation based on sections of watersheds, termed the Historic Development Area or HDA, has been used to organize the data and information in both Parts II and III of this report. This concept is explained below in section 4 on the "Four Hypotheses." Organizing the data and information in watershed development areas was thought to be the best way to make them readily accessible and understandable. There is a total of eighteen "HDAs" as they are termed for short, eleven in Portland, and seven in South Portland, discussed at length in Part III. Twenty in all are characterized in Part II, including two in the upper Stroudwater watershed in Westbrook and Gorham. There were few if any pollution sources identifiable in the parts of these two towns that drain into the Stroudwater. The little information discovered was all placed in the Part II characterization in this report, and these HDAs in the two towns were not included in Part III. See Map No. 1.

Part II of this report: A characterization and overview of Historic Development Areas

In Part II of this report the twenty Historic Development Areas are characterized to give overview of findings from this investigation. Each HDA characterization has three sections. First, the boundaries and cultural-geographic features are described, then follows, secondly, a synopsis of the environmental history of that HDA based on data in Part III. Thirdly, the industrial and commercial activities and related probable pollutants are set forth. The Historic Development Areas are grouped together under the larger watershed of which they are part.

Four larger watersheds are covered in this study. In the order of their treatment they are the Fore River, the Back Cove, the Portland City Harbor, and South Portland. The HDAs in each watershed are numbered as part of an alpha-numeric system of identifying sites. For example, in one of these four larger watersheds, that of the Fore River, there are three numbered HDAs including: 1.1 Stroudwater, 1.2 Capisc watershed and 1.3 Railroad Triangle. For each of the larger watersheds, there is a Geographical Information System-generated map to show the outlines of the HDAs composing it. The system of numbering is designed so that the rest of the Casco Bay watersheds could be given distinct designations as further investigation takes place.

Part III of this report: The Data Package: Industrial sites by Historic Development Area, keyed to GIS maps

In Part III, the data package, each of the eighteen Historic Development Areas in Portland and South Portland is treated comprehensively. Twenty-seven types of polluting sites have been designated in the system set up for this report, ranging from "Automobile and Truck-related" ones to "Sewers and

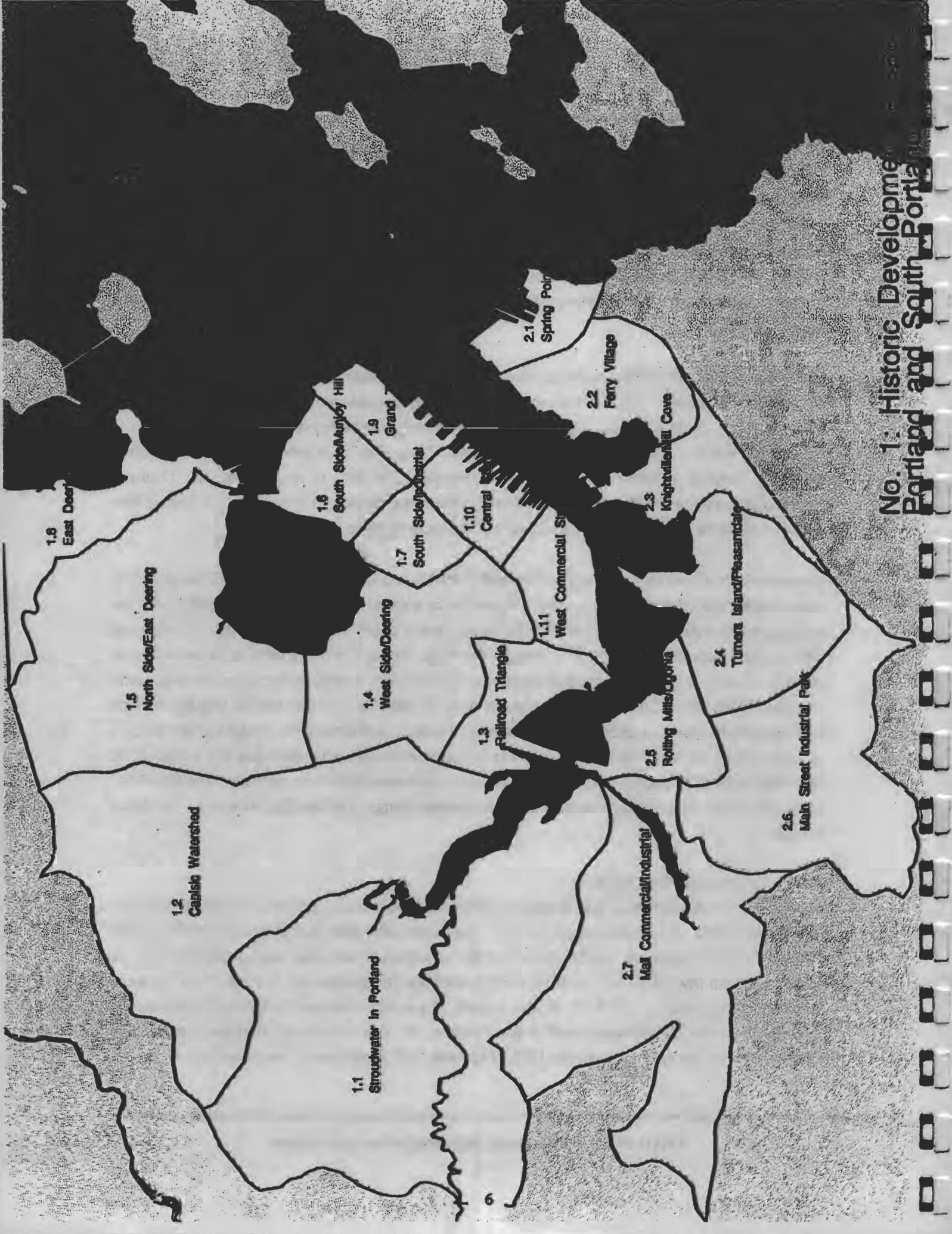
Outfalls," and on to places of "Varnish and Paint Manufacture." These types are indicated in the alpha-numeric system used to characterize, locate and date within a range of years each site where there is probable pollution. Under each of the HDA characterizations, in alphabetical order by type of site, there is information about individual sites located with the historic maps and other resources used in the study. Each site is given a designation under the alpha-numeric system. Each site is further located on a GIS-generated map for its HDA included in this report. All sites in the watersheds studied have been recorded in the Geographical Information System data base of the Casco Bay Estuary Project, using the alpha-numeric designation. They can be called up and used in overlays for different kinds of analysis.

Hazardous and toxic materials do not necessarily remain where they are produced. Thus this report is not only concerned with industrial and commercial sites with possible remnant pollutants, but also with places to which the pollutants may have been transported or could be in the future. They may move in the surface water or groundwater to new locations. They may have been moved to established dumps or included in refuse deposited in old quarries, brick yards or mudflats as fill. Thus the locations of dumps revealed by documentary or oral sources are indicated in the report, as well as 19th century brickyards and quarries that could have or did become dump sites.

Sewers outfalls are another type of site discussed in Part III and located on the maps. Either pollutants were intentionally or accidentally poured into sewers, or entered them with surface runoff. From the entry point they could flow to outfalls to settle in river, harbor or bay sediments. From there they could have been transported by currents or through dredging. Today development of a former industrial site can release old hazardous materials and toxic wastes to flow directly into streams, rivers coves or harbors. They may flow into the sewer system, to be released into the harbor through sewage treatment plant outfalls, or along with storm water and sewage at the many old outfalls that still function as outlets from the CSO facilities. In addition, through excavation, such materials and wastes could have been moved to landfills in recent years without awareness of what the contents were of the "fill." Thus there are additional reasons to locate and discuss dumps and landfills, as well as the sewer outfalls.

The Site Designation System

The alpha-numeric system for site designation is intended to cover a number of eventualities and is easily exportable. It was developed jointly by the investigator and Tom Burns of the Casco Bay Estuary Project. There are four "Indicators" in the sequence for any site, each separated from the other by a dash (hyphen). For instance, the first entry for Stroudwater is a tannery. This has been given the designation [1.1-T-1-1]. In this system, the number before the decimal indicates the municipality. Thus, "1." indicates the HDA is in Portland, "2," that it is in South Portland. The number after the decimal stands for the specific HDA. Therefore "1.1" stands for the first listed HDA in



No. 1: Historic Development
Portland and South Portland

Portland. "T" indicates the site type, a tannery; the "1" following the hyphen indicates that this was the first of the tannery sites located and listed in that particular HDA; and the second "1," the period the site was active, 1840-1899. This system is described in detail in the Historic Development Areas GIS Key at the beginning of Part III. In further research in the Casco Bay region or the state of Maine, all four indicators could be used.

4. Four hypotheses

(1) A historical period hypothesis would be needed to make the data and information understandable.

The foundations for industrializing an area are laid after a turning point when new factors become apparent. Before this point pollution would not have been long lasting because (1) the power sources (water in most cases) placed limits on the size of facilities, and (2) chemical processes were small scale. After the turning point four new factors become apparent. (1) Steam power, then electrical power, erase the limits on facility size and, to some degree, on location. (2) Chemical industrial processes involve creation of substances not naturally present, or at least not present in quantity. These substances include such toxins such as coal tars from coal gas production, white and red lead for paint, and lead and other heavy metals used in foundries and rolling mills, etc. (3) Chemical processes involve creating "wastes" for which dilution was a much less effective solution to pollution than it had been. (4) Fossil fuels make possible mobile power sources to move other fossil fuels, as well as raw materials and finished products, cheaply and efficiently.

Preliminary research in 1991 indicated that industrial development probably resulting in serious long lasting and wide-spread pollution went back at least to 1860 in South Portland, and that was the date proposed in the grant application. Research on the Portland side carried out under this grant quickly revealed that 1840 was the more appropriate turning point for Portland Harbor as a whole. It appeared that after the third decade of the 19th century, environmental history of the region could be divided into three periods: The Foundations of Industry: 1840-1899; The Economy Matures, 1900-1969; The New Era, 1970-present. The historical data and information in this report and in the Casco Bay GIS are organized into these time frames, since the investigation validated the historical period hypothesis for Portland and South Portland. Elsewhere in the state and the country this might not be the case, but the hypothesis could be used at the beginning of any further investigation.

A corollary is that important developments in technology in the Western world shape the industrial and pollution history of any region. Historically there is a clear line from the first decade of the century when development of alloy steels began, the 1920s with lead additives created for gasoline and PCBs for transformers, to the 1930s when specialized alloy steels were developed. The line goes on

through the 1940s war production period, and the 1960s-70s when high technology industries were developed in many places.

Another turning point in the history of industrial development and pollution in the United States is 1970. One feature of it is that environmental policies on clean air, clean water and waste disposal were developed on the Federal and State levels and implemented. Costs of compliance with regulations some believe placed pressures on local industries that forced some such as the foundries to close, and others to modify their ways of doing business. Another feature is what has been called "deindustrialization." Some local industries were bought out by out-of-state corporations which moved production and the name elsewhere to places where cheaper labor was available. Another feature is the redevelopment of older areas of a city or town, using historic preservation and industrial development policies to favorable advantage. These patterns were searched for in the history of the Portland/South Portland region.

(2) Water would be important in determining the size and location of individual industrial and commercial facilities.

Water had long been important in determining the location and size of individual industrial facilities in New England generally. Sawmills, grist and flour mills, and textile mills used flowing water as a power source, the rivers and streams of the region, and the currents in enclosed tidal inlets. Shipyards and boatyards required access to rivers and harbors.

At some point in the towns and cities of the region, water became even more significant. In order to transport fuels, raw materials and finished products to and from industrial and commercial facilities, harbor access, or railroad access on the waterlevel areas of a settlement, or both would be required. A source of clean water was needed for such industrial processes such as tanning, iron and steel sheet rolling, and acid production. Rivers and large bodies of water were necessary to dispose of and dilute industrial wastes such as spent pickling acids from rolling mills, solvents, metallic wastes and oils from foundries and machine shops, and "wash waters" from gas works. As towns and cities developed and installed sewer systems from the 1880s onward, large bodies of water were needed to dispose of the sewage. For the Portland/South Portland region, it appeared that, again, 1840 would be that turning point.

(3) Spatial and temporal patterns of development would emerge on a watershed basis.

Given the importance of water in determining the size and location of industrial and commercial facilities, spatial and temporal patterns of development on a watershed basis should emerge. Clear patterns likely should be seen when a succession of historic maps from different periods showing locations of these activities was examined. It ought to be possible to reach some conclusions about patterns in the Portland/South Portland region with its connection with the sea and interior through

ship, wagon, canal boat, railroad and truck. Patterns of pollution should also emerge, that should be comparable to other urban areas located on major estuaries.

(4) To manage data, and to make it useful and understandable, Historic Development Areas, parts of larger watersheds, can be identified and described.

It was assumed that HDAs possess four characteristics: (1) They are definable, using topographic maps, as part of a larger watershed. Although in some cases they may be small watersheds in themselves based on a stream. (2) They contain the same or similar Industrial and commercial activities over time, activities not found in the adjoining HDAs. Sometimes the sites could be symbiotic, such as a foundry and a refinery, both using products of a local acid plant. (3) The areas had recognized names or identities in the past. (4) They may have a commonly used name or identity in the present. Either the historical or contemporary name can be used to identify the HDA, giving the public a sense of association with the information about industrial activities and pollutants.

It was expected to make great sense to identify HDAs and use them. This had been done earlier in the report for the South Portland Engineering Department and facilitated uncovering, recording and managing data. Discrete geographical units can be visualized and described, then used with overlays of other data in the Casco Bay Geographical Information System. Finally, HDAs should help public to embrace the need for watershed planning and management, and to transcend the boundaries of their neighborhood, their town city.

5. Resources used for this report

Three categories of local resources

Three basic categories of local primary evidence were used in this historic pollution source investigation. They are fully described in the Annotated Resource List that forms Part IV of this report. Secondary sources were of some use. Local histories of Portland and South Portland were consulted, but as expected, little was found in most of them. Their authors had other purposes, celebrating the heroic first settlers and participants in the Revolution and Civil War, and telling the history of churches, fraternal orders and great families. Oral resources were utilized in the form of conversations with engineers at the departments of public works in the two cities and with two chemistry professors at Bowdoin College.

The evidence in two of the three categories of primary sources made it possible to determine locations of sites and the industrial, commercial or transportation activities carried on at them. The first category was composed of documentary resources; the second of evidence from remnants in the cultural landscape, the old buildings, railroad yards and other physical remainders from past industrial

and commercial activities. The documentary sources, in turn, were divided into two subgroups: the various maps used in what are termed Level One investigations; the second, various resources for detailed site-specific Level Two investigations.

The evidence in the much smaller third category of local evidence was important in helping determining what polluting processes and actual pollutants were found in specific industrial and commercial establishments in the 1970s and early 1980s in the Portland/South Portland region. The Industrial Pretreatment Programs of municipalities required under the Clean Water Act of 1977 provide a vital link between site location and pollutants. In effect, the records of these pretreatment programs show what actually may have been discharged into the water or down into sewers before regulation, but now must be pretreated and kept track of.

(1) Documentary Resources

The first kind of evidence was supplied by fairly accessible public documents in libraries, archives and municipal offices. These are what are used for Level One investigations which provide the basics about individual sites, together with data for a broad watershed study such as this one. This report is intended to provide data to link with the scientific research carried out for the Casco Bay Estuary Project, and to be used in environmental planning in the estuary watersheds. Thus it was expected that Level One resources were the ones to be utilized primarily. Both Level One and Level Two resources are discussed below.

The first public documents obtained were current and past USGS topographic maps. These provided the first set of draft base maps when enlarged. They provided evidence about locations of such facilities as tank farms, quarries, railroad yards in the 1950s when they were prepared. The current ones, revised in the 1970s, also show facilities built in the intervening years designated by purple shading.

The second and most important Level One type of documents used were old maps, such as county and city atlases, so-called "Bird's Eye" maps and the Sanborn map books for insurance agents. These showed location and layouts of factories, foundries, tanneries, coal gas works, dry cleaners, railroad roundhouses, etc. In some, especially the Sanborn insurance maps, there were some indications of specific production processes. The 1914 city atlas containing both Portland and South Portland showed the major sewer lines and outfalls. The third type of documents were recent maps of the sewer systems showing directions of flow of lines, and locations of outfalls and CSOs in Portland and South Portland.

Other resources enabled more to be learned about specific sites through Level Two investigation. The grant proposal envisioned this level of investigation to be carried out only on a highly selective basis.

Three types of resources in the Level Two category were used. Here they will be presented in the order of their importance for the report. First were newspaper stories buried in yellowed pages of the originals or in microfilms. Fortunately, the Portland Room in the Portland Public Library has articles indexed back into the 1930s, enabling the researcher to easily find out more about major industrial establishments and public works projects such as construction of sewage treatment plants. Second were photographs. Early in the course of the research, the collections of the Maine Historical Society and the Spring Point Museum were reviewed. Later in the research, the wonderful collection of the Sullivans who operate the Photocraft store on Forest Avenue was examined in its entirety. Copies of some of their photographs were purchased for duplication on slides and for possible use in the final report. In Part III, the data package, useful photographs of specific sites are noted.

Directories formed the third type of resource. City directories (lists of businesses and residents with their occupations) and business directories telling what was produced, plant size, etc. were used to a very limited extent. However, in any further work on Level Two for specific sites, they will be important. Aerial photographs would be useful in future work. They are essentially Level Two resources since they do not provide names of sites, unlike the Sanborn maps and the Bird's Eyes. Furthermore, the last Sanborn map additions go up to the early 1960s, the last decade this investigation was concerned with, so for this reason, as well, the aeriels were judged not necessary.

(2) Remnants in the Cultural Landscape

The second kind of evidence is supplied by the "cultural landscape" of industry and commerce, the remnants of past development out "in the field." In this category were former factory buildings, foundries, and machine shops, remains of railroad yards and shipyard structures. Less obvious were railroad rails buried almost out of sight in streets and abandoned bridge abutments with rusty remnants of safety railings. The historic maps provided the evidence for their location which field work verified. The reverse was true, also. The field work turned up buildings and other features in the cultural landscape that the study of the maps had not revealed. This was why the third step of the methodology discussed below was important.

(3) Records of the Industrial Pretreatment Programs

Under provisions of the 1977 Clean Water Act, municipalities have to institute programs to review possible discharges of various industries and commercial establishments into the sewer systems, set up permitting processes, do field review and laboratory testing. These programs must institute requirements to avoid or limit pollutants that would damage the sewage treatment process or pass through to have negative impacts on the bay. Program records provide evidence of what substances specific foundries, machine shops, commercial laundries, and food processors discharge, and ways in which discharges are mitigated. For example, the Laughlin Co. [see 1.9-MW-2-123 in Part III] was a major foundry in existence since the 1890s. In the early 1980s, just before it closed, Laughlin had to

take steps to prevent metal particles from metal working and machining, zinc from galvanizing, and solvents from machining from entering the sewers.

To be sure, the secondary and primary published resources discussed in the next section provide information about processes and pollution in a general sense. But without going deep into Level Two sources, including court records and unindexed newspapers, the Pretreatment Program records provide a firm link between industrial sites evident from the series of maps and what such establishments were likely to have discharged. However, there are limitations in this evidence:

(1) The programs were not started until the 1980s. In some municipalities such as Portland, they were begun early in the decade; in some, such as South Portland, late in the decade; (2) Municipalities vary in the thoroughness of their permitting, and (3) in their record keeping.

Three categories of resources on industry and pollutants

Other than the data from the Industrial Pretreatment Programs there is little to link together industrial activities and pollutants in the local documents. To provide more accurate information about likely pollutants from various industrial and commercial activities, a parallel research effort was undertaken largely outside the grant-supported investigation into local industries. Various secondary and primary resources were used to link industries, processes and pollution more broadly and definitively than was possible with the data easily at hand at the beginning of the investigation. This is a new field of historical research and analysis, so there is a limited amount of secondary journal literature that can be drawn upon for specific data or general analysis, and, as yet, no books on the topic of historic pollution.

(1) Scholarly journals

The first task was to examine the secondary journal literature. Several environmental historians and historical geographers have written articles on pollution in industrial areas and included data about wastes and pollutants. Craig Colten, the most prolific writer on this subject, has utilized especially the public health literature from earlier in this century plus evidence from Superfund site lists to find out what pollutants were associated with what processes. All relevant data from these articles has been included in the survey of information in Appendix I.

(2) Histories of industrial chemistry

In order to provide more documented information on historical industrial and commercial activities and resultant pollutants, the investigator undertook research in the field of industrial chemistry, or chemical engineering, as it is sometimes called. This meant examining general histories of industrial chemistry and ones on specific industries published in this country and Britain. These included Richard M. Stephenson's Introduction to the Chemical Process Industries and Williams Haynes American Chemical Industry. This material was augmented by information from certain of the MSDS (Material Safety Data Sheets) available on a computerized data base.

(3) Primary sources for industrial chemistry

Encyclopaedias of industrial technology, handbooks and laboratory manuals for industrial chemistry were studied, as well. These included the Scientific American Encyclopaedia of the 1890s and an industrial chemistry training handbook of 1908, as well as other primary resources in the Bowdoin College library, and in the collections of the investigator and his colleagues. Using these resources was very fruitful.

The resources under item 2 and 3 provided four kinds of information: (1) on processes, (2) on "raw" materials, (3) on products and undesirable by-products, and (4) on dangers to health of workingmen. This research was summarized in Appendix I, digested in the "Key to Industry and Pollutants," and brought where appropriate into the Part III data package.

6. Methodology

Six steps were taken in this historic pollution source investigation, because earlier experience with smaller research projects in Boothbay Harbor and in South Portland showed that they were appropriate. They were not taken in unidirectional fashion, since data discovered in one later step might suggest new insights related to earlier findings. Indeed, these steps are best conceived of as related tasks which are enriched by feedback. Thus, returns to earlier steps are necessary and to be expected.

(1) Recording of local documentary evidence on draft base maps and in written notes.

The investigation started with the currently available topographic maps of the US Geological Survey. Old maps including the Cumberland County and city atlases, the Portland Bird's Eyes, and the Sanborn Insurance maps were studied to locate facilities in the Level I investigation of all the watersheds. See Part IV of this report, the "Annotated Resource List," for full citations. The USGS maps were enlarged and used as draft base maps to record locations of sites on them during the first six months of this work.

After the Casco Bay Estuary Project GIS data base effort was underway, printouts of the USGS maps from the data base were used to record locations, and indicate their designation in the alpha-numeric code. On these drafts self-adhesive colored dots were used to mark sites on the maps. Orange dots signified sites between 1840 and 1899, black, ones between 1900 and 1969. Black was also used for sites that continued to be active, and in some cases expanded, from 1970 on. A few new sites active after 1970 were included in the data. They are ones in Industrial Pretreatment Program records that provided links between earlier industrial sites or activities in the Portland and South Portland

region and actual pollutants. Also the new sites shown in purple on the current topographic maps, mostly tank farms, are included. There are certainly many others of minor importance, but the scope of the investigation precluded investigating them.

Detailed written notes were made about buildings and other structures and their changing appearance and functions, about dates of railroad facility and bridge construction, and about dump sites, etc. There were so many filling stations and repair garages that, while notes were made about their locations and included in the detailed Part III compilation by HDA, they were not entered individually on the draft base maps. Instead, clusters of them on the roads and streets at the major entry points to Portland, the "gasoline gates," were discussed.

Such questions as the following were asked of the evidence: Where were the foundries, the machine shops, the tanneries, the railroad yards, the chemical industries, the tank farms, the refineries, the filling stations and repair garages? Does a building with a chimney on the Portland Bird's Eye map of 1876 correspond in location to a foundry or a paint factory on the Sanborn maps with their scaled layouts of sites? Where were the brickyards and quarries which often later became dumps? Sanborn maps showed layouts, such as those of foundries, rolling mills, railroad facilities, a kerosene works and several paint factories. These provided indications of processes and likely pollutants. How long the sites were active could be determined by the presence or non-presence on successive maps. The maps revealed when they were enlarged or relocated.

After the research began, the importance of sewer outfall locations became obvious. Fortunately there are maps to assist in the determination. The 1914 City atlas for Portland and South Portland contains maps that show all major lines at that point with the locations of outfalls. Recent maps of the sewer systems of the two cities are available showing direction of flow, and the locations of Combined Sewer Overflows [CSOs] and their outfalls. This data were entered on the draft base maps.

(2) Field study of the remnant evidence in the cultural landscape.

An investigator must learn the layout of road and rail networks, and the locations of former canals and bridges. The courses of rivers, streams and tidal inlets are traced by noticing where roads and streets cross them. It is necessary to find out what kinds of industrial or commercial activities are present today, and what evidence there is of past activities. Sometimes present activities are continuations of historical ones; sometime new activities are found going on in old mills and foundry buildings. The data recorded on the draft base maps served as a guide for the field work in Portland, South Portland, Gorham and Westbrook.

Many of the major streets and roads, past and present, were driven over for a "windshield survey." In the Portland downtown, the investigator walked on many streets looking for evidence. Through this process, some of the major buildings indicated on the atlases, the Bird's Eye and Sanborn Insurance

maps were found. Some no longer exist. The industrial and commercial cultural landscape of the past emerged. Additional buildings and other structures were seen that had not been noticed on the maps. The field data were recorded on the maps and in written notes. In carrying out this step, first efforts were made to determine larger watershed boundaries, and the tentative boundaries of Historic Development Areas.

Conversations with Jim Robbins in the Portland Department of Public Works and with Dave Pineo in the South Portland Engineering Department in this step were of assistance. They helped in locating sewer lines and outfalls, and dumps and landfills. George Flaherty, Director of the Portland Department of Parks and Public Works, gave useful hints.

(3) Analyze the data, allowing a feedback process to occur between steps 1 and 2. The evidence from the documentary sources and from the field work is complementary. Questions arising from a field resource may be answered by a library resource. The investigator must expect to go back and forth between the evidence on the maps and that from the cultural landscape. It is helpful to imagine a dialogue between the maps and the actual remnants on the streets and roads, and the rivers and harbor, in order to become familiar with the historic landscape as it was in different periods.

The analysis revealed that some sites, such as major foundries, railroad yards and chemical works, were more important than others. At this point Level II sources, such as newspaper articles and old photographs, were consulted. Photographic collections were surveyed to determine what might be of use to indicate specific site usages and technologies involved. Newspaper accounts were found through the index in the Portland Room of the Portland Public Library. For a few sites of importance, city directories were consulted to determine when exactly a firm was active and if there was information about products. A few of the local histories of Portland and South Portland were useful in giving information about specific sites.

(4) Determination of the boundaries of the larger watersheds and of the Historic Development Areas within them.

As steps 2 and 3 take place, a preliminary determination of the larger watershed boundaries and those of the HDAs can be undertaken, and lines placed on the draft base maps. In this fourth step, a considered determination of the boundaries is made. The compilation about activities and pollutants at specific sites that formed Part III had to be organized on this basis. This step was consciously taken, as it must be, not too far into the investigation, before all sites had been identified. This enables concentration on various areas of the cities at different times, rather than all at once. Furthermore the alpha-numeric system for site identification may be applied with confidence.

In this step patterns of concentration of certain types of industries, and commercial or transportation

activities indicated what Historic Development Areas made sense. For instance, railroad yards, shipping facilities and foundries together led to identifying at least two HDAs in Portland, and railroad yards and the coal gas works close by each other indicated another HDA. Common names of parts of the cities in the past provided evidence of an identity revealing that this was considered a distinct part of the urban area. Thus the Grand Trunk, Ferry Village and East Portland HDAs received their names. Sometimes the popular identities of parts of the watershed were clues to how to do the subdividing and what to call the area, as is the case with the Central Commercial HDA in Portland or the Mall Commercial/Industrial Area in South Portland.

The task of identifying boundaries was fascinating. Roads and streets sometimes indicated the locations of the larger watershed boundaries. For example, down the center of the Portland peninsula, Congress Street runs right along the watershed line. Street names themselves were occasionally helpful in this determination, as was Highland in South Portland. Of course, topographical lines on maps were often used outside of the densest urban areas of Portland and South Portland. Sometimes it was the main river or stream in the watershed that gave the HDA its name. "Stroudwater in Portland" and "Capisic Watershed" are two examples.

In this step it is important to revise the earlier tentative boundaries where appropriate. The most difficult to establish one was between 1.3, the Railroad Triangle Area and 1.4, Back Cove-West Side/Deering Area. The Bird's Eye of 1876, the Cumberland County and the state atlases, and the Sanborn maps were ambiguous about which directions water flowed from marshy areas. The puzzle arose from marshes long ago filled in and forgotten. In the 1840s one marsh was located between Congress and Park near where Union Station Plaza is now, and another on the other side of I-295 where the playground of the Douglass Street school is today. On the first draft base map made from enlargements of the USGS maps a tentative boundary line was drawn, but it did not seem right. The question was finally resolved by a comparison of the 1868 plane table map at the Portland Public Works Department Archive with the 1984 "General Plan, Existing Sewer System." Together they indicated the water in the marshes flowed down a stream still on the maps in the 1860s and 70s through what is now Deering Oaks Park to the Back Cove. By 1914 the "Alms House" sewer line was built to carry this stream and sewage down to the cove. Today that line joins an main interceptor and the contents are pumped around to the sewage treatment plant at the mouth of the Back Cove. However, on the way there, several CSO outlets are in place at or near the locations of the historic sewer outfalls of 1914.

(5) Determination of what pollutants may have been associated with the industrial sites described in the notes and located on the draft base maps.

A "Survey of Historic Pollution Sources and Pollutants" forms Appendix I, based upon resources described above. The "Key to Industry and Pollutants" is a summary at the beginning of Part III that was derived from that survey. The data assembled in this research formed the rationale for including

the twenty-seven types of sites in Part III, and for the contents of the summaries of "Pollution Sources" in the Part II characterizations. The primary and secondary books and articles drawn upon for this survey are listed and described in Appendix II.

These two appendices in the report are final products of a process of research that was conducted largely parallel to the work supported under this Casco Bay Estuary Project grant. As explained above, study of historical industrial processes and pollutants is just beginning. The material available at the outset did not sufficiently answer the investigator's questions, so this research was carried out along side that on sites where pollution would be likely found in the Portland and South Portland region. These materials were used in making a determination about likely pollutants at any site. Two Bowdoin College faculty members were helpful in this work, Prof. Edward Gilfillan, Director of the Marine Research Station, and Prof. David Page of the Chemistry Department.

(6) Analysis and Synthesis.

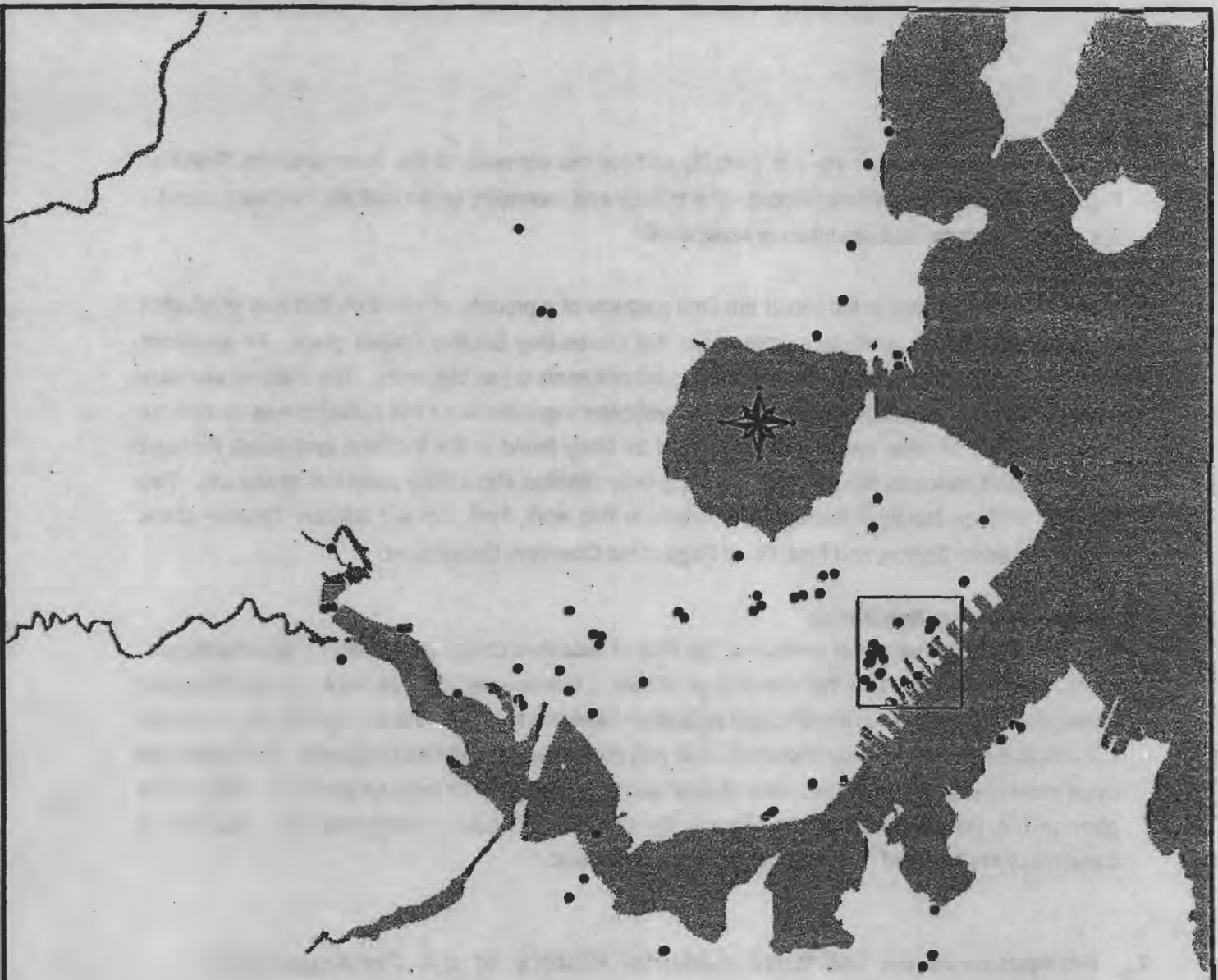
The last step included a final revision of the Part III data describing and identifying sites by Historic Development Areas. Then the earlier draft of Part II was revised to make sure that the boundary descriptions were accurate, the historical summaries reflected the last research done for Part III, and all the information possible about industrial sites and probable pollutants was included. The draft base maps were checked over for accuracy of locations and the alpha-numeric designations. These were given to Tom Burns for entry of the data into the Casco Bay Estuary Project data base. Versions of these maps are included at appropriate places in this report.

7. Perspectives on the Environmental History of the Portland/South Portland Region

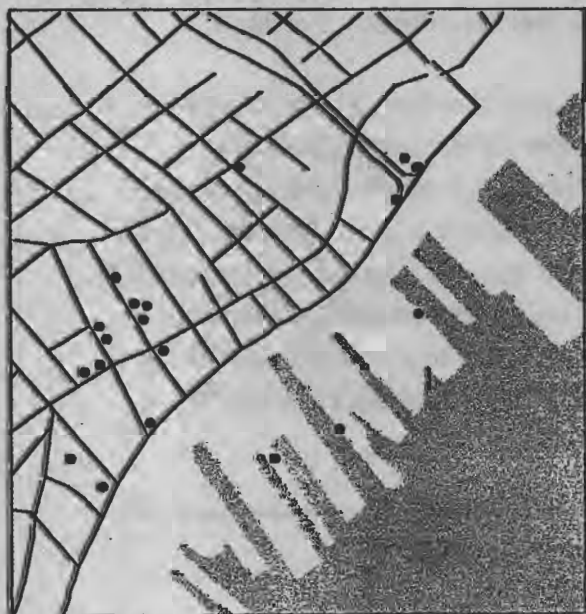
(1) Time Perspectives

Industrial development began in the 1840s in the Portland/South Portland region. See Map No. 2.

Four Historic Development Areas had their beginnings in this decade; therefore, it is appropriate to state that pollution began then. Two companies laid the foundations for the Grand Trunk HDA. Where Bath Iron Works parking lots are now, the Grand Trunk Railroad to Montreal built its passenger depot, ocean shipping facilities and its yard with car building and repair shops and roundhouse. Close by on Fore Street, the Portland Co. opened to build locomotives for the new railroad. Its foundry and machine shop are very evident from the first maps of the city in the 1870s. The facilities went through several expansions before the firm closed one hundred years later. The site is now now the home of the Maine Narrow Gauge Railroad and Museum, of boat storage and repair facilities, and a machine



One inch = 3000 feet



One inch = 1000 feet

• Sites Active only in the Period 1840-1899

Map No. 2
Sites of Probable Historic
Pollution 1840-1899

shop.

Some blocks away along the harbor to the west at the other end of Commercial Street, the coal gas works started in the 1840s. For almost 100 years it produced gas for Portland. The Portland, Saco and Portsmouth Railroad built a bridge over from Turners Island where it had its roundhouse and repair facilities. Coal and coke must have arrived at the gas works by rail and/or ship. The gasworks and its port facilities provided the foundations for the West Commercial HDA. By 1870 two railroads, the Maine Central and the Boston and Maine had depots, yards and repair facilities here. The maps show, in addition, a hat factory, soap making and match making establishments here, as well as for a few years a sugar refinery.

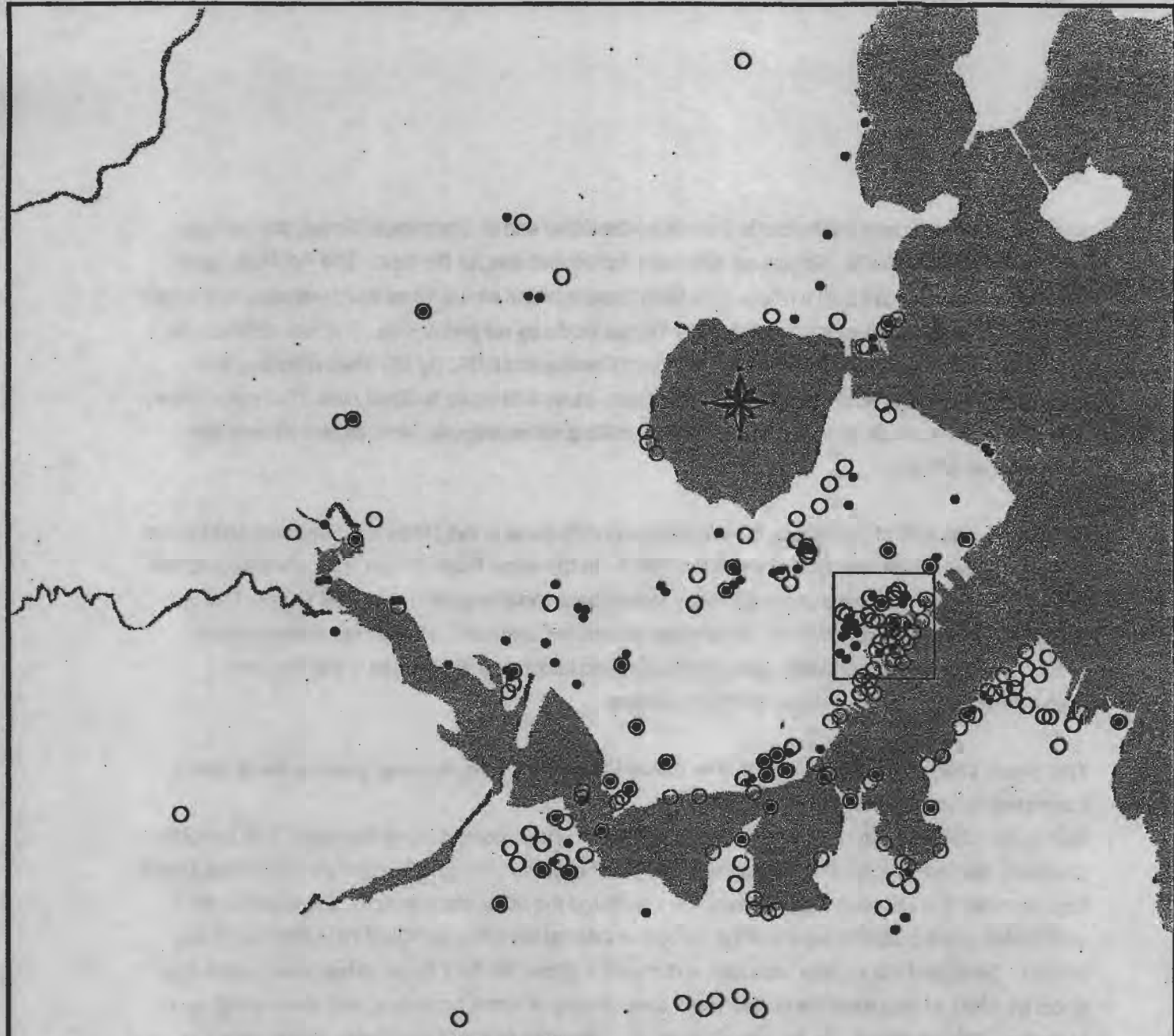
On the opposite side of the harbor, in Ferry Village on Mill Cove in the 1850s a major brass and bronze foundry opened which operated well into the 1980s. In the same Ferry Village HDA, the shipyard and marine railway that still exists on its site today started boat and ship construction and repair. The Turners Island railroad yard with its roundhouse was further upstream, a facility that lasted into the 1930s. Today a major petroleum off-loading facility and tank farms are located in the Turners Island/Pleasantdale HDA of which the yard was part.

The year 1900 stood all during the investigation as the turning point where the economy began maturing. See Map No. 3.

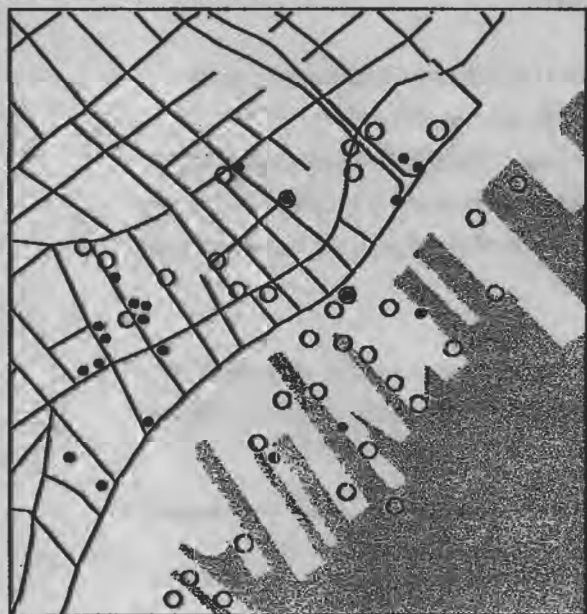
During the 1890s additional heavy industry had come to Portland and South Portland. The Laughlin Company opened its large tool-producing foundry in the Grand Trunk HDA. It joined a white lead paint factory on Munjoy Hill, several small machine shops and the other existing industries which probably contributed to the pollution legacy of the harbor. A Central Commercial Street HDA had long been evident. Several of the smaller foundries and machine shops off Fore Street in this area closed their doors by 1900, or moved to the Grand Trunk area. However some continued, and were joined by a number of printing shops. On the waterfront in this area were motor repair shops, canneries and a paint manufacturer by 1909, as the Sanborn maps of that year show.

The tank farms in South Portland by I-295 go back to the 1910s. The industrial foundations of the Rolling Mill-Ligonla HDA where they were located lie in the 1860s when the iron rolling mill and company town of Ligonla started. By the 1870s close by the mill was a chemical factory producing acids needed for the mill and foundries in the region, and for the kerosine refinery located now where the Mobil distribution facility is. This HDA is still important in today, but oil storage tanks have replaced the mill and its town.

Two railroads constructed new yards. The Grand Trunk built the Presumpscot Yard in what has been termed in this study the East Deering/Bay Shore HDA. This enabled the railroad to move the engine



One inch = 3000 feet



One inch = 1000 feet

- Sites active only in the period 1840-1899
- Sites active only in the period 1900-1969
- Sites active in both periods 1840-1900 and 1900-1969

Map No. 3
Sites of Probable Historic Pollution

maintenance and car repair functions away from the city waterfront from where they had been since the 1850s and use the space for grain elevators right by the docks. The Boston and Maine built its Rigby Yard in South Portland, still in operation today close to wetlands. The impact of the internal combustion engine began to be seen in the Sanborn maps of 1909 in the repair facilities here and there. By the 1930s the maps showed several hundred filling stations in the two cities, with many of them clustered at the "gasoline gates," at the bridges and crossroads at the entrances to the city of Portland.

The year 1970 marked the beginning of a new era in the environmental history of Portland and South Portland.

The deindustrialization of Portland and South Portland, in the sense of the end of heavy industrial production in the two cities, began to be evident. In the West Commercial Street HDA the coal gas works shut down in the sixties, and the company, then owned by an out-of-state corporation, began distributing natural gas brought in by pipeline. The owner of the Portland Company sold the name and several divisions, and the works closed in the late seventies. An out-of state corporation purchased the Laughlin foundry in the 1950s. There was talk of expansion at several points, but in the mid-eighties the works were shut down. Rockwood Industries, the last operator of the foundry on Mill Cove in Ferry Village, stopped operations in the late 1980s. The mainstay of the Back Cove-South Side Industrial HDA, the Portland Stove Works, turned off its fires in the mid-eighties, as well.

The Grand Trunk railroad closed its livestock yards in the mid-sixties, and began demolishing the huge grain elevators that had been landmarks on the waterfront. In the early 70s, the third and largest one came down. But the other company with the connection to Montreal, the Portland Pipeline, expanded its facilities, and prospers today in the Spring Point HDA. This area also includes the sites of the World War II shipyards where Liberty ships were built. During the 50s and 60s it had been an area with machine tool works; in the 70s it began its transition to mixed industrial, commercial and residential uses.

Additional patterns of renewal have been observable, as well. The rolling mill in Ligonla shut down in the mid-60s and the firm moved to a new site in an industrial park on the South Portland-Scarborough boundary. In the Main Street Industrial Park HDA of which the firm's facilities were part, truck repair and machine tool producing firms were reported in business.

In the late 60s an entirely new HDA began to be noticeable, the Mall Commercial/Industrial Area. First there was Fairchild Camera in facilities constructed by the city of South Portland. National Semiconductor is there now. Several other high tech industries located in the area. Now, of course, this area popularly identified with "The Mall" is the location of all sorts of commercial activities, filling stations, auto dealerships with service facilities, insurance companies, hotels and motels.

The Interstate highway system brought dramatic changes in patterns of land use, road networks and downtown business. The Mall development in South Portland had economic impacts elsewhere in the Portland/South Portland watersheds, as well as its environmental ones. Very noticeable in this investigation has been the shift in automobile dealerships from the Back Cove-West Side/Deering locations out near I-95. Even more pronounced has been the shift in filling station locational patterns. The "gasoline gates" of the 30s and 40s exist only in remnants. Many of the isolated filling stations are gone as well. The exhaustive listing of these site types in Part III is intended to provide data that can be used to make sure that the hidden legacy of underground storage tanks that might leak the residue of PAHs into the groundwater and ultimately the harbor is known about.

The Mall continues to have its impact on downtowns in the region. However, the "Old Port" in the Central Commercial Street HDA has become a synonym for renewal in Portland. Although a few printing establishments remain in its heart, the HDA is the financial center of Maine. Along Commercial Street itself, old and new co-exist uneasily. Waterfront- and fishing-related facilities are on the harbor side of Commercial along with fancy condominiums on wharves. On the landward side, former workshop and warehouse buildings now contain offices of law and other firms, as well as up-scale food shops and boutiques.

It was in the 70s that another kind of renewal began nationwide, an environmental renewal. The National Environmental Policy Act of 1970 set the stage. From that point Congress on passed legislation that was concerned with clean air, clean water and clean land. The legislation had its negative impacts locally, some believe. But on the whole most think that the results have been positive, and the efforts to develop a sustainable environment with a sustainable economy have been worthwhile and necessary. The Casco Bay Estuary Project represents one of these efforts, involving a range of "stakeholders" in decisions about the future. Balancing economic and ecological considerations will not be easy, but data on historical sources of pollution are some of the many kinds of information that will help in decision making.

(2) Watershed development perspectives

The investigation established that access to water was vital for many industries. This fact provided the basis for determining the patterns of development from the data on Portland and South Portland. Railroads could easily build their yards along side the harbor, and ships could easily approach wharves. The dual needs for water in processes and to carry away wastes interacted to shape the location of some of these same industries, as well as others. Waterlevel sites were needed by shipyards and canneries for related reasons. As the investigation of historic pollution sources proceeds to other parts of the Casco Bay watershed, and to other estuaries, these findings will provide a predictive model of what will be found, where, and when. There were at least four needs

shaping the patterns of development, and thus of pollution.

First, certain industries needed water in their processes. There were three groups of these industries. One group was formed by tanneries and slaughter houses. Tanneries needed water for the baths to clean and tan leather. Locations on ponds and streams would be natural for them. The foul odors associated with tanneries means they would be outside the main settled areas of a city when they were started, which is the case in Portland. One whole Historic Development Area, Back Cove-Deering/West Side, is testimony to this. Most of the tanneries there were in existence by the time of the first atlas, that of Cumberland County of 1871. Several were there still in 1909 as the Sanborn maps of that year show. All were gone by the 1930s. The former stream flowing from the marshy area at the intersection of Park and Congress was by then entirely underground in the Alms House Sewer.

The largest group of industries needing water in their processes was formed by the foundries and the rolling mill. They required water for acid baths to clean iron and steel sheets and castings. The Portland Company in the Grand Trunk HDA was the first of these, followed a few years later by the foundry on the other side of the harbor in Ferry Village. Then in the later 1860s the "Portland Rolling Mills" opened in Ligonla. The Portland Stove Company, opened close to the south side of Back Cove in the 1870s. The Laughlin foundry moved to the Grand Trunk area in the 1890s from its small operation in the Commercial Street HDA and expanded tremendously. Of these, the only site that had what the Sanborn maps of 1886 and 1896 show as a fresh water pond close by was the rolling mill. This source was formed by damming a tidal inlet. It is not clear what the source of fresh water for the other foundries was, whether they could use the nearby saltwater, or whether their fresh water needs were limited to quenching baths that could be supplied by the municipal water system.

The third group, the chemical industries needing a water supply, was represented in the Portland/South Portland region by only one small works. In Ligonla from as early as the 1870s to the turn of the century, the Atwood Lead Company made hydrochloric and sulfuric acids, also drawing from that fresh water pond. It needed water for processes involving salts and steam in closed lead vessels.

Second, were needs of these industries and many others for waste disposal, either in sewers or directly into streams, rivers, the cove or the harbor.

The spent pickling acid solutions from the rolling mill and the foundries had to go somewhere with their burden of heavy metals, the range and toxicity of which would have increased after alloy steels were introduced after 1900. Wastes from the acid factory and from the kerosine refinery that existed nearby the rolling mill had to be discharged into the Fore River. Thus began the process of depositing heavy metals and PAHs long before the tank farms existed in Ligonla. Machine shops workers may have swept solvents with suspended heavy metals down into the sewers. Canneries

needed to dispose of the hot waters from the cooking baths for the canned sardines and other canned sea foods and vegetables. These probably contained lead from solders up through the 1920s when other methods of sealing cans were developed.

The tanneries in the Back Cove-West Side/ Deering area must have flushed waste water from their "vegetative process" and "mineral process" tanning baths down into Back Cove for many years. Wastes from three tanneries in the portion of Morrills Corner in the Back Cove-North Side/East Deering Area would have been deposited in the cove, as well. There should be evidence of chromium there, and arsenic, if the "mineral process" was used in the tanneries. The coal gas works discharged ammonia water laden with various PAHs into the harbor from the processes of "cleaning" the gas, removing sulfides and other undesirable compounds.

Thlrd, some Industries required water-level sites for their operations

Shipyards and boatyards needed such sites for construction and maintenance, as did canneries for fishing boat access and waste disposal. In the Kennebec River watershed there are accounts of ships being built several miles from the rivers or bays, then being pulled on rollers by oxen to a river or Merrymeeting Bay. However, in the Portland/South Portland region there were many sites with direct access, and the two cities became boat and ship building and repair centers. The yard and marine railway in Ferry Village, started in the 1850s and still going today, is just one of many examples. There were the three yards in East Deering in the later 19th century, one of which survived through the First World War.

More than a year before the U. S. entered the Second World War, at Spring Point a major shipyard, the East Yard, was constructed where coal-fired Liberty ships were built for the British government. Through most of the war, a second yard nearby, the West Yard, built oil-fired Liberties for our war effort. After the British contract was completed, the East Yard did also. The pollutants in the 19th century yards were perhaps not substantial, confined to lead and copper from bottom paints. But the yards building the Liberties must have contributed a load of heavy metals and PAHs. Yards and marinas in the 60s and 70s bestowed their legacy of tributyltin, an extremely toxic compound in bottom paints, now banned for boats less than 30 meters, but not for ships.

Sardine canneries needed waterlevel sites for ship access. From the 1890s through the 1950s in both Portland on the wharves in the Central Commercial HDA and over in South Portland in Ferry Village there were canneries. The 1890s was the great age of development of cannery machinery and of corporate accumulation of local enterprises all up and down the Maine coast. In Portland during the 1930s was still a cannery owned by R. J. Peacock who had several canneries in Lubec. The city had several vegetable, fish and meat canning enterprises on the Central Commercial Street Area and in the Grand Trunk Area. One of these was Burnham and Morrill which moved to the mouth of the

Back Cove in East Deering by 1914.

Fourth, and more commonly, many industries needed waterlevel sites for transportation access.

Energy sources had to be transported, unloaded and stored. They were one factor in shaping waterfront usage. Coal for the gas works, for ships and boats, for railroad locomotives, steam power and electricity generation, and home use had to be transported by ship and rail, unloaded and stored. Maine Central had a huge facility by the Million Dollar Bridge from at least the 1930s to the 1950s. Petroleum products for many of the same uses were brought in by ship, barge and rail tank car. Portland Pipeline from early in the Second World War on received oil by ship and sent it through its lines to refineries near Montreal. Now one of the lines is used to send natural gas here. Before 1972 when the Pipeline Company began to use booms during unloading, there must have been spillage that left a legacy of pollution until today. The off-loading facilities of the other petroleum storage facilities scattered along the harbor in South Portland must have left a similar legacy. Then there are the tank farms themselves on the harbor or up one of the small streams in its watersheds. Spillage and leakage would contribute to the PAH legacy in the soils and sediments..

A second category of items needing transport were raw materials. The early foundries and the rolling mill needed bar iron from elsewhere in this country. The small brass smelter under the Eastern Promenade at the mouth of the Back Cove, the large foundry on Mill Cove in Ferry Village and the smaller ones in the Central Commercial Area needed either copper ore which came from Chile and possibly elsewhere, or copper ingots. All the major foundries and the rolling mill were located right on the harbor, and served by rail, as well.

The third category of items needing transport were finished products. The Portland Company must have used the rail lines to transport the stationary steam engines it produced; and the Portland Stove Company, its many models of stoves. The need to transport steam and internal combustion engines, boilers, and machined parts from the foundries and from machine shops large and small must have made sites where railroads and ships came together attractive. Where railroads were located there were inevitably yards, round houses, machine shops, ash piles, fuel and lubrication oil storage facilities. PAHs and heavy metals, including mercury, are the legacies left behind on the sites of these facilities, and in the sediments of the harbor.

(3) Two hidden histories that tie pollution sources together

Two topics of research had not been planned for in the grant proposal, but proved to be necessary and productive. The first was investigation of locations of dumps and areas of the cities that had been created by landfilling. The second was the determination of where the main sewers and outfalls were in 1914 in relation to CSO outfalls today. The data provided links between sites of polluting activities

and the overall development patterns of the two cities. They also provided links between sites and the places where some pollutants were first deposited in the sediments of the Rivers, the harbor and the Back Cove.

Landfilling and dumps have changed the landscape and brought pollutants from various sites together.

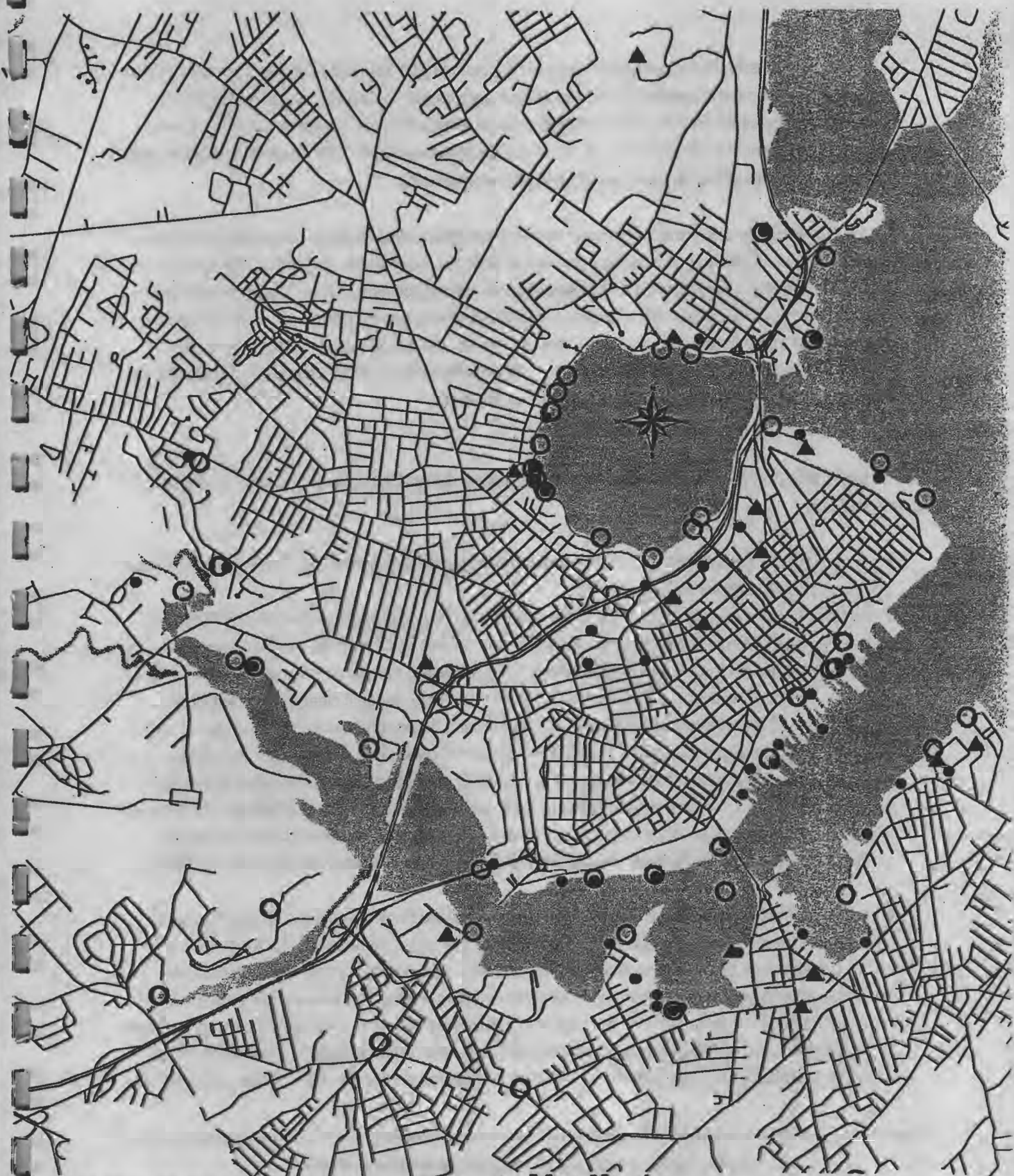
Much of the harbor front on the South Portland side of the harbor, as well as Commercial Street on the Portland side was created by landfilling. The expansion of Portland into the wetlands of the Back Cove can be traced by examining successive maps, such as the 1827 map, the 1871 Cumberland County atlas map, the Sanborns, the State atlas of 1894 and the City atlas of 1914. Dramatic changes are apparent, and they continued right to the present with the building of I-295. The GIS maps of the filled land with the industrial and commercial sites by period here in Part I are very revealing of the patterns and of potential pollution problems through either site development or the normal processes of groundwater flow.

On a smaller scale, some brick yards, quarries and interior wetlands were filled in with unknown kinds of refuse in the 19th and 20th centuries. Sometimes development took place on top. The site of the Douglass Street school and playground is an example. In the 19th century it was wetland that drained over to the marshy pond between Congress and Park. On its periphery was a brickyard. In the 1920s and 30s the site was used as a dump. The structural consequences for the school have become apparent, for there has been settling and cracks have appeared in the walls. The environmental consequences have not yet been experienced apparently. See Map 4.

The consequences of building a park at the site of the East End dump used in the middle years of this century below the Eastern Promenade are beginning to be experienced. In the 1970s this dump was bulldozed down and covered over. Part of the site of was used for the new Portland Sewage Treatment plant, the rest for the parkland under the Eastern Prom. Leaching is occurring from the site since, as was standard procedure then, no cap was placed over the old refuse.

The sewer systems are human-created watersheds that carry pollution down to the harbor.

Early in the investigation, it was discovered that the 1914 City atlas covering both Portland and South Portland shows routes of major sewers and locations of outfalls. Some pollutants must have either intentionally or accidentally been flushed down the drains. Pollutants disposed of at a site could easily have been transported by rain to the street sewers. Recent sewer system maps for the two cities show direction of flow and locations of CSOs with their outfalls. In most cases the 1914 outfalls still serve the CSOs. All of this information was incorporated into Part III, the data package, in the "Sewers and outfalls" entries under each HDA. See Map No. 4 showing the locations of modern CSOs and the 1914 sewer outfalls.



- 1914 Sewer Outfalls and important lines
- Present Day Sewer/CSO outfalls
- ▲ Historic Dump Sites

Map No. 4
Dump Sites and Sewer/CSO Outfalls
in Portland and South Portland

It is clear that the sewers are part of the watersheds, and fit in with the HDA concept. The major sewers simply reflect the older watersheds, and sometimes were based on streams placed underground. The Alms House sewer was one of the largest of these, but leading into the Back Cove there were others. This means that at the outfalls, a concentration of pollutants from the industrial and commercial activities of that sewer's watershed would be hypothetically likely.

All the sewer outfalls and some of the main sewers were given alpha-numeric designations, and have been included in the historical data base generated from this study for the Casco Bay Estuary Project. Thus it is possible to derive from the GIS data base on historic pollution sources maps showing the likely pollutants concentrated at the outfalls. In addition, since some of the industries no doubt had straight pipes to the Fore River, the Back Cove and the harbor, the GIS data indicating the likely locations of pollutants based on the proximity of the industrial activity to the water will be of assistance in future sediment research and management of Casco Bay.

8. Applications of this study for the Casco Bay Estuary Project and its audiences

(1) For natural scientists: Data to raise some questions, point to some answers and provide future research directions

The data and information in the report and the GIS data base further the attainment of the Project's goals of "Investigation of Existing Sediment Contamination and Its Effects," as well as "Investigation of Sources Threatening to Critical Habitats." They will help explain the pollutants and their levels found in the sediment studies in 1991 and the 1980s. They should also make it clear that the legacies of polluting sites in the watersheds of Portland/South Portland harbor and the Back Cove have provided ample sources of the pollution found in the "Inner Harbor" of Casco Bay. The additional mapping possibilities through the Casco Bay Estuary Project's GIS data base will help in deciding on locations for further sampling. The data will provide important overlays useful in two of the "actions" envisioned in the Comprehensive Conservation and Management Plan being developed through the Project: producing a GIS map of "pollutants of concern" and a map of critical habitats and the threats to them.

Particularly a need exists to relate the data in this study with the several sediment studies that have been done, including the most recent one carried out by Texas A & M University for the Project in 1991. Comparisons by the investigator of sewer outfalls where pollution might be expected to be concentrated with points on maps from the sediment studies suggest there may have been more sediment transport in the harbor and Fore River than has been thought. Eventually it may be possible to evaluate amounts of pollution in relation to the length of time historical sources were active. This may enable prediction of likely levels of pollution elsewhere, given a knowledge of how long particular

sources were active and their locations.

(2) For planners and managers, developers and investors: Data and information for planning development and resource protection, for assessing site development potentials and risks

The GIS maps and the material in Parts II and III of this report will help in determining where and what management practices should be applied. The materials can be used to consider what kinds of development to encourage and where they should be encouraged. Development today can release pollutants long held at a site in the soil or old foundations and walls. These can be problematical at the site, or "downstream" in the groundwater or in above-ground watercourses. Obviously historic pollution released from sites in the watershed can enter the sewers or even go in the groundwater down to the harbor or river. There it can join the legacies already deposited in the past. Harbor development in the sense of dredging or wharf construction or reconstruction can be problematical in stirring up and transporting parts of those legacies.

In particular, the GIS maps showing the sites of industrial, commercial and transportation activity in two periods, 1840-1899 and 1900-1969 [nos. 2 and 3], will be useful in management. Since the data are organized under Historic Development Areas, it will be easy to see where the "downstream" impacts may be. The GIS map showing the sewer outfalls of CSOs today [no. 4], in most cases in the same locations as sewer outfalls were on the 1914 city atlas maps, will be useful in assessing the areas to be careful about in dredging and work on wharves.

Developers, mortgage lenders and insurers will find the extensive information about sites, the locations and possible pollutants useful in making decisions about investment. Analysis of past uses of sites will help determine what might be called "appropriate development forms." Using a foundry site with its old buildings as a boat storage and repair place, and for workshops for machine tool rebuilding makes sense. Conformity to the present environmental laws and regulations means little risk. To rebuild and use adaptively the buildings for condominiums, restaurants and retail shops involves environmental risks that need to be ascertained through an environmental site audit.

(3) For the general public in the Bay region: Information useful in developing watershed consciousness and promoting stewardship

One of the goals of the Casco Bay Estuary Project is increasing watershed awareness through public outreach activities, including talks, publications and school programs. The slide talk in Appendix III reveals that pollution, once it is produced, may stay around a long while and still be problematical today. It demonstrates that water was important in industry, and patterns of development were shaped by it. Consequently watersheds need to be considered in environmental planning, indeed in any kind of development because "we all live downstream." The talk can be used in various ways in

outreach programs for schools and general audiences. Increased watershed consciousness should lead to increased citizen roles in planning and intertown efforts at management.

Goal Four calls for promoting responsible stewardship. Public involvement is important in this, and continuing this type of investigation in other communities in the Casco Bay region is vital. Volunteers could do some of the research work in their own towns, under the guidance of this investigator. Projects to encourage this could be undertaken. The talk in Appendix III will be important in training, as would other related talks developed during the course of this study.

[4] Applications for estuary projects elsewhere

This investigation of historic pollution sources can be replicated elsewhere and will reveal important information/ data for research in the natural sciences and in environmental planning and management. Similar sources exist for other parts of the U. S. The methods should be applicable with little modification. Data and information will be useful to scientists, planners and managers, even though the goals and actions of the particular estuary program might be different. The general public is always interested in the historical watershed development approach because it is so different than the usual local history. This kind of project is a fine tool to build watershed awareness!

This sort of investigation helps answer important questions that natural scientists have about the origins of sediment pollution, the nature of transport, about the risks of pollutants on land, in the water and in the sediments. It helps answer important questions social scientists and planners have. It reveals how development and consequent pollution have proceeded temporally and spatially. This and other investigations can help clarify the patterns in coastal communities, in riverine communities and in land-locked communities. The material provides a basis for intelligent discussions and decisions about land and resource planning and regulation.

Acknowledgements

Most of all, thanks need to go to Helen Koulouris, Associate on this project and Coordinator of the Environmental Studies Program at Bowdoin College in Brunswick. She did the conceptual organization of the written report. Clarity of layout in relationship to the data was crucially important in Parts II and III. Since there were no models available, she had to experiment. The CBEP staff reviewed several drafts in the process of finding the best format, and made helpful editorial suggestions. The last review by some twenty outside peers resulted in many useful suggestions which are incorporated in the report.

A vital part of the process of doing the research and preparing the data for GIS input was to develop the alpha-numeric code to designate and describe the sites. Tom Burns of the Casco Bay Estuary Project staff and the investigator worked together to develop a system that was appropriate for this

investigation and could be used for similar historic pollution source projects elsewhere. Thanks to him for his creativity and patience.

Professor Edward Gilfillan, a marine ecologist at Bowdoin College who served as a consultant on the investigation, was most helpful early on reviewing material gathered on historic processes and pollutants. He was able to explain some of these processes and what might be the impacts of wastes from them, and introduced me to the Material Safety Data Sheet [MSDS] data base. His colleague in the Chemistry Department at the College, Professor David Page, pointed the investigator in the direction of the resources on industrial chemistry. His own knowledge in that field helped with the interpretation of what the Sanborn Insurance maps really said about industrial processes in Ligonja.

Jim Robbins, an engineer with the Portland Department of Public Works, assisted me immensely in finding resources in the archival collection of the department. He helped the investigator find maps and other data related to the sewer lines and outfall, and to understand the wealth of data to be uncovered there. His recollections of locations of dumps, and of conversations with contractors who had worked in the landfilled areas around the Back Cove were most useful. Dave Pineo with the South Portland Department of Engineering assisted in interpreting what the maps revealed about sewers and landfills, and generally in uncovering the mysteries of the underground infrastructure.

Thanks also to the staffs of the Maine Historical Society library, the South Portland Library, the Portland Room of the Portland Library, and the Maine State Library in Augusta for their assistance. Likewise to the people who work in the Industrial Pretreatment Programs in Portland and South Portland, Katherine Staples, Lisa Songco, and Ron LeTarte.

Part II

Characterization: Historic Development Areas

**Area Descriptions, Historical Development Summaries,
Pollution Sources with Probable Pollutants**

Report
Environmental Impact Statement
Development Area

Area Description: 11,000 sq. ft. of land
located in the City of...

No. 5: Fore River Waterfront
Historic Development



Part II: Characterization of Historic Development Areas

Area Descriptions, Historical Development Summaries, Pollution Sources with Probable Pollutants

1. Fore River Watersheds Historic Development Areas (1.1-1.3. See Map 5)

1.1 Stroudwater in Portland:

Area

The watershed of Stroudwater River and the Cumberland and Oxford canal now within the city limits of Portland. Includes tidal pond into which the canal emptied and Capisc brook flows (but not the brook's watershed which is 1.2). Along the Fore River to where it widens and a short canal connection to the tidal pond comes out.

Historical Summary

Stroudwater is now an interesting and fairly well-preserved settlement with its historic houses composing a National Register Historic District. Little pollution-creating industrial activity seems to have been here historically. The tanneries probably used the "vegetative process" with bark as a source of tannin. In the past fifty years, the expansion of suburbs and the development of the airport have resulted in the possibility of considerable non-point source pollution.

Pollution Sources

19th century: Two tanneries (*possibly chromium and arsenic if "mineral processes" used*). Possible 19th and 20th centuries: Other undiscovered industrial activity on the Stroudwater mill pond and at the tidal mill below the Capisc? The non-point source pollution from the Capisc and Stroudwater watersheds must have been concentrated by the sewer system with its outfall (1914 City atlas) on the narrow head of the Fore River below Stroudwater, actually in the Capisc watershed (H D A 1.20).

1.2 Capisic Watershed:

Area

Watershed of Capisic Brook from its mouth in the tidal cove at Stroudwater, up to Nasons Corner, across Brighton Avenue along tributaries that reach close to Morrills Corner. Also includes frontage along the Fore River from Thompsons Point up to the place where the river widens out below the tidal pond where a short canal segment existed to connect to the pond.

Historical Summary

In the early 19th century, Morrills Corner (Stevens Plains then) had several workshops that produced pewter and Britannia metal items. A tannery was located in the watershed at the Corner. Two brickyards were in the area, one at the mouth of the short canal segment, another off Brighton on a stream. Several cemeteries are in this area, and it has been suggested that the embalming and burial practices in the century may result in pollution of neighboring watercourses as burial containers are breached. This whole area, however, has been mainly residential through the years. A number of filling stations were along Brighton in the 1950s, and probably some are still at the same locations.

Pollution Sources

19th century: Pewter and Britannia metal works (*lead, tin, copper, zinc, antimony*). Tannery (*possible chromium and arsenic if "mineral process" used*). Brickyards (*sediments from clay mining, leachates if used as dumps*). 19th and 20th centuries: Cemeteries (*arsenic*). 20th century: Filling stations and repair facilities on Brighton (*lead, PAHs*). Non-point sources in the extensive suburbs since the turn of the century.

1.3 Railroad Triangle Area:

Area

The triangular area beginning at the abutments of the old Vaughan Bridge going northwest along the Fore River and the Portland Terminal tracks to Thompsons Point, then inland on Congress Street through Libbytown close to the former Union Station site (the apex), and back along the railroad tracks to the end of the former bridge. Includes the Portland end of the modern Veterans Memorial Bridge and the I-295 Bridge, but not the cloverleafs on Congress because they are mainly in 1.5, the Back Cove/West Side/Deering Area.

Historical Summary

Within the triangle major repair and connecting points for the railroads that served the city were located. This has been the important node for the transportation system from the later 19th century right to today, even though the repair facilities are gone. Many historic pollution sources were and are in this area. There were the railroad roundhouses and yards with machine shops at

each end of the base of the area on the Fore River, the Maine Central facility at Thompsons Point and the Boston and Maine facility by the Vaughan Bridge. Two slaughter houses and a soap factory were in this area, as well as a brickyard.

In this century there are the contributions from the facilities for the automobile age: the filling stations and repair garages on St. John and Danforth, and the petroleum storage and distribution facilities on Danforth, and other sources, such as the old trolley barn, which became the bus garage. One sewer line must carry some of this automobile-related pollution into the Fore River by the Veterans Memorial Bridge.

Pollution Sources

19th century and 20th centuries: Railroad car and locomotive repair facilities including two round houses and machine shops; also trolley barn on St. John, now bus garage (*heavy metals,, including lead, copper, tin; PAHs*). 20th century: filling stations and auto repair facilities (*heavy metals, PAHs*). Landfill of unknown contents to expand Thompsons Point and for the base of I 295. Sewer outfall by foot of Veterans Memorial Bridge (Bridge not there in 1914); now a CSO for southern part of St. John and Danforth. Thompsons Point outfalls.

Back Cove Watersheds Historic Development Areas (1.4-1.7. See Map 6)

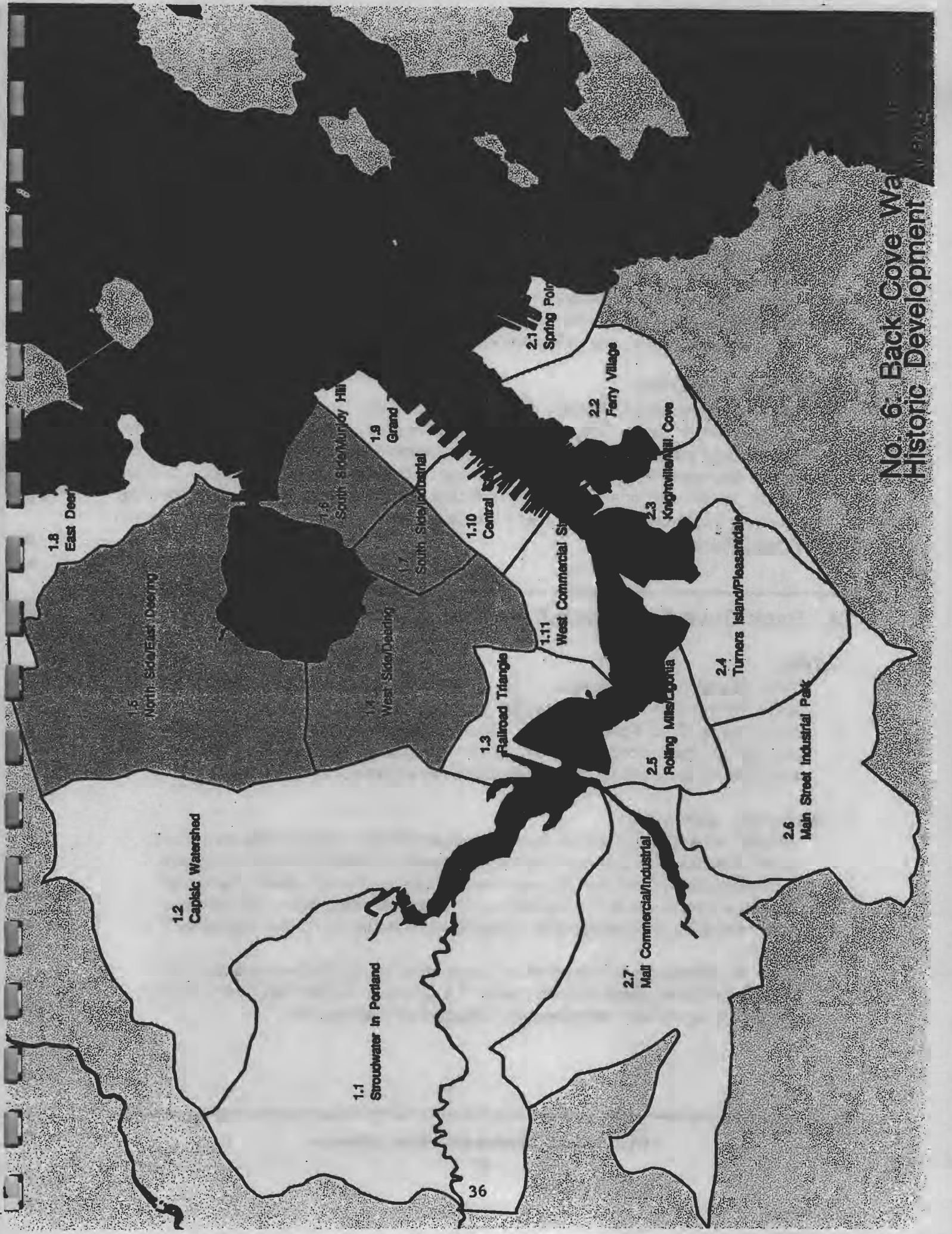
1.4 Back Cove-West Side/Deering Area:

Area

This is a sizeable area including surprising parts. The center is Deering Park and its watershed. The park was built around a tidal pond (northern branch filled in, and southern branch now in part forming the fresh water pond in the park). The watershed divides in the west near the intersection of Congress and Portland and was created by a creek (now underground in a sewer) that flowed down to the northern branch of the tidal pond. It even includes the Douglass Street school grounds, once a dump, and earlier a wetland and brickyard. To the south the area extends up the hill to Congress. To the north it goes out Forest Avenue to Woodfords Corner, and all along the avenue over to the cove waterfront.

Historical Summary

Until 1899 this area included parts of two cities, Portland and Deering. The old boundary of the municipalities was close to the tidal inlet. Portland annexed its neighbor at the end of the century, only four years after South Portland separated itself from Cape Elizabeth. Urban development had caused separation and integration.



No. 6: Back Cove Watershed
Historic Development

This area had at least four tanneries in the later 19th century. The one across from where the Post Office is located lasted into this century. The upper watershed close to where the intersection of Congress and St. John is today had a varnish and paint factory; the lower watershed, a foundry in what is now the northeast corner of Deering Park. A stoneware factory was located where the Shop and Save plaza is today.

By the 1930s these were all gone. Along Forest Avenue from where the I-295 Interchange is now for several blocks toward Woodfords Corner were filling stations, repair garages and auto and truck dealers. Some of the dealerships are now occupied by furniture stores, and the erstwhile occupants have moved to the "new auto city" around and in the Mall. One dump was located on Douglass Street, another may have been located close to the Back Cove by Woodfords Corner.

Pollution Sources

19th and 20th centuries: Foundry (*heavy metals*). Several tanneries (*arsenic, chromium if "mineral process" used*). Stoneware plant on the Cove (*lead and other heavy metals in glazes*). 20th century: Filling stations on Forest Avenue, Cumberland Street; auto and truck repair and service garages on Forest, Bedford. Bus garage on Cumberland with gasoline tanks. (*Lead, PAHs*). Sewer outfall for Almshouse and North Side sewers at old tidal outlet (in 1914 City atlas); now flows into the Marginal Way West Interceptor. Closest CSO is Preble Street. Dump on Douglass (*various*).

1.5 Back Cove-North Side/East Deering Area:

Area

This is the largest Historic Development Area in Portland. It is defined by Fall Brook and the other smaller feeders to Back Cove as well as the topography readable on the U. S. Geodetic Survey map for Portland East. It goes from Forest Avenue at Woodfords Corner along the shore to I-295 and Tukeys Bridge, and back inland to the watershed of Fall Brook. It includes Lunts Corner and North Deering. At one end are portions of Morrills Corner, and at the other, of East Deering.

Historical Summary

From 1871 when Deering separated from Westbrook to 1899 when the former was incorporated into Portland, this was a fairly rural area. Morrills Corner, Lunts Corner and East Deering were crossroad villages. In the earlier 19th century Stevens Plains, as Morrills Corner was then known, was famous locally for its makers of pewter and Britannia metal wares. Whether the workshops were in this HDA or in the extreme tip of 1.2, the Capisic Watershed, has not been established.

By the later 19th century Morrills Corner had two tanneries, one combined with a leather book bindery. The Corner attracted industry after W. W. II. American Can had a factory on what was appropriately named Canco; not far away was a billiard ball and poker chip factory.

Over at the other end of the area, in East Deering, in 1909 there was a galvanizing and plating workshop. By the 1930s it was gone. The Washington Avenue dump must have been active in this time, where the city filled in a large tidal inlet off Back Cove with trash. Now houses and part of the parkway are on top of it. This area had one of Portland's "gasoline gates." Before and after W. W. II there were a number of filling stations on Veranda and Washington, just before Tukeys Bridge. Many of these have closed now that I-295 goes over this portion of the HDA.

Pollution Sources

19th century: Pewter and Britannia metal workshops at Morrills Corner (then Stevens Plains) (*lead, tin, copper, antimony*). 20th: Filling stations and repair facilities on Veranda and Washington in East Deering, on Forest at Morrills Corner (*lead, PAHs*). Railroad yard near Morrills Corner (*PAHs*). Plating works (*zinc, zinc oxide, copper, cadmium and chromium*). Washington Street dump (*various*). Possible 19th century: Brickyard.

1.6 Back Cove-South Side/Munjoy Hill Area:

Area

From the foot of Congress on the Eastern Prom around to the foot of Franklin. Includes I-295 and Marginal Way built on fill.

Historical Summary

An area settled early, but few polluting industries were located on here. In the 1870s at least there was a tannery on the cove. However, the East End Dump and the practice of extending the land into the cove by dumping trash and debris here certainly have left a dubious long term legacy.

Pollution Sources

One tannery in later 19th century (*arsenic and chromium if "mineral process"*). 19th and 20th century: East End Dump (*various*). The outfall below the Prom (in 1914) and the one close to Marginal Way concentrated pollutants from feeder sewers, but with the minimal industry, these were probably not significant. Although the dry cleaners may have left legacies (*solvents*).

1.7 Back Cove-South Side/Industrial Area:

Area

From the foot of Franklin along west to where Forest Avenue meets the cove at the former inlet of the one-time tidal pond where Deering Park is now. From Congress Street on down to the cove. Includes Marginal Way and I-295 built on fill.

Historical Summary

Much filling with trash and other debris happened here to extend the shore from Oxford four blocks, beyond Lincoln, then Kennebec, to Marginal Way and most recently to I-295, all traceable by examining successive maps from the 1837 Portland map, to the 1871 atlas and on to the Sanborns. The Portland and Rochester Railroad had a yard and engine house here in the later 19th century. By 1909 there were no repair facilities, only the yard.

Industrial activities here from the later 19th century on generated substantial residual pollution. One of the longest continuous sources was the Portland Stove Company foundry. The costs of pollution abatement may have been one of the causes of the firm's demise in the early 1980s. In the later 19th century there were other smaller machine shops and metal working facilities, including a plow factory for a time, in this area, as well. These had disappeared by 1909, but were replaced by radiator works with a machine shop. In the 1960s there was a junk yard and the New England Metal Culvert Co. here.

This area included one of the city's major "gasoline gates." The development of Marginal Way early in this century and the use of Preble as a principal street into the heart of the city led to this. By the 1930s a number of filling and service stations were open on Preble, many of which were still in operation in the early 1960s. Only one sewer outfall was located in this area, at the end of Pearl. Perhaps straight pipes were common for those that needed water disposal.

Pollution Sources

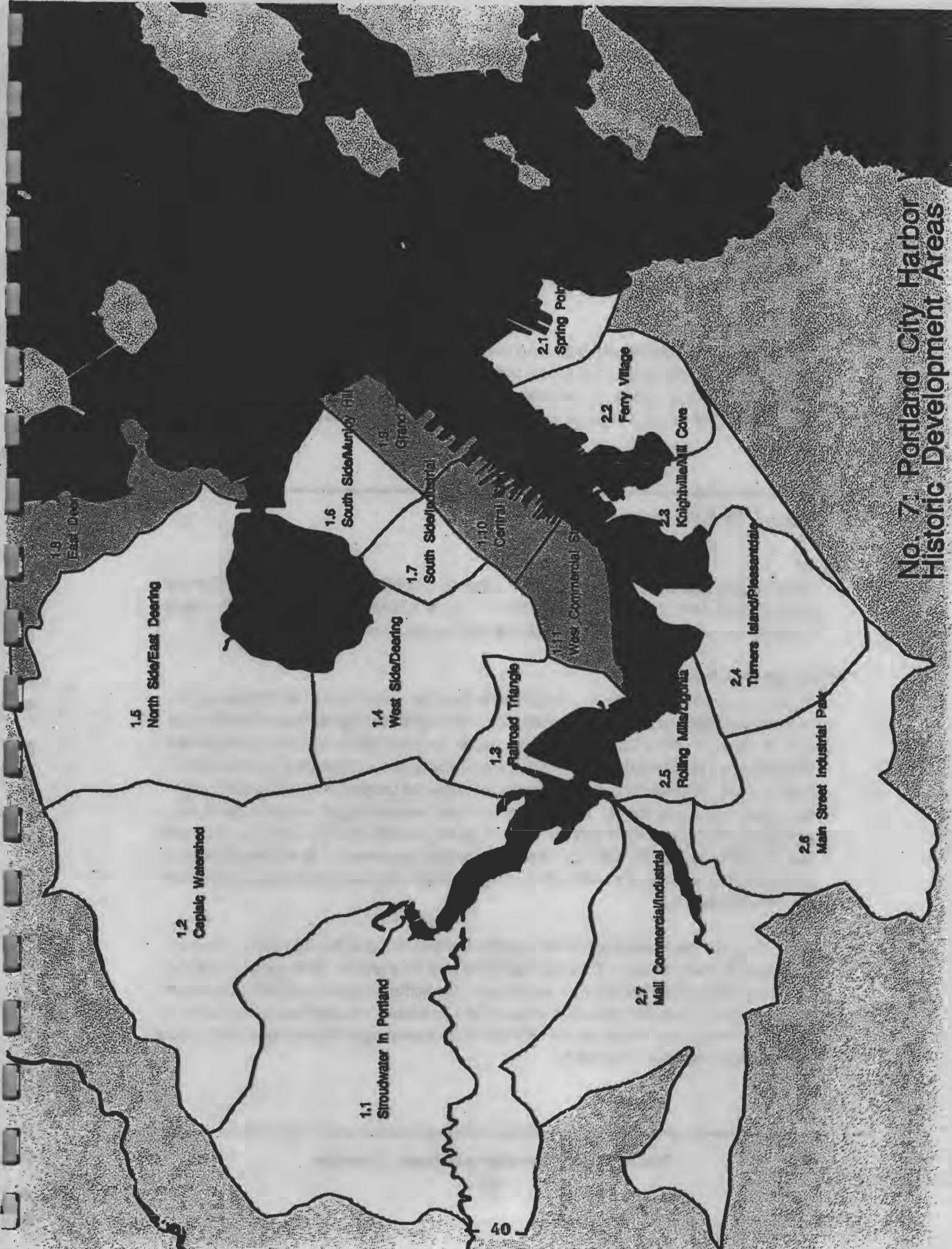
19th and 20th centuries: Portland Stove works (*limited heavy metals given what was produced, cleaning acids, toxics from sand molding*). Railroad repair facilities (*heavy metals, PAHs*). Machine shops (*heavy metals and?*). 20th century: Junk dealers (*heavy metals, PAHs, solvents*). Filling stations and repair facilities on Preble, Oxford, and Forest streets (*lead, PAHs*). Sewer outfall may have concentrated some wastes, but more straight pipes likely.

Portland City Harbor Watersheds Historic Development Areas (1.8-1.11. See Map 7)

1.8 East Deering/Bay Shore Area:

Area

From Tukeys Bridge and the Burnham & Morrill plant along the shore to the Falmouth town line. It includes the site of an iron foundry east of Martin's Point that was active for a time in the 19th century. It goes back inland beyond Presumpscot Street to the watershed, and includes the site of the former Presumpscot yards.



No. 7: Portland City Harbor
Historic Development Areas

Historical Summary

A rural area through much of the 19th century, nevertheless it had three shipyards and an iron foundry that might have left their residues. Industrial and residential development began to be substantial in the early 20th. The railroad yard, stockyards and slaughtering plants contributed to pollution in their time, and the railroad facilities probably left residual pollution. The petroleum storage and distribution facilities on the shore close to the Burnham and Morrill plant probably contributed to pollution, as well. The Ocean Avenue dump close to the Falmouth town line has been a continuing problem.

Pollution Sources

19th century: Iron foundry (*limited heavy metals*). 19th and 20th centuries: Shipyards to 1920s only (*lead, copper*). Railroad yard with round house (*heavy metals, PAHs*). Slaughter houses and rendering plant (*biological wastes*). 20th only: Oil storage and distribution facilities. (*lead, PAHs*). Food processing plant with outside fuel tanks. (*biological wastes, PAHs*). Dump (*various*).

1.9 Grand Trunk Area:

Area

This area goes from the foot of Franklin on the harbor up to Congress, eastward up Congress and down the bluffs of the Eastern Promenade to the mouth of the Back Cove. From there, the site of a 19th century smelter and a shipyard, it goes around the harbor waterfront to Franklin.

Historical Summary

This is one of the three oldest Industrial Historic Development Areas in the Portland region. Pollution-producing activities can be traced back to the 1840s when the railroad to Montreal was opened and the Portland Company, makers of locomotives and heavy machinery, was founded. The company's foundry had several forges, a machine shop and, until this century, a railroad car painting shop. Another major foundry was located here, the Laughlin works, in operation from the 1890s to the mid-1980s. When it closed it had several forges, machine shops and a galvanizing works. The smelter at the foot of Congress must have left its legacy; so did small machine shops and a shipyard in the area during the later 19th century. On Munjoy Hill close to where a school is now was a white lead paint factory which may have produced lead, as well as used it in paint making.

Today Bath Iron Works two drydocks with the ship outfitting and repair facilities occupy some of the waterfront where the Grand Trunk Railroad had its grain loading piers. BW's parking lots fill the old yards and cover the site of the roundhouse. The Portland Company's buildings are used in part for boat repair and storage, and now (1993) in part for the new Maine Narrow Gauge Railroad and Museum. The wonderful 1903 Grand Trunk passenger station at the corner of India and Fore has been gone since 1966.

Pollution Sources

19th century: Smelting furnace at mouth of Back Cove (*zinc, tin, copper, lead*). Shipyard (*lead, copper*). 19th and 20th centuries: Cemetery (*arsenic*). Railroad yard with shops (*heavy metals from machining and metal forming, PAHs, lead from paints*). Metal working facilities, small and large, on the harbor waterfront: a major foundry with machine shops that produced locomotives, stationary steam and marine engines, jet engine parts, cannon and shells, etc.; a second major foundry one block west on Fore where tools, marine hardware, etc. were made. (*Wide range of heavy metals from casting, shaping and machining iron, steel alloys, bronze and, after W. W. II more exotic alloys, toxics from sand molding, solvents, PAHs, lead and cadmium from painting*). Paint manufacturing (*red and white lead, zinc, cadmium, solvents*).

20th century only: Printer (*lead, arsenic, mercury, cyanide, solvents*). Two sewer outfalls, one at the foot of India Street, the other at Franklin. The former is now a CSO (*various*). The foundries must have used straight pipes to get rid of wastes for most of their existence, although the Laughlin works had Pretreatment Permit in the early 1980s.

1.10 Central Commercial Street Area:

Area

A densely developed area from the foot of Franklin along the waterfront on west to State Street, up the hill to Congress on the north, then along Congress to Franklin and from there down to the harbor.

Historical Summary

The Central Commercial Area was significant during the 19th century, and continues to be of major importance today. Most of the industrial activity has been on a small scale compared to that in the previous area and to the next one, the West Commercial Railroad Area (1.11). But the small scale may be deceptive, and the cumulative impact of the numerous machine shops and small smelters and foundries, six printing establishments, canneries, four junk dealers and other businesses over time may have been considerable. The vanished filling stations of the 1930s may have left their legacy of forgotten tanks, as well as the military facilities on the wharves in the 1940s. A significant portion of this area was cleared in the "urban renewal" program of the 1960s. Where the machine shops and foundries were on Union is now the Canal Plaza complex. To the west are parking lots where stolid vernacular commercial and industrial buildings once stood.

Pollution Sources

19th and 20th centuries: One paint factory (*lead, cadmium, solvents*). Canneries (*lead, biological wastes*). Many machine shops and small foundries, several with galvanizing operations (*heavy metals such as copper, lead, zinc, tin; and in this century also chromium, lead, nickel; PAHs; toxics from sand molding; solvents; arsenic; PAHs; zinc, zinc oxide, copper, arsenic, cyanide and cleaning acids in the galvanizing operations*). Ferry and steamship landing wharves (*mercury from coal ashes, PAHs from fuel storage and use in this century*). 20th century: Filling stations (*lead, PAHs*). Junk yards (*heavy metals, PAHs, solvents*). Print shops (*lead, mercury, arsenic, solvents*). Sewers concentrated pollutants from industrial activities and deposited them at six outfalls, five of which are still CSO outfalls.

1.11 West Commercial Street Area:

Area

This area goes along the waterfront below Danforth eastward from the end of the former Vaughan Bridge to State Street, and up the hill to Congress. Close to the east end was the Old Portland-South Portland Bridge. Now its replacement there, the "Million Dollar Bridge," will be replaced. At the western end is the abutment of the Vaughan Bridge obscured by various industrial facilities.

Historical Summary

This is one of the three oldest major industrial Historic Development Areas in the Portland region, along with Rolling Mill/Ligonia and the Grand Trunk Area (eastern Commercial Street). Several highway and railroad bridges were built to connect it with South Portland and the world beyond in the 19th century. Their replacements still do. Railroad yards and repair shops, a gas works and other industries and commercial activities over time have made it a significant source area for pollution of the harbor and Casco Bay.

Pollution Sources

19th century only: Match factory (*phosphorus*). Sugar refinery (*biological wastes*). 19th and 20th centuries: Railroad yards, one with a roundhouse (*PAHs, heavy metals*). Gas works (*PAHs from coal tars, hydrogen sulfide and other sulfur compounds, ammonia*). Hat factory (*mercury, other heavy metals from dyes*). Petroleum storage and distribution facility (*PAHs*). 20th century: Filling station (*lead, PAHs*). Four sewer outlets, at Clark, Emory, Vaughan and below the junction of the Western Prom and Danforth. The first and second ones were the sources of most of the concentrated wastes because of the proximity to the industrial sites. Most likely the gas works emptied its waste waters directly into the harbor.

2. South Portland Watersheds Historic Development Areas (2.1-2.7)

2.1 Spring Point Area:

Area

The waterfront from the Technical College, through the Spring Point marina and condominiums along by the former Naval Reserve Base to Bug Light, and around to Front and Preble Streets. Inland to Preble Street which is basically the western border.

Historical Summary

Much of this area is on filled-in mudflats, with Preble as the historic waterfront. Most of the filling took place early in the Second World War when shipbuilding facilities and the naval base were constructed. The Vocational Institute and the Spring Point Museum on the site of Fort Preble are on high ground, and there is a long history of use of this portion of the area for military purposes. Since the 1940s the filled-in land has seen much industrial activity, most importantly, metal working and machining, although it died down by the 1970s. Petroleum storage has been an important function since 1940s, as well. New visions for the old yards came in the 1980s. The East Yard became the site of a condominium and marina; the West Yard site was revived for continued industrial and commercial usage.

Pollution Sources

19th and 20th century: Military bases (*various*). 20th century: Landfill (*mud from flats, city wastes?*) Shipyards from 1940 (*copper, lead, and TBT from bottom paints 1959-82, PAHs, and the pollutants associated with machining and metal working*). Long distance pipelines, tank farms and off-loading facilities (*PAHs, lead*). Metal working facilities including machine shops and foundries (*from machining and metal working, copper, zinc, tin, lead, aluminum, cadmium, chromium, manganese, molybdenum, nickel; solvents; PAHs; arsenic*). Truck repair facilities (*PAHs*). Sardine canneries (*lead, biological wastes*). No sewer outfalls in 1914; today sewers flow to the Ferry Village area where there is a CSO outfall.

2.2 Ferry Village Area:

Area

This area goes along the waterfront close to Front Street westward from where it meets Preble, then close to High Street around to the east side of Mill Cove. From there it runs back along Broadway to where the latter meets Preble. South of Broadway the watershed is residential.

Historical Summary

This area has an historical identity going back at least to the 1870s because of the ferry connections to Portland across the harbor. Along the waterfront this area encompasses a metal working facility evident in the early 1870s, the Coast Guard station, a shipyard with a marine railway that traces its origins back to the 1850s, a marine construction firm, the sites of the terminals of two ferries to Portland and a former sardine factory. Pine and Sawyer tie it to Broadway and go on to Cottage where the original Ferry Village was located on the 1871 Cumberland County map. Some of these facilities have been at the same locations for at least 140 years.

Pollution Sources

19th and 20th centuries: Long established shipyard with marine railway (*lead and copper from bottom paints, TBT from 1959 on, PAHs*). Long time metal working facilities (*zinc, zinc oxide, copper, tin, lead, aluminum, cadmium, chromium, cobalt, manganese, molybdenum, nickel; solvents, arsenic, PAHs, toxics from sand casting*). 20th century: Military base with machine shops (*see metal working*). Sardine cannery (*lead, biological wastes*). Marina (*toxics from bottom paints, PAHs*).

2.3 Knightville/Mill Cove Area:

Area

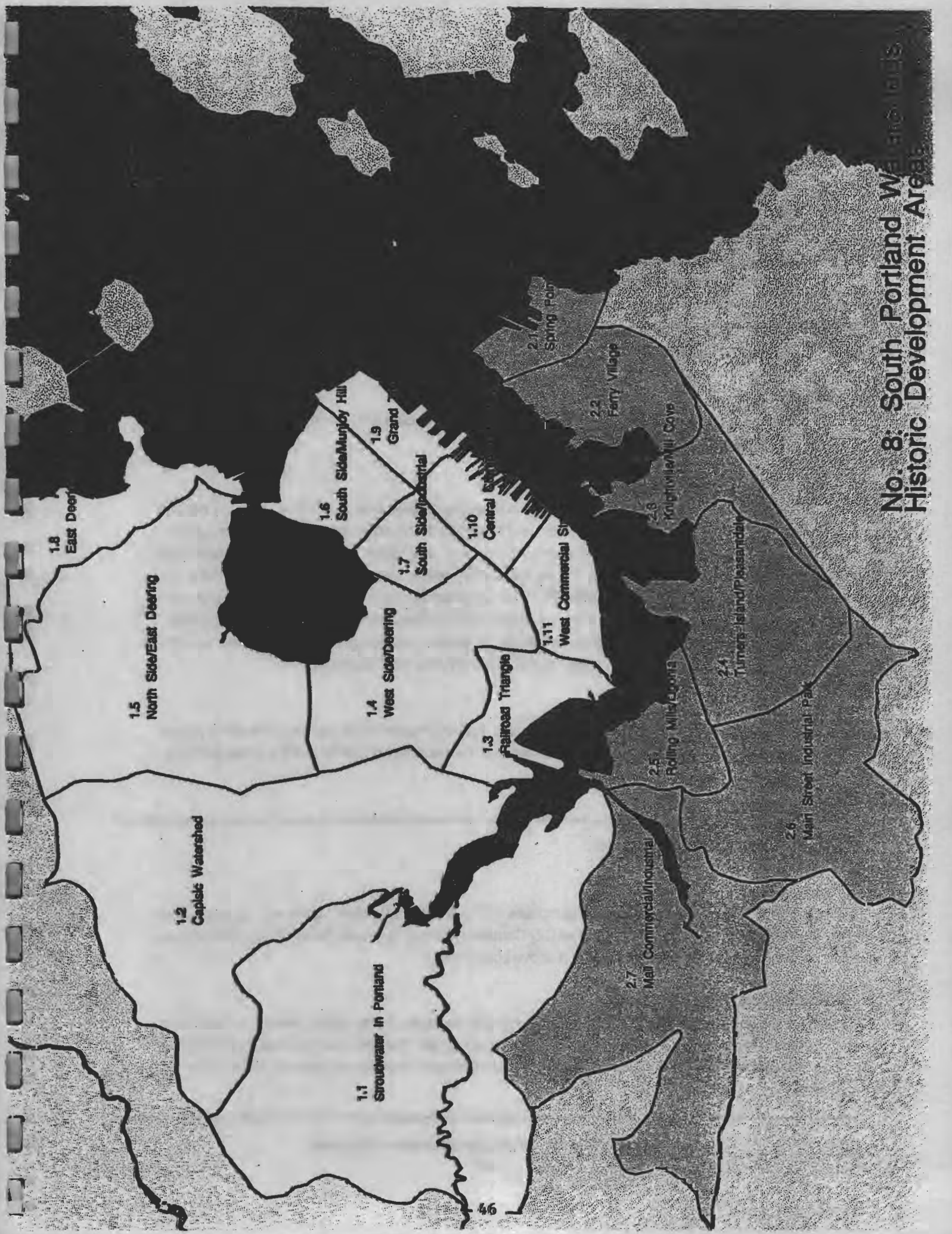
Basically this is the point of land defined by the west side of Mill Cove from where it meets Broadway around to the Old Portland Bridge (now "Million Dollar Bridge"), then on by the new sewage processing plant along the cove shore to Broadway and Anthoine streets. It includes the lower watersheds of Kimball and Trout brooks.

Historical Summary

Knightville was one of the first areas settled in South Portland/Cape Elizabeth. Over time this little peninsula was built up by landfilling on both the Mill Cove side and the other cove to the west where Waterman Drive and the city sewage treatment plant are today. Two "nice" areas were dumps earlier in this century: Mill Creek Park and the school grounds at Cottage and Ocean. In the 1870s there were still a brewery in the upper watershed, close to a brickyard, and at the mouth of the tidal creek that used to flow in and out where Mill Creek Park is today were two tidal mills.

A major drydock facility was here from the Civil War period onward. The Portland and Cape Elizabeth railroad had its direct current generating plant close to the bridge in buildings that are still present. In this century it became part of the Portland Street railway, and eventually was taken over by Central Maine Power for AC power generation. By the 1950s a rug factory was located where the Shop and Save parking lot is today.

Along Ocean Avenue before the Million Dollar Bridge was one of Portland's "gasoline gates." Today the filling stations and automobile-related facilities are largely on Waterman Drive and



No. 8: South Portland Watersheds
Historic Development Areas

Broadway. At least one dry cleaner was in the area in the 1950s. Only one sewer outfall shows up in 1914, at the end of E Street. It is now a CSO outfall.

Pollution Sources

19th century: Dry dock(*lead, copper*); brewery (*biological wastes*). 20th century: Possible leaking tanks from abandoned gasoline stations on Ocean, College and Broadway (*PAHs*). Dry cleaning plant (*solvents*). Electricity generating plant (*PCBs*). There must have been a number of straight pipes for sewage in this area, given the single outfall.

2.4 Turners Island/Pleasantdale Area:

Area

Turners Island, and the lower watersheds of the Antholne and Barberry creeks. Includes Broadway from Antholne to Lincoln streets.

Historical Summary

A great deal of landfilling has gone on in this area; to the extent that the "Island" is now a peninsula. Even the cemetery was smaller in the late 19th century, for it too expanded between 1914 and what the USGS topographic maps show. The island was originally developed as a railroad yard and repair facility in the mid-19th century, with a railroad bridge leading over to what is designated in this report as Portland's West Commercial Street Area (1.11). In this century, the area became important for petroleum storage and distribution, with provision for off-loading tankers and extensive tank farms close to the water or up the creeks. In 1914 there were six sewer outfalls, most of them on the "island;" today only two are CSO outfalls.

Pollution Sources

19th and 20th centuries: Cemetery (*arsenic*). Railroad roundhouse and repair facilities (*heavy metals, mercury from coal ashes*). 20th century: Fuel tank farms and off-loading facilities (*PAHs, lead*).

2.5 Rolling Mill/Ligonla:

Area

The Nonesuch Creek watershed comprises this area. The rough boundaries are the shore from Veterans Memorial Bridge to Forest City Cemetery, then up to Lincoln Street, along Broadway to Cash Corner, and back to the Bridge above Long Creek.

Historical Summary

A substantial amount of landfilling has occurred in this area. In the 1870s Nonesuch Creek was tidal a long ways back. Over time sections were dammed. The first pond must have been filled in by early in this century, perhaps in part with sludges and other wastes from the rolling mill and

refinery close by. It was also regarded as a "dump" by others who remembered it so functioning. The two "fresh" water ponds shown on Sanborn maps of this century still exist, now framed by petroleum tanks and pipes. On the south of the area is one cemetery which forms a watershed with the Turners Island area; on the north, is another cemetery on both sides of the upper pond.

This area has long been a contributor to the pollution of the Fore River and Portland Harbor. The iron rolling and fabrication facility, a factory that produced hydrochloric acid and sulfuric acid, and a kerosene refining works were started here after the Civil War. The acid plant was on one of the ponds, and it shared access with a varnish and paint factory across the street. The rolling mill continued in operation until very recently, working with various alloy steels in this century. Petroleum tanks began encroaching upon its company town, Ligonla, as early as 1922. The site of the kerosene works has been continuously occupied by petroleum storage and distribution facilities right to today. The former company town has become the site of the Casco Bay region's largest tank farms. On Main Street just before the long-gone Vaughan Bridge was one of Portland's smaller "gasoline gates." The stations here were affiliated with the companies that had the tank farms, not surprisingly; today none of these retail outlets are left. No sewer outfalls were located in this area in 1914. Today there is a CSO outfall right by the old Vaughan Bridge site. The other goes directly into the upper "fresh" water pond by the cemetery.

Pollution Sources

19th and 20th centuries: Rolling mills (*pickling acids, solvents, and in this century heavy metals used in alloy steels possibly including cobalt, chromium, lead, manganese, molybdenum, nickel, tin and zinc*). Kerosene and related refinery products to 1890s; then many gasoline and fuel oil distribution facilities, with ship and tank car off-loading plants and tank farms (*PAHs*). Varnish and paint factory (*lead, possibly mercury, cadmium, solvents*). Industrial chemical factory producing sulfuric and hydrochloric acids (*lead, sulfuric and hydrochloric acid*). Cemeteries (*arsenic*). Dump (*industrial wastes and various*). 20th century: Filling stations (*PAHs*).

2.6 Main Street Industrial Park Area:

Area

This area is composed of the upper Barberry Creek watershed from wetlands from which water flows down to the Fore River and in the other direction down to the Spurwink. Along Main Street westward from Cash Corner and includes the Rigby Yard, and several industrial parks along or in the wetlands.

Historical Summary

South of Cash Corner where Main and Broadway meet is the Rigby railroad yard and three industrial parks set up and financed in part by the city in the 1960s. The first was the Rumery Industrial Park off Cash and Rumery to the northeast of the Rigby Yard. By 1971 there were trucking companies and truck repair facilities, a body shop, and a producer of machine tools to salvage lead and copper from scrap. The Rigby Industrial Park had a major truck maintenance

facility. To the southwest in the Wallace Avenue Section in 1965, Bancroft and Martin opened their structural steel fabrication works. Here were until recently their new facilities for rolling, forging and shaping structural steel as well as for painting it. On the upland to the south in the watershed of the wetland the city used its property for a trench landfill in the 1960s. Now close is by a landfill that is soon to be closed. A cemetery is on the same hillside.

The facilities in the first two Industrial parks appear to have been built on the edge of a major wetlands, and in some cases, judging from the 1970 photo updating of the topographic map, possibly in them. From the wetlands right flow the beginnings of Barberry Creek which goes down to Turners Island through Pleasantdale. See area (2.4). To the southwest flow the beginnings of Spurwink River down through Cape Elizabeth to Higgins Beach.

Pollution Sources

20th century: Filling stations, truck and auto repair facilities (*PAHs*). Machine shops and metal working facilities (*chromium, cobalt, lead, manganese, molybdenum, nickel, tin, zinc; solvents; arsenic; PAHs*). Roundhouse and railroad repair facilities (*mercury from coal ashes, PAHs, limited heavy metals*). Cemetery (*arsenic*).

2.7 Mall Industrial/Commercial Area:

Area

The largest and newest Historic Development Area in South Portland, it is composed of the watershed of the creeks leading into Long Creek by the Jetport, and then into the Fore River. The Maine Mall along Western Avenue gives it identity. The area includes the commercial and industrial facilities along Congress.

Historical Summary

In the late 50s as part of its economic strategy the South Portland city council encouraged development along Western Avenue which led to the Municipal Airport, and laid water and sewer mains. In the late sixties, the first section of the Maine Mall was built bringing in New England and national chains, huge parking areas, and further development of this once-rural part of South Portland. The Mall was expanded in 1983. Today the area is virtually another city, with its expanded road network, its office buildings, hotels, mini-shopping centers, warehouses, service stations, auto dealerships and car washes.

Pollution Sources

20th century: Filling stations, car dealerships and repair facilities, car washes (*PAHs*). Electronic parts manufacturing facilities (*heavy metals, solvents*).

3. Westbrook (3.1)

3.1 Stroudwater River Watershed In Westbrook:

Area

This area goes south of the high elevation in the village of Westbrook (formerly Saccarappa) across the Cumberland & Oxford Canal to where the Stroudwater River flows over the Portland line. This area does not include the Presumpscot River which constitutes its own complex watershed and is not within the scope of this research project. The latter should be studied comprehensively in the future.

Historical Summary

Mainly a rural area with little contribution likely to the historical pollution of the Fore River, except that which might have been transported by the C & O canal. Industrial activity took place on the Presumpscot River in the urban area. On one of the Stroudwater tributaries between the village of Westbrook and Stroudwater settlement was a slaughter house on the 1871 County map.

Pollution Sources

19th century: Slaughterhouse (*biological wastes*). 20th century: Non-point sources.

4. Gorham (4.1-4.2)

4.1 Stroudwater River Watershed In Gorham:

Area

This area includes Parker's Corner on a small tributary, and part of the village of Gorham next to the Portland and Rochester railroad tracks from Maple to Portland Streets.

Historical Summary

From Maple to Portland Streets along the railroad tracks in Gorham village there seems to have been no industrial activity. Parker's Corner was, like Stroudwater, a typical place of early rural industry with no long term environmental impacts.

Pollution Sources?

Mills on dam at Parker's Corner probably left no pollution. Close analysis of the USGS topographic map and Sanborn maps shows that the industrial activity in Gorham village contributed to the Presumpscot watersheds, not to the Stroudwater.

B. Westbank

3.7. St. Lawrence River Watershed in Westbank

The St. Lawrence River watershed in Westbank is a large area of land that is located in the northwestern part of the province. It is a very important area for the province as it is the source of the St. Lawrence River, which is one of the largest rivers in the world. The watershed is also home to many different types of plants and animals, and it is a very important part of the province's natural heritage.

The St. Lawrence River watershed in Westbank is a very important area for the province as it is the source of the St. Lawrence River, which is one of the largest rivers in the world. The watershed is also home to many different types of plants and animals, and it is a very important part of the province's natural heritage.

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4. Gormin

4.1. St. Lawrence River Watershed in Gormin

The St. Lawrence River watershed in Gormin is a very important area for the province as it is the source of the St. Lawrence River, which is one of the largest rivers in the world. The watershed is also home to many different types of plants and animals, and it is a very important part of the province's natural heritage.

The St. Lawrence River watershed in Gormin is a very important area for the province as it is the source of the St. Lawrence River, which is one of the largest rivers in the world. The watershed is also home to many different types of plants and animals, and it is a very important part of the province's natural heritage.

The St. Lawrence River watershed in Gormin is a very important area for the province as it is the source of the St. Lawrence River, which is one of the largest rivers in the world. The watershed is also home to many different types of plants and animals, and it is a very important part of the province's natural heritage.

Back Cove Watersheds:

1.4 Back Cove - West Side/Deering (See Map 12)

1840-1899

Background Information

General:

This is a sizeable area encompassing the watershed of the west side of the Back Cove, including what is now Deering Park and going up to the meeting of Congress and Park Street in Libbytown or Libbys Corner. It also extends out to Woodfords and up the hill to Congress which in this period were not very much developed areas. Several tanneries were in this watershed, as well as a foundry and, at its upper extent, a varnish and paint factory. The mouth of the tidal pond leading into Back Cove by Forest Avenue and Green Street offered opportunities for water-powered industry. The 1876 Birds Eye shows an unnamed tidal powered mill with what appears to be a smoke stack on the bridge over the outlet on Green Street/Forest Avenue. The 1886 Sanborn shows no industry at this site.

Watersheds:

In the previous area (1.3), the probable watershed dividing line was discussed. Here it is necessary to describe in more detail this side of the divide:

Upper watershed

Using the 1876 Bird's Eye, the watershed features can be described. The Back Cove stream started near Libbys Corner. The pond to the south of Maine (now Congress) was gone. There was no sign of the feeder from it to the stream that still passed through the marshy area between Maine and Portland (now Park), then went down to the cove. It passed in back of where the Portland Armory is now and went down to the head of the north branch of the tidal mill pond on Grove Street (Deering Avenue).

Lower watershed

A wooded parcel bounded on two sides by Portland and Grove Streets contained the Y-shaped tidal pond. On or close to this pond there were several industrial establishments described below. The Portland and Rochester Railroad crossed the pond on a trestle and proceeded north. In 1876 there was still no connection around the pond to the Maine Central tracks. By 1886 Deering Park had been mostly developed. The north branch of the tidal pond was filled in, and the south branch was cut off from the cove for the Deering Park pond. However, in the southeast corner across from where the Post Office is now, there were several industrial establishments. At some point after this, the Alms House Sewer was built and the old Back Cove stream ran in it. Note that the 1894 State atlas (pl. 48)

shows the situation before 1886 without indicating this earlier date: the north branch was still a tidal pond; the south branch was the park pond.

1840-1899

Pollution Sources Keyed to GIS

Brickyards:

W. Parker's, R. Tibbet's

[1.4-BY-1-12]

The 1871 atlas (pl. 44) shows this brickyard at the end of Douglass. This would put it on the northeast side of the marshy area shown on the 1868 plane table sheet in the Portland Department of Public Works archive. The latter shows an unidentified brickyard at the same location. The 1894 State atlas shows "R. Tibbets brickyard" at this location. The location continued to be used into this century.

Other brickyards

[1.4-BY-2-12, 1.4-BY-3-1]

The 1894 State atlas (pl. 48) shows two unnamed brickyards off Portland near Libbys Corner. One continued on into this century. Did it become a dump?

Electricity generation and urban transport:

Portland Railroad Co.

[1.4-EG, UT-1-12]

One of the trolley company's electric power stations is shown next to the stoneware factory in 1896 (pl. 34) at 5 Forest Avenue

Metal working:

Raidy and Kelly Foundry

[1.4-MW-1-1]

This foundry was located in the lower watershed in 1871 on Green Street east of the Ricker tannery. The buildings were indicated on the 1876 Birds Eye, but the firm was not identified. There was no foundry at the site in the 1896 Sanborn.

Stoneware and pottery:

Portland Stoneware Co.

[1.4-SP-1-12]

The 1876 Birds Eye shows the works (no. 89) on the west side of the cove with its own pier. The facilities were shown in 1886 (pl. 34) and 1896 (pl. 34) in much expanded form, with some of the Back Cove mudflats filled in to create land. Photo of lithograph in Sullivan's Photocraft collection.

Tannerles in the lower watershed:

Portland Leather, Hayes and Britton; Gray's

[1.4-T-1-1]

The Hayes and Britton Morocco Factory was no. 77 on the 1876 Birds Eye. Located on the Back Cove stream where it went under Grove (now Deering) at the head of the northern branch of the tidal pond. In 1871 this had been the Portland Leather Co. (pl. F). In the 1894 State atlas, it was identified as Gray's Tannery (pl. 48).

H. & C. Fling Tannery

[1.4-T-2-1]

On the other side of the stream on the 1871 county map. The 1876 Birds Eye map showed the buildings, but did not identify them.

J. S. Ricker & Co.; Casco Tanning Co.

[1.4-T-3-12]

On Green Street, across from the current post office where Deering Park is now was the J. S. Ricker & Co. in 1871 (pl. F). The 1896 Sanborn gives the details of the site (pl. 35) when the Casco Tanning Co. was located there (no. 76).

Tannerles in the upper watershed:

J. Dow & Sons Tannery

[1.4-T-4-1]

Southwest of the intersection of the railroad tracks with Maine [Congress] in 1886 was the tannery in the same two- smokestack factory shown on the Bird's Eye of ten years before. This was likely right next to the pond that had been present on the 1871 atlas. Since tannerles require a good water supply, the pond may still have been there fifteen years later.

Sheep Skin Tannery of Hart & Co.

[1.4-T-5-1]

Northeast of the intersection of Portland and Maine Streets in Libbytown was this tannery on the 1871 atlas (pl. E). It could have been the unidentified one-smokestack facility on the 1876 Bird's Eye at approximately the same spot. This may have been the same "tannery" shown on the 1894 state atlas (pl. 48).

Varnish and paint making:

Fuller's Varnish Factory

[1.4-Y-1-1]

The 1871 atlas shows in the upper watershed, a varnish manufacturer close to the southeast corner of Maine [now Congress] and the railroad tracks, next to the little pond that also shows up on the 1837 map. Although it was not identified on the 1876 Bird's Eye, the 1894 State atlas (pl. 48) shows

Fuller's Varnish Factory at the southeast corner of Congress and St. John, i.e. the same site. Note that this firm also had a plant in the Rolling Mill/Ligonla Area, 2.5, at this time.

1900-1969

Background Information

General:

In the 1930s this Historic Development Area was one with many filling stations, auto dealerships and repair facilities. In the construction of I-295 cloverleaf, a number of these were removed. The showrooms have been converted to other uses (e. g. Pier One, etc.).

1900-1969

Pollution Sources Keyed to GIS

Brickyards:

Douglass St. Brickyard

[1.4-BY-1-12]

Shown on the 1914 atlas (pl. 7) at the same location as in the later 19th century.

S. B. Dinsmore Brick Mfr.

[1.4-BY-2-12]

Dry cleaning:

[1.4-DC-1-2]

On the 1954+ Sanborn, a rug cleaning establishment was located at 57 Baxter blyd. (pl. 89).

Dumps:

Douglass St. Dump

[1.4-D-1-2]

East of Congress and south of Douglass where the school is now located was a dump in this century. This would have made it close to the old canal basin. Presumably the marsh shown on the 1868 plan table map at the archives of the Department of Public Works was filled in by this dump. Any leachates must go down into the sewers leading to the Back Cove. According to Jim Robbins of the Dept. of Public Works, the school which was built on part of the site has had severe settling problems (Interview 12/17/92). Photo in Sullivan's Photocraft collection.

Dump at Woodford on the Back Cove

[1.4-D-2-2]

Between Vannah and Woodford close to where they end at the Back Cove, Jim Robbins of the Dept. of Public Works understands that there was a dump (time period not established).

Electricity generation:

Cumberland County Power and Light

[1.4-EQ-1-12]

On the Deering side of the old tidal inlet in 1914 (pl. 6) was this plant where the trolley company had earlier had its plant. Photo of the plant in Sullivan's Photocraft collection.

Filling stations and repair facilities in the upper watershed:

Two at the intersection of Park and St. John in the 1930s (1909+, pl. 63): 294 Park, wooden filling station with three gas tanks; 288 Park, brick filling station with three gas tanks. Both were still there in the early 1960s (1954+).

891 Congress near Weymouth: Service station with two tanks in the 1930s (1909+, pl. 63). Gone by the early 1960s (1954+).

506-510 Cumberland (east of Mellon): Bus garage and service station with gasoline tanks the 1930s (1909+, pl. 40). By the 1960s this was the location of "Holmes Electrical Supply" (1954+).

Filling stations and garages in the lower watershed:

On Forest ave:

Near Woodfords Corner: Service stations in the 1930s still there in the early 1960s (1954+):

564 Forest at the corner with Coyle: autos, gasoline and service (1909+, pl. 27).

520 Forest at the corner with Noyes: same (")

Forest and Dartmouth area:

525 Forest: truck service (1909+, pl. 56)

531 Forest: autos (")

495 Forest: autos (")

488 Forest on corner with Dartmouth: filling station with three gas tanks (1909+, p. 12). Still present in the early 1960s (1954+, pl. 80).

476 Forest on corner with Dartmouth: filling station with 2 gas tank in the 1930s and early 1960s.

Near USM today:

363 Forest: service station at corner with Fenwick (1909+, pl. 12).

357 Forest: same. No gasoline tanks indicated at 357 or 363 (").

329 Forest: auto service with one gasoline tank (").

318 Forest at the corner with Baxter Blvd.: filling station with three gasoline tanks (1909+, pl. 77).

301 Forest: auto service with four gasoline tanks (Firestone) (1909+, pl. 78).

18-24 Bedford: truck sales and service in a building constructed in 1926 ("Forest City Motor") (1909+, pl. 77). Still present in the early 1960s.

35 Bedford: truck sales and service with no fuel tanks (1909+, pl. 76).

Forest now covered by I-295 Interchange (see 1954+):

292 Forest: auto sales and service (1909+, pl. 77).

254 Forest: filling station with three gasoline tanks (").

234 Forest: auto service station with no gasoline tanks (").

229 Forest: filling and service station (1909+, pl. 78).

220 Forest: auto service (1909+, pl. 77).

210 Forest: filling and service station with three gasoline tanks (")

Sewer lines and outfalls:

Almshouse Sewer and North Side Intercept

[1.4-S-1-23, 1.4-S-2-2]

The 1914 atlas shows the Almshouse Sewer, following the course of the Back Cove stream, [S-1-23] and the North Side Intercept sewer line [S-2-2]. Both joined where the tidal inlet had been, and the combined load was discharged directly into the cove. The North Side Intercept has been discontinued through Deering Park, but the Almshouse line was upgraded with 84" pipe in the 1960s.

The Marginal Way Intercept

[1.4-S-3-23]

Now starts at Forest and carries the sewage from the Almshouse line and others through the Back Cove Industrial Area [1.7]. The flow is by gravity until the Northeast Pump Station near Tukeys Bridge, then it is pumped to the treatment plant under the Eastern Prom. [From Jim Robbins, and the City of Portland Dept. of Public Works' General Plan, Existing Sewer System as updated to 1984].

Outfall at old stream location?

[1.4-S-4-2]

On the 1871 atlas a stream is shown emptying into the cove between the tidal inlet and Belmont (p. 44). No outfall is shown on the 1914 atlas (pl. 6).

Outfall from Belmont

[1.4-S-5-2]

The 1914 atlas shows an outfall down from Belmont Street. It is not a CSO outfall site.

Outfall from Woodford

[1.4-S-6-2]

Below Coyle and Clifton at the end of Woodford Street on the 1914 atlas (pl. 6). CSO outfall today.

Stoneware and pottery:

Portland Stoneware, Winslow Co.

[1.4-SP-1-12]

Detailed in the 1909 Sanborn. Later it was known under the name of Winslow Co. (1909+, pl. 78). In 1946 the plant closed (Maine Sun. Tel., 12/18/1977, p. 33A).

Tannery:

Casco Tanning Co.

[1.4-T-3-12]

This old tannery was still present on the 1914 City atlas at what is now the corner of Deering park across from the Post Office.

1970-present

Pollution Sources Keyed to GIS

Sewer lines and outfalls:

Not surprising given the history of Deering Park, there is saltwater intrusion into the pond during spring tides . The CSOs from the old sewer lines present problems during heavy runoff [G. Flaherty].

Stoneware and pottery:

Portland Stoneware

[1.4-SP-1-12]

The site of the Portland Stoneware Co. was excavated in 1984 during construction of the Shop and Save Plaza (see Ey. Exp., 12/20/84, p. 12).



North Side/East Deering



80

sheds
ment Areas
North Side/East Deering

Back Cove Watersheds:

1.5 Back Cove - North Side/East Deering (See Map 13)

1840-1899

Background Information

General:

This largest Historic Development Area in Portland is formed by the watersheds of Fall Brook and at least four shorter brooks that empty into Back Cove a little southwest of that brook. It includes part of Morrills Corner east of Forest Avenue, North Deering through which Fall Brook passes, and Lunts Corner. East Deering north of the Blue Star Memorial Highway is part of this area. The watershed in East Deering is a small geological formation separating this southern part of the HDA from 1.8, East Deering-Bay Shore.

Portions were included in the 1871 Cumberland County atlas. What is shown on the 1876 Bird's Eye is all rural. The 1886 Sanborn simply identified the area, but in the edition of 1896 two small sections were shown in detail. One of these, East Deering along Maine Street was residential only (pl. 33).

1840-1899

Pollution Sources Keyed to GIS

Brickyard:

[1.5-BY-1-1]

On Lucas off Main (later Washington) Street by a stream (Fall Brook?), an unnamed brickyard in the 1871 atlas (pl. 38).

Railroad facilities:

The Presumpscot Yard of the Grand Trunk is included in area 1.8, East Deering/Bay Shore.

Tanneries:

F. M. Houghton Tannery

[1.5-T-1-1]

On Forest Avenue opposite Stevens Plains Avenue, by the Portland and Rochester Railroad on 1886 Sanborn (pl. 21 insert).

Chas. E. Morrill Factory

[1.5-T-2-1]

First shown on 1871 atlas (p. 42. "Mfg Leather Bindings" with tanning facility on 1886 Sanborn - pl. 34. Also on 1896, pl. 3 insert.

A. McKone Tannery

[1.5-T-3-1]

Shown on the 1871 atlas, opposite Morrill's on Fore Street

1900-1969

Background Information

General:

The several Sanborn maps are very useful: 1909, 1909+, 1954, 1954+. The Maine Historical Society has some photographs of East Deering when the I-295 highway was being built that show Washington and Veranda filling stations clearly.

1900-1969

Pollution Sources Keyed to GIS

Dump:

Washington Street Dump

[1.5-D-1-2]

The 1914 atlas in East Deering shows a large tidal inlet off of Back Cove that reached Washington, crossing Front and Ilsey, then continued on as a tidal creek. This became, according to Jim Robbins of the Dept. of Public Works, the Washington Street Dump and was used for many years. The area was developed with streets, water and sewer lines eventually. Today residents have problems with flooding basements in times of extreme spring tides (Interview, 12/17/92).

Galvanizing and plating:

[1.5-G-1-2]

Shop near 498 Washington by corner with Veranda and Bates in East Deering in 1909 (pl. 37): "Electroplating." Not present in the 1930s.

Metal working:

American Can Co.

[15-MW-1-2]

At 84 Read, fabricated cans (Sanborn, 1954, pl. 7). By the 1960s replaced by Newton Beamis Inc. (1954+).

Filling stations and repair facilities:

On Veranda (watershed assumed at Fairfield/Acadia) and Bates:

- 127 Veranda at corner with Fairfield: filling station with two gas tanks in 1909 (pl. 41), 1930s (1909+), 1960s (1954+), in 1992 site of a small apartment house.
- 42 Veranda at corner with Sherwood: filling station in the 1930s (1909+, pl. 38), 1954 and the 1960s (1954+). Now station building used adaptively as pizza parlor (1992).
- 6 Veranda at corner with Washington: filling station in the 1930s (1909+), 1954 and the 1960s (1954+). Closed (6/92).
- 5 Bates at corner with Washington: filling station and service with two gas tanks in the 1930s (1909+, pl. 37), 1954, and the 1960s (1954+).
- 2 Bates at corner with Washington: filling station and repairs in the 1930s (1909+, pl. 37). Repairs only in 1954. Now small shopping center.
- 32 Bates at corner with Baxter: filling station and "greasing" in the 1930s (1909+) and 1954. Gone by the 1960s.

On or near Washington

- 3-? Washington at corner with Baxter, East Deering: filling station in the 1930s. Not present in 1954.
- 504 Washington: see 2 Bates above.
- 520 Washington: see 5 Bates above.
- 801 Washington: at corner with Ocean at Lunts Corner, filling station (1954+, pl. 34).
- 1376 Washington: at corner with Allen in North Deering, filling station (pl. 33).
- 1397 Washington: near corner, filling station (").
- 1400 Washington: at corner with Cyprus, filling station (").
- ? Washington, at corner with Auburn: filling station (").
- 330 Allen: repairs (").

On Canco

- Canco, to Maine Central railroad tracks: Corydon Transport with repair facilities (1954+, pl. 65).
- Canco, opp. tracks: auto body shop (").

Morrills Corner

- 1211 Forest (c. Allen): filling station in the late 1930s (1909+, vol. II, pl.).

Plastic working:

Burt Co.

[1.5-PW-1-2]

On Morrill at Deering Junction, billiard ball and poker chip factory (1954+, pl. 60).

Railroad facilities:

Small yard near Morrills Corner for diesel servicing.

Sewers and outfalls:

"Below" Veranda and Presumpscot on former tidal cove site

[1.5-S-1-2]

Outfall in 1914 at location of mouth of a stream that on the 1871 atlas (pl. 38) still flowed between Veranda and Presumpscot (pl. 38). Cove filled in subsequently and now residential area.

Johnson Street (north side of cove)

[1.5-S-2-2]

Outfall in 1914 at location of mouth of a stream on the 1871 atlas (pl. 38).

_____1970-present_____ **Pollution Sources Keyed to GIS**

Filling stations:

See under 1900-1970: "Filling stations."

Testing laboratory:

Ventrex Laboratories

[1.5-TL-1-3]

Read Street near Morrills Corner in 1992: (Industrial Pretreatment Report for City of Portland).

"Laboratory quantities of chloroform and toluene, and low level radioactive wastes."

Back Cove Watersheds:

1.6 Back Cove - South Side/Munjoy Hill (See Map 14)

1840-1899

Background Information

General:

Before 1876 at least, there was little industrial activity in this area. One tannery may have left a legacy, but perhaps so did the landfill used to extend the built up area into the marshes of the cove.

1840-1899

Pollution Sources Keyed to GIS

Dumps and Landfill:

[1.6-D-1-1], [1.6-D-2-2]

Successive maps after the 1837 Portland City map show more and more land along the northern shore of the cove filled in [D-1-1]. Until after 1876, however, less was filled in this area than in the adjacent HDA to the west, 1.7, the Back Cove Industrial Area. In 1837 Oxford was the waterfront street over to Washington, which became closest to the shore.

The 1876 Birds Eye shows the plateau that forms the Eastern Promenade clearly, and under it the double tracks of the Grand Trunk. These tracks extended to the railroad bridge to East Deering. From there around the point and under Tukeys Bridge went a single track. On the cove side, the single track went on over a causeway and trestle that ended at the point where the I-295 interchange with the Franklin arterial is now. The city had extended itself one block over the marshes and now Lincoln was the waterfront street instead of Oxford, and instead of Washington, now Greenleaf followed by Cove. The situation was the same on the 1894 State atlas [D-2-2].

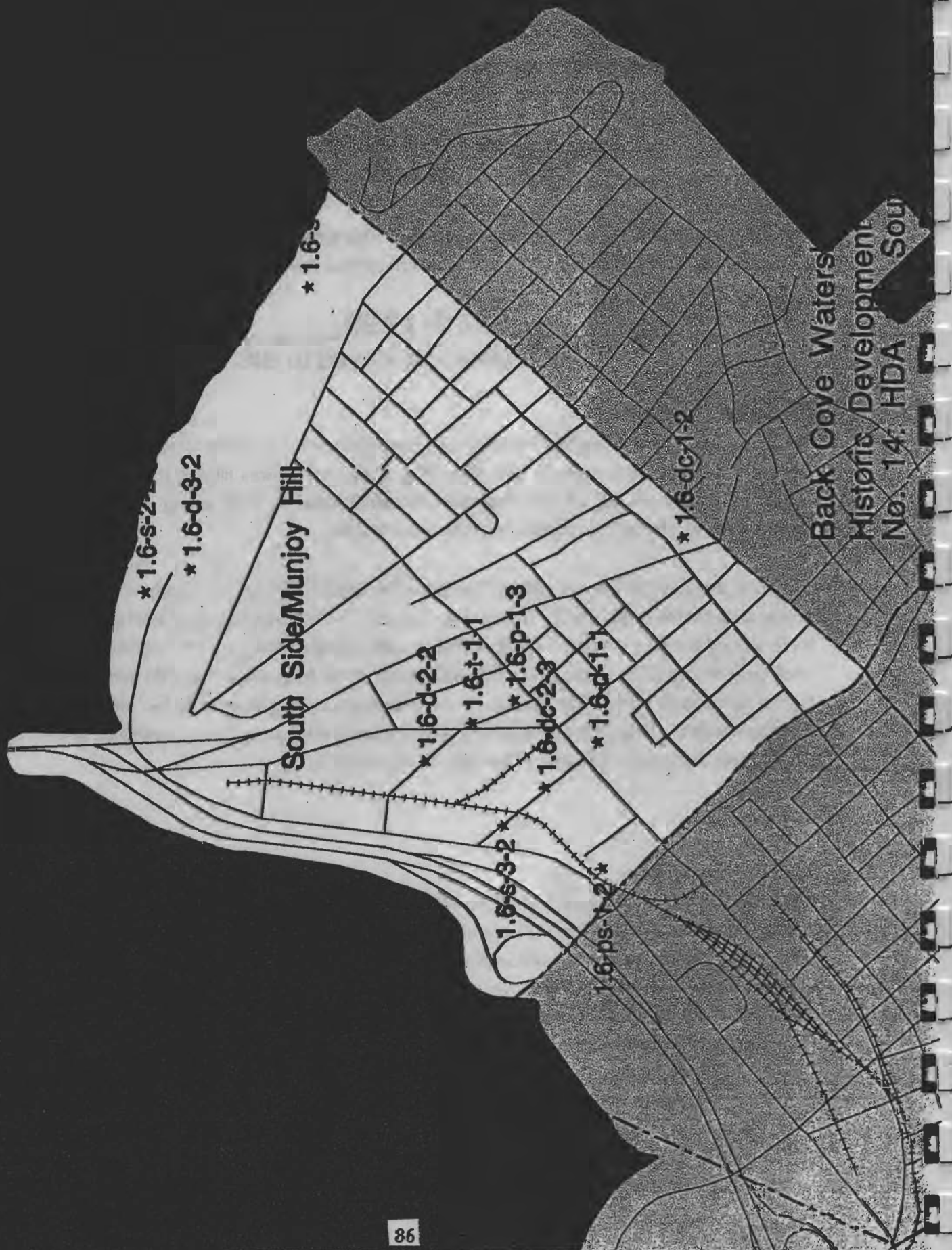
Tannery:

George Cusick's Tannery

[1.6-T-1-1]

The 1876 Birds Eye shows several long buildings comprising the tannery (no. 88), between Cove Street and the cove itself. The 1871 atlas had identified the then owner of the buildings (M. Gould) but not their function (pl. A). The buildings were not there in 1894 according to the State atlas.

There was little polluting industrial activity in this area, as earlier. But the Back Cove flats continued to be filled in during the early part of the period, probably with city refuse. Engineers in the Dept. of Public Works have heard from contractors of finding bottles and trash when doing work in the area.



1900-1969

Pollution Sources Keyed to GIS

Petroleum storage and distribution:

Gould's Wharf

[1.6-PS-1-2]

The 1914 City atlas shows "Gould's wharf" with what might pass for oil tanks east of Franklin by trestle of Portland Terminal railroad. Not present in 1954.

Dry cleaning:

[1.6-DC-1-2]

In 1954+: 6 Washington, "Dry Cleaning" (pl. 14).

Dumps:

The East End Dump

[1.6-D-3-2]

This was located where the sewage treatment plant is now. A sizeable area was filled in, as can be seen by a look at the 1914 City atlas which shows open water between the railroad tracks and the shore. When the plant was built, much refuse was uncovered. (Jim Robbins, 12/17/92).

Filling stations and repair facilities:

One place only in this area: 116-18 Washington in 1954+ (pl. 9).

Sewer lines and outfalls:

Under the Eastern Prom

[1.6-S-1-2]

The 1914 atlas shows a sewer outfall emptying into a short open ditch passing under the tracks of the Portland Terminal railroad below the Eastern Prom (pl. 2) close to where present sewage treatment plant is.

North Side Intercept

[1.6-S-2-2]

Outfall by landward side of railroad tracks. "Present sewer outfall. Future outfall at Pomeroy's rock." 1914 City atlas (pl. 2).

Smith Street outfall

[1.6-S-3-2]

Present CSO on Marginal Way approximately where outfall was in 1914 City atlas (pl. 2).

Tannery:

[1.6-T-1-1]

No evidence of the presence of the tannery in 1914 or later (1954) where it had been in 1876.

1970-present
Pollution Sources Keyed to GIS

Dry cleaning:

Associated Textile Rental Services

[1.6-DC-2-3]

At 31 Diamond. See City of Portland Public Works, Industrial Pretreatment Program, 1992 Permittees List).

Printing:

Allen Screen Printing

[1.6-P-1-3]

At 46 Cove. On "Industrial Pretreatment Program Permittees List," City of Portland Industrial Pretreatment Program records.

Back Cove Watersheds:

1.7 Back Cove - South Side/Industrial (See Map 15)

1840-1899

Background Information

General:

Considerable polluting activity went on during this period but it was probably not as extensive as that in the three areas in the city on Portland Harbor.

1840-1899

Pollution Sources Keyed to GIS

Dumps and filled land:

[1.7-D-1-1]

More marsh was filled in here than in the adjacent area (1.6) to the east. Oxford Street ran close to the shore from Franklin to Preble in 1837. A short block beyond Preble, at Alder, it met Portland (now Park) which was somewhat more removed from the shore over to Fore Street.

On the 1876 Birds Eye, the shore was two blocks northward, with Lincoln and Kennebec streets in between. At the foot of Franklin the shore had been built out for a wharf and the beginnings of the causeway of the railroad which went around under the Eastern Prom. Five years before the Cumberland County atlas made it clear that more filling was contemplated. "Marginal Way" is outlined on the water the equivalent of another block out in the cove (pls. B, F).

Metal working:

Merrill File Cutting Shop [Not on GIS map]

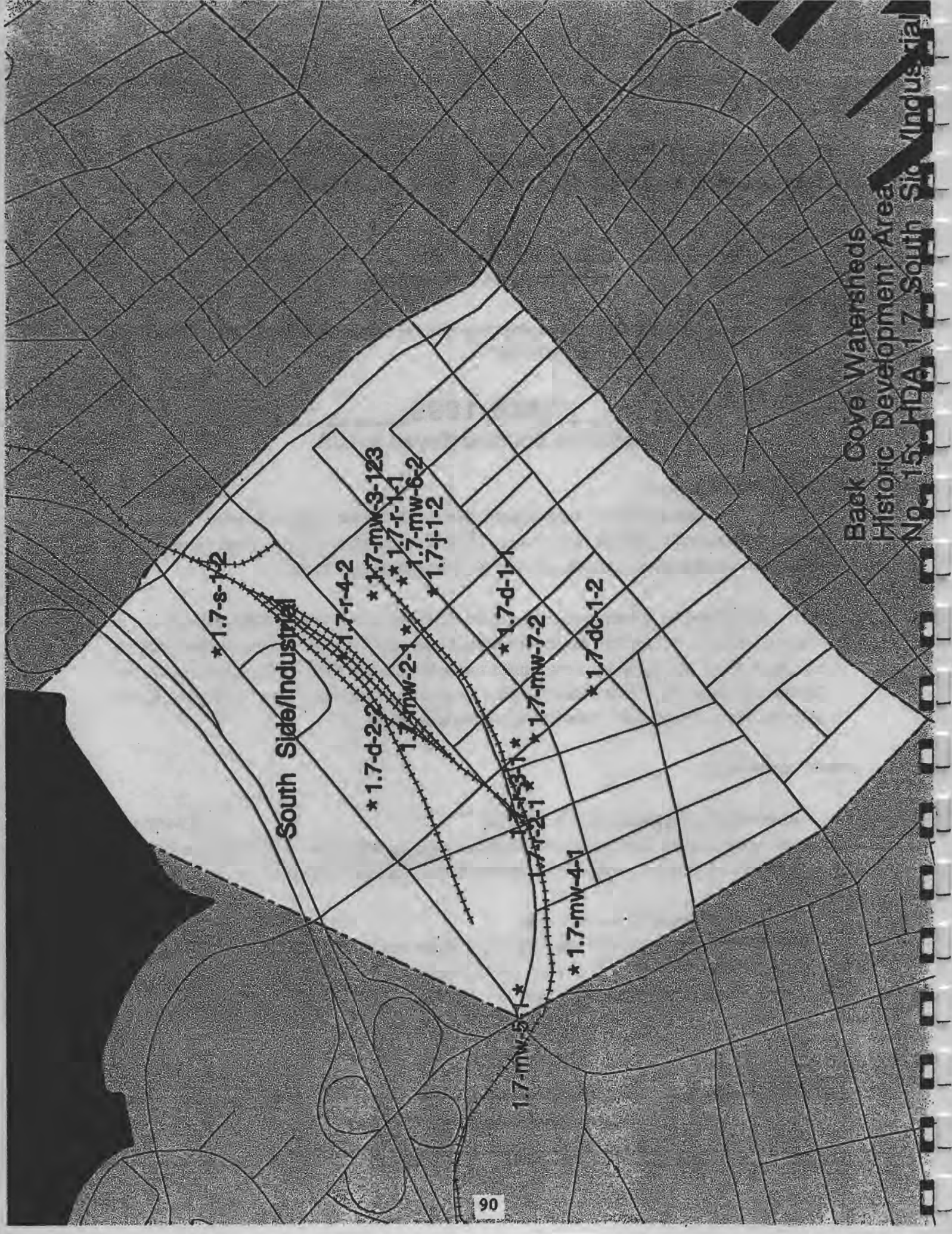
[1.7-MW-1-1]

On Preble between Oxford and Cumberland (pl. B) in the 1871 atlas. In the 1886 Sanborn (pl. 15) at apparently the same place, now listed as 65 Preble, was a "blacksmith."

E. M. Land Solder and Die Works

[1.7-MW-2-1]

In 1876 right on the shore between Myrtle and Cedar was the die works with two buildings and two smokestacks (no. 85). Ten years later it occupied a small corner space at Kennebec and Chesnut adjacent to the Portland Stove Co



*1.7-s-12

South Side/Industrial

*1.7-r-4-2

*1.7-mw-3-123

*1.7-r-1-1

*1.7-mw-6-2

*1.7-j-1-2

*1.7-d-2-2

1.7-mw-2-1

*1.7-d-1-1

*1.7-mw-7-2

*1.7-dc-1-2

*1.7-mw-4-1

1.7-mw-5-1*

Back Cove Watersheds

Historic Development Area

No. 15 HDA 1.7 South Side/Industrial

The Portland Stove Co.

[1.7-MW-3-123]

Founded in 1877 according to a brief history in the Press Herald (6/30/73, p. 112). The site is shown on the 1886 (pls. 15, 29) and 1896 (pl. 30) Sanborns between Somerset and Kennebec close to where the Solder & Die Works had been in 1876.

J. C. Frye & Co. Plow Factory

[1.7-MW-4-1]

On the east side of Green close to the mouth of the tidal pond in 1876. It seems to have been at the same site in 1886 (pl. 13). It was not present in 1896 (pl. 35).

D. T. Kelley & Sons Portland Foundry and Machine Works

[1.7-MW-5-1]

Opposite the former site of the Frye works in 1896 at 171 Kennebec (north side). This firm also had a foundry on Union Street in the Central Commercial Street Area, 1.10.

Railroad facilities:

Portland and Rochester Railroad engine house and yard

[1.7-R-3-1]

1894 State atlas (pl. 49) identified the "engine house" of the railroad between Alder and Hannover.

Portland and Ogdensburg passenger station s

[1.7-R-1-1], [1.7-R-2-1]

The passenger station on the 1871 map (pl. B) was at the foot of Myrtle on Lincoln [R-1-1]. By 1884 (pl. 49) it had been moved to between Preble and Elm [R-2-1]. See also 1896 Sanborn, pl. 31. These facilities were shown on the 1876 Birds Eye but not named.

1900-1969
Pollution Sources Keyed to GIS

Automobile and truck related (Source: 1954+, pl. 35):

173 Kennebec: used auto parts in the 1930s (1909+ Sanborn, pl. 35). Post office garage by 1954+.

185-99 Kennebec: **Central Tire Co.**, tire retreading.

73-75 Portland (close to corner with Preble): auto painting.

Dry cleaning:

[1.7-DC-1-2]

Shown on the amended 1954 Sanborn at 114 Preble (1954+).

Dumps and filled land:

[1.7-D-2-2]

Construction of Marginal Way (1909, 1909+, 1954) and I-295 resulted in considerable extension of the shoreline into Back Cove.

Filling stations and repair facilities on Preble, 1930s, 1960s:

31 Preble: filling station with gas tank in the 1930s (1909+, pl. 27). Parking lot in the early 1960s (1954+).

35 Preble: filling station with gas tank (?). By the early 1960s joined with 37 Preble.

37 Preble at the corner with Cumberland: filling station with two gas tanks (?). Still present in the early 1960s.

79-85 Preble: garage and filling station with two gasoline tanks in the 1930s (1909+, pl. 21). Still present in the early 1960s (1954+, pl. 21).

Preble, Oxford and Portland triangle: tires and auto service in the 1930s (1909+, pl. 36). Not in the early 1960s (wholesale heating supply firm), (1954+, pl. 36).

Preble between Oxford and Cumberland opposite the previous: *Portland Buick* sales and service in the 1930s (1909+, pl. 36). In the early 1960s, a truck sales and service place (1954+, pl. 36) and Cumberland: filling station with one gasoline tank in the 1930s (1909+, p. 36). Early 1960s? (1954+?).

Junk and scrap:

[1.7-J-1-2]

Kennebec, between Pearl and Chesnut: junk yards in the 1960s (1954+, p. 22). In 1909 there had been a lumber yard to the west and to the east the "Portland Amusement Grounds" on Pearl.

Metal working:

Portland Stove Co.

[1.7-MW-3-123]

The 1909 Sanborn (pl. 22) and the 1914 Portland atlas (pl. 1) show the foundry between Somerset and Kennebec and between Chestnut and Pearl as it had been earlier (31-53 Kennebec). The details of the site were revealed on the Sanborn. From east to west first came the foundry itself, then a building for cleaning castings and "Japanning" (painting), another for plating, and a tin shop. Some changes in layout had been made by 1954, but the tin shop and foundry were still the same. However, the small building at the west end now housed the "enameling shop" and a "machine shop" of the stove works. (See also 1954+, p. 22).

E. M. Lang & Co. Soldering and Die Shop

[1.7-MW-2-1]

In 1909 and 1914 a small building at the west end of the Portland Co. works housed the Lang shop as it had in 1886. By 1954 the Lang firm was gone.

Radiator & Heater Works

[1.7-MW-6-2]

At 38-44 Kennebec with a machine shop in 1909 (pl. 22). Opposite Portland Stove.

New England Metal Culvert Co.

[1.7-MW-7-2]

At 155 Preble in the 1960s according to the amended Sanborn (1954+, pl. 21). Supplier or fabrication?

Railroad facilities:

The Portland and Rochester

[1.7-R-4-2]

The railroad in 1909 had a yard north of Somerset with a freight house, but there was no evidence any longer of repair facilities.

Sewers and outfalls:

Pearl Street

[1.7-S-1-2]

Only one outfall in 1914 in this HDA, at the end of Pearl beyond Somerset.

_____1970-present_____
Background Information

General:

Dramatic changes took place. The area now has the makings more of an industrial park than an industrial district, given the number of sprawling single story buildings.

_____1970-present_____
Pollution Sources Keyed to GIS

Metal working:

Portland Stove Co.

[1.7-MW-3-123]

The oil shortage in 1973 was a boon for the Portland Stove Co. as several articles in the Pr.-Her. indicate (10/17/73, p. 1; 11/20/73, p. 1; 6/29/74, p. 109. The site with its buildings was regarded

important enough for National Register listing in 1975 (5/9/75, p. 9). In the same year the company obtained an SBA loan to purchase new equipment to meet the air pollution control laws (Ev. Exp., 11/19/75, pp. 1, 12). A year and one half later it had converted from a coke-fired foundry to electricity to melt the iron. ((5/31/77, pp. 1, 16). Two years later the product line was reduced from 19 to 3 stoves (ME Times, 2/17/78, pp. 18-21) and the company began direct sales to customers (11/17/78, pp. 12-15).

These efforts were to little avail. A year later the Evening Express reported that sales were down (12/17/79, pp. 1, 8), and two years later that because of "poor management and not enough aggressive marketing" business had dropped, (5/5/81, pp. 1, 12). The story was more complicated than this, and related to the deindustrialization of Portland though export of industry to countries that had lower costs of production. The Express told how the Franklin Cast Products of Rhode Island had forced companies into bankruptcy by importing and selling inferior Taiwan copies, then attempting to take over the ailing firms and market the inferior stoves through the firms. Portland Stove, the paper reported, was able to avoid this fate through reorganization and to "start a new market line" (5/3/81). However, in February, 1984, the paper reported that "the 107 year old company will cease to exist" and its assets would be auctioned. (18, p. 1). Fires in 1989 and 1991 destroyed parts of the facility (Ev. Exp., 2/24/89, pp. 1,32; 10/9/91 pp. 1D, 2D).

Filling stations:

See under 1900-1970: "Filling stations."

Part III

Data Package

Probable Historic Pollution Sources by Historic Development Area

**Sites in Portland and South Portland from 1840 to 1970
Keyed to Industries, Pollutants, and CBEP GIS Maps**

Four Larger Watersheds

**Fore River Watersheds Historic Development Areas
(1.1-1.3)**

**Back Cove Watersheds Historic Development Areas
(1.4-1.7)**

**Portland City Harbor Watersheds Historic Development
Areas
(1.8-1.11)**

**South Portland Watersheds Historic Development Areas
(2.1-2.7)**

Geographical Location, Activities, and Time Frame

This key is designed for use in the Portland/South Portland region, as well as in other estuaries throughout the country. The following example is the first site listed in Portland's Stroudwater HDA. The example is a tannery site and is designated as:

[1.1 - T - 1 - 1]

HDA
(1.1 = Stroudwater)

Time Frame
(1 = 1840-1899)

Industry or Commercial Activity
(T = Tannery)

Specific HDA Designation #
(1 = Stroudwater HDA Tannery #1)

The first indicator - 1.1 in the above example - stands for the municipality and the Historic Development Area (HDA). Portland's HDAs are designated by 1; South Portland's are indicated by 2; the number after the decimal point designates the specific HDA within each municipality. In the example above 1.1 represents Stroudwater. Other municipalities in the Casco Bay watershed may be added as historical pollution surveys progress.

The second indicator - T above - represents the site's industrial or commercial activity, or transportation function. These letter indicators are listed on the Industry and Pollutants Key. For example, AT stands for "Automobile and truck-related" sites, BY for "Brickyards" and so on. A single site may have more than one activity and, therefore, more than one designation. Note that in the case of highway bridges (BR), railroad bridges (RBR) and canals (CA) there are no HDA numbers first, since they connect several HDAs, and in themselves, are not pollution source sites.

The third indicator - 1 above - designates the specific site number within the HDA. These are numerically ordered by activity. In the Stroudwater example, this site is found as T-1. If a second tannery were found in the Stroudwater HDA it would be listed as T-2, and so on.

The final indicator - 1 above - designates the period(s) of time the site was active. Note that more than one period may be indicated. The period designations are:

- 1 = 1840-1899
- 2 = 1900-1969
- 3 = 1970-present

- AT** Automobile and truck-related. PAHs in lubricants. Cleaning solvents. Heavy metals and solvents in body paints.
- BY** Brickyard. Often become dumps when closed (see D).
- C** Cemetery. Arsenic from embalming fluids.
- CM** Chemical manufacturing: Sulfuric and hydrochloric acid only in South Portland. Lead. Sulfur dioxide. Acids.
- CG** Coal gas production. PAHs in coal tars. Hydrogen sulfide and other sulfur compounds, ammonia.
- DC** Dry cleaning (and laundries). Solvents. (Heavy metals from work clothing).
- D** Dumps and landfills. Various industrial, commercial and household wastes that can be toxic or hazardous.
- EG** Electricity generation/transmission. PCBs from 1920s.
- E** Electronic equipment manufacture. Solvents with heavy metals.
- FP** Food processing, fertilizer and soap production, sugar refining. Lead from solder in cans (to 1920s at least). Caustic equipment cleaning solutions. Biological wastes from canneries, etc. Lye from soap making.
- FS** Filling stations, repair. Lead from anti-knock additives, 1922-1970s. PAHs in fuel and lubricants. Leaking tanks.
- G** Galvanizing and plating. Zinc, zinc oxide, copper; 20th C: also cadmium, chromium. Cyanide, arsenic and pickling acids.
- H** Hat manufacture. Mercury in felt preservative. Heavy metals from dyes.
- J** Junk and scrap yards. Heavy metals. PAHs in lubricants and fuels. Other toxics.
- M** Machining. Copper, zinc, tin, lead from brass and bronze working. In 20th century, chromium, lead, manganese, nickel from steel alloys. Cleaning solvents. PAHs in cutting oils, machine lubricants and hydraulic oils.
- MT** Marine transportation. From bottom paints, lead, copper; from 1950-, tributyltin (TBT). PAHs from spilled fuels.
- MW** Metal working. Copper, zinc, tin, lead (in 20th C: also aluminum, cadmium, chromium) from smelting and forming brass and bronze. In 20th century, chromium, cobalt, lead, manganese, molybdenum, nickel, tin, zinc from casting, rolling and forming steel alloys. Pickling acids containing heavy metals. Toxics associated with sand molding including graphite, phenols, PAHs. Silica, a hazardous material, used in molding and furnace operations. See also G and M.
- MF** Military facilities. PAHs. See also M.
- O** Other possibly polluting activities. Match manufacture, rug mfr. etc.: See Appendix I.
- PS** Petroleum refining, storage and distribution. Kerosene refining, 1860s-90: sulfuric acid and sludge with lead sulphide, resins and tars; naptha (gasoline) sometimes treated as a waste. Storage, etc.: PAHs. Lead additives to oils from 1900. Lead additives to gasoline from 1922-1970s.
- PW** Plastic working. Solvents including phenols.
- P** Printing. Lead. Mercury. Arsenic. Solvents.
- R** Railroad facilities. PAHs from lubricants and, from 1950s, from diesel fuel used in operations; from spillage and leakage in transport, flushing of tank cars. Mercury from coal ashes. See also M and V.
- SR** Shipbuilding and repair. See MT for bottom paints. From 1900, see MW and M, esp. 1940 on.
- S** Sewers and outfalls. Carry pollutants. At outfalls should be concentrations of pollutants unless sediment transport has occurred.
- SP** Stoneware and pottery. Lead and other heavy metals from glazes.
- T** Tanning. Alum. Chromium present if "mineral process" used for tanning. Arsenic.
- TL** Testing laboratory. Toluene, chloroform.
- UT** Urban transportation. See FS and PS.
- V** Varnish and paint manufacture and use. White lead used as pigment base and dryer in paints, white and red lead and other lead compounds, zinc, cadmium and other heavy metals used as pigments in paints and varnishes. C tars (PAHs) in some 19th century varnishes. Synthetic solvents and resins from 1920s on. Mercury from the 1940s.

Fore River Watersheds:

1.1 Stroudwater (See Map 9)

1840-1899

Background Information

General Note:

This area was no doubt the scene of rural industrial activity in the late 18th century right up through 1840. Some of the houses in the settlement go back to that earlier period. The falls augmented by a dam provided a fine hydropower source. The cove with its mouth where "Stroudwater Crossing" is located today on Congress provided a good reservoir for a tidal power installation, and a tidal mill may have been built there very early.

Stroudwater does not appear in the first Portland Sanborn of 1886. However, ten years later the Fickett & Milliken grain mill and warehouse are shown bridging the tidal cove mouth.

Cumberland and Oxford Canal:

The canal built in the later 1830s provided transport from Sebago Lake down to the harbor at Portland. On the way it paralleled the Presumpscot until Saccarappa (Westbrook) then went inland down to the Stroudwater.

Locks and the Audubon Sanctuary

[1.1-CA-1-1]

Here it opened out to the tidal cove, after passing through a series of locks, now in ruins. Now the canal's mouth is marked by tall plants (cattails?) that can be seen across the cove from behind "Stroudwater Crossing." Maine Audubon Society has a sanctuary that preserves part of the old canal route and tow path. Their pamphlet describing the resource states that "stone rubble is all that remains of five locks that eased the descent down the steep hillside" (see Fore River Sanctuary, Portland, ME, n.d.). The canal boats must have gone out into the Fore River from here. Perhaps currents in the canal brought pollution down from Saccarappa and even further up from the gun powder mills. See Ernest R. Rowe, Highlights of Westbrook History (Portland, 1952), pp. 53-61.

Canal from the tidal cove to the Fore River

[1.2-CA-2-1]

Across from the outlet of the canal at the foot of the locks the 1871 map shows another short canal leading to the Fore River a bit downstream from the mouth of the tidal cove. It went under Stroudwater Road (now Congress) just under the bluff along the river to a small inlet by the Portland Brick Co. yard in the Capisic HDA, 1.2.



Fore River Watersheds
Historic Development Areas
No. 9: HDA 1.1 Stroudwater Portland

Competition from the Railroads:

The Portland and Rochester

In the later 1840s the York and Cumberland railroad was built to Buxton through Westbrook through the Back Cove-West Side/Deering area, 1.4. In 1860 it became the Portland and Rochester Railroad. Along with the Grand Trunk, it provided substantial competition for the canal. Demand for transport by canal lessened, and by the end of the 1860s the C & O canal fell into disuse.

The Portland and Ogdensburg

[1.1-R-1-123]

The competition from P & O Railroad which went through this HDA finished the canal. In the early 1870s the railroad line was built over the marshes of the Stroudwater tidal cove on trestle and causeway and onto the upland. See Ernest R. Rowe, et al., Highlights of Westbrook History, (Portland, 1952), pp. 50-52, 59-60. The trackage and the trestle remain part of the cultural landscape in this area today.

1840-1899

Pollution Sources Keyed to GIS

Food processing:

Fickett & Milliken Grain Mill

[1.1-FP-1-1]

In the 1896 Sanborn the Fickett & Milliken grain mill and warehouse are shown bridging the tidal cove mouth at 1380-84 Congress. "Tidewater," according to the note on the Sanborn was the power source, and kerosine provided the lighting (pl. 17, inset). See Sullivan's Photocraft coll.

Tanneries:

J. Smith Tannery

[1.1-T-1-1]

The only possible historic pollution sources were the two tanneries in this area. One was located on the Cumberland County atlas of 1871 close to the fourth house from the corner of Westbrook and Garrison (pl. 43). This puts it on the right side of the road leading from the historic settlement to where the airport is now, shortly after Garrison Street. However, given the presence of a bark mill close by, it is unlikely that this one or the next used the "mineral process" with chromium.

Tat Brothers Tannery

[1.1-T-2-1]

On the 1871 atlas close to Stroudwater Bridge, this was located a bit to the north of the bark mill.

Bark mill

[1.1-T-3-1]

At the north end of the Stroudwater Bridge on the 1871 atlas (pl. 43) was a "bark mill," carrying on a business presumably of grinding up bark for the two tanneries here, and perhaps for some of those in the Back Cove-West Side/Deering area. *No lasting pollution likely.*

1900-1969

Background Information

General:

By 1914 the few industrial activities present in the late 19th century were gone apparently. No tidal mill or tannery is shown on the Portland city atlas of that year (pls. 10, 8). The 1954 Sanborn shows no industry at all in the immediate area of Stroudwater (vol. II, pl. 42). The C & O Canal does not appear in the 1914 atlas.

1900-1969

Pollution Sources Keyed to GIS

Sewers and outfalls:

West Side sewer

[1.1-S-1-2]

By 1914 the thirty inch "West Side" sewer had been constructed, paralleling the old canal route above the locks for part of the way. A CSO is located with an outlet about where the canal used to enter the tidal cove from the locks.

1970-present

Background Information

General:

The extension of Congress Street and the jetport roads caused much controversy in early 1970s. Now the continued growth of the Mall Commercial/Industrial Area (2.) is doing the same ("Maine Mall City," Maine Times, 24: 51(1992), pp. 1-7.)

1970-present

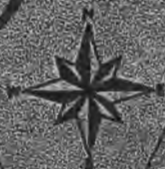
Pollution Sources Keyed to GIS

Metal working:

[1.1-M-1-3]

Nichols-Portland

Out at 2400 Congress. Included here because it is part of Portland's Industrial Pretreatment Program. Generally post-1970 polluting industrial activities have not been researched, assuming that state and federal legislation require ample records. The material provides evidence of what metal working and machining facilities before the Clean Water Act might have discharged into sewers or directly into watercourses. The "Permittees 1992" list indicates the following activities: Machining, cleaning of work. The 1981 report provides the helpful evidence. "Potential Sources of Pollutants:" powdered steel, metal chips, detergents, lubricants, trichloroethane and other solvents for degreasing. Potential problems were handled by holding tanks and settling tanks to take care of heavy metals.



Capisic Watershed

1.2-c-1-123

1.2-s-3-2 * 1.2-by-1-12

* 1.2-s-2-2

1.2-by-1-1
* 1.2-s-1-2

* 1.2-ca-1

Fore River Watershed
Historic Development
No. 10: HDA 1.2 Capisic Watershed

Fore River Watersheds: 1.2 Capisic Watershed (See Map 10)

1840-1899

Background Information

General:

The 1871 Cumberland County atlas reveals little activity in this area. A brick yard was located just north of Brighton Street on the first stream crossed on the way to Portland from Nasons Corner. The area was not developed enough in this period to be included in either the 1886 or the 1896 Sanborn maps.

Cumberland and Oxford Canal:

Canal from the Stroudwater tidal cove to the River

[1.2-CA-2-1]

The little segment came out on the boundary of the HDA with the Stroudwater HDA by the Portland Brick Co.

Canal along the Fore River across Thompsons Point

[1.3-CA-3-1]

Beyond the mouth of the tidal cove close to where the river widens out downstream, the 1914 Portland atlas shows the beginning of an "old canal." From here the boats must have gone close the river and then through what became known as Thompsons Point (In H. D. A. 1.3).

1840-1899

Pollution Sources Keyed to GIS

Brickyards:

Portland Brick Co.

[1.2-BY-1-1]

Located at the mouth of the short segment of the C & O canal that joined the river to the Stroudwater tidal cove [CA-2-1]. Shown on the 1871 County atlas only (pl. 43).

J. L. Lucas brickyard

[1.2-BY -1-12]

On the 1871 County map just north of Brighton on the first stream crossed on the way to Portland from Nasons Corner.

Cemeteries:

The stream by the brick yard [1.2-BY-1-12] passes close to four cemeteries, all near to Morrills Corner.

Evergreen [1.2-C-1-123]

Between Stevens and Forest aves. The 1871 County atlas shows Evergreen only (p. 37; detail, p. 42).

Pine Grove [Not located on GIS map] [1.2-C-2-123]

Off of Stevens Avenue, just south of the Corner. Before 1900?

Mt. Sinai [Not located on GIS map] [1.2-C-3-123]

and

Mt. Carmel [Not located on GIS map] [1.2-C-4-123]

close to Warren Avenue, west of the Corner. Before 1900?

Tannery:

N. K. Sawyer Tannery [1.2-T-1-1]

Shown on the 1871 County atlas (pl. 41 detail) apparently just inside the line of this watershed in Morrills Corner. Note that across Forest Avenue in the Back Cove/North Side HDA there were three tanneries [1.5-T-1-1, 2-1, 3-1].

1900-1969

Background Information

General:

The 1914 Portland city atlas shows that the Lucas brickyard was still at its 1871 location [1.2-BY-1-12]. Southeast of the yard toward Portland considerable suburban development had taken place. However, to the north of Brighton and west of Nason's Corner there was still much open land. The reality of these land use patterns had been captured six years before in the 1909 edition of the Sanborn maps (see vol. II, pls. 21, 9, etc.).

In 1954, vol. II of the Sanborn shows this watershed as much more developed, largely for residential purposes. Along Brighton north to south were Sagamore Village, Nasons Corner and Brightons Corner. There was some development along Capisic Road near the pond. All the way north on Stevens from Bradleys Corner, through Brighton Corner and out to Morrills was residential. No industry activities appear to have been carried out along this street. (See pl. 4).

1900-1969

Pollution Sources Keyed to GIS

Filling stations and service facilities (50s and early 60s):

Along Brighton near Sagamore Village, Nasons Corner and at the Intersection with Woodfords, the Sanborn maps reveal there were filling stations in the fifties and early 1960s. Stevens had few except at the Intersection with Clinton, and then at Morrill's Corner.

Brighton Avenue

- 518 Woodford: Corner with Brighton, filling station (1954+, pl. 21).
- 623 Brighton: Between Westminster and Edgeworth (").
- 861 Brighton: Between Essex and Bennett in Nason's Corner area (1954+, pl. 50).
- 875 Brighton: Between Kent and Essex (").
- 964 Brighton: Between Terrace and Rowe (").
- 1002 Brighton: Near Sagamore Village, "Sales and Service" (1954+, pl. 63).

Stevens Avenue

Nothing up to Morrill's Corner except 477 Stevens [at corner with Clinton] (1954+, pl. 12).

Sewers and outfalls:

West Side sewer

[1.2-S-1-2]

In 1914 the sewer opened out on the south side of the Fore River close to the short segment of the canal connecting the cove to the river.

Forty-Two Inch main

[1.2-S-2-2]

In 1914 this main crossed Capisc Pond and Capiscic Street. Today in 1993 there is a CSO located where it crossed but with no apparent outlet.

West Side Interceptor

[1.2-S-3-2]

In 1914 the Interceptor crossed the Capisc here, but there was no outlet (pl. 8).

1970-present

Background Information

General:

By 1978 the photorevision of the "Portland, West," quadrangle shows more suburban development close to Capisic pond, and a whole new residential area north of Nasons, Corner between the two branches of the brook. The density of development in the area has led to significant overloads of the combined sewers, according to George Flaherty, Director of Public Works.



* 1.3-eg-1-23

* 1.3-fp-3-1

* 1.3-fp-2-1 * 1.3-ca-4-1

* 1.3-r-3-12

* 1.3-r-1-12

* 1.3-ca-3-1

* 1.3-ps-3-23

* 1.3-fs-2-23

* 1.3-by-1-1

Railroad Triangle

* 1.3-ut-1-123

* 1.3-fp-4-3

* 1.3-s-1-12

* 1.3-r-2-12

* 1.3-ps-1-2

* 1.3-ps-2-2

Fore River Watersheds:

1.3 Railroad Triangle Area (See Map 11)

1840-1899

Background Information

General:

The Importance of this area to transportation shows up on the 1837 map of Portland. Close to where the Veterans Memorial Bridge [1.3-Br-4-23] is today was one of the first bridges, the Vaughan [1.11-Br-1-12], connecting Portland to the south, discussed below in the section of the report on the West Commercial Street Area (1.11).

Cumberland and Oxford Canal at Thompson's Point:

[1.3-CA-3-1]

The canal first made this area important in transportation to and from the interior. The 1837 map shows it going all along the shore of the Fore River from a cove north of what became known as Thompson Point, under the Vaughan Bridge, then around along almost to the old bridge over to Knightsville in Cape Elizabeth.

On the 1886 Sanborn just north of the Thompson Fowler slaughter house [1.3-FP-1-1] was what was described as "low wet ground" that looks suspiciously like it was the old canal bed. The C & O Canal would have passed right between the turntable and the shops if it continued, as it must have, right to the canal basin. The 1894 State atlas (pl. 48) shows the canal actually cutting across the Point, the "canal basin" to the south, and the continuation of the canal along the Fore River almost to the Boston & Maine Railroad bridge (pl. 48). This edition of the atlas must have contained the unchanged plate from the 1880s. The Sanborn of 1896 shows no low ground, so presumably this part of the canal was filled in by then.

The Railroad Triangle:

By 1876, as the Bird's Eye map reveals, the boundaries of this area were clear and it was the railroads that defined them. The base of the triangle went along close to the Fore River with the trackage of the Portland & Ogdensburg [1.3-R-1-12] to Thompsons Point. One leg was formed by Maine (Congress) Street going from Thompson Point through Libbys Corner to the corner of Maine and St. John where Union Station would be. The other end of the base to the south was formed by the Boston and Maine [1.3-R-2-12] yard and roundhouse. From here the Maine Central tracks ran to the future Union Station, the apex. (See 1894 State atlas, pl. 48).

Other than one unidentified two-smokestack factory south of the intersection of Congress with the railroad tracks, there were no industrial establishments or railroad repair facilities in this area in 1876. This was similar to what the Cumberland County atlas revealed five years before. Except that the Portland and Kennebec Railroad name was on the tracks used later by the Maine Central.

The Watershed Boundaries:

Today using the USGS topographic map and the evidence from the field it is difficult to determine exactly where the divide was between this area and the one to the east, the Back Cove (1.4). The I-285 highway has changed land elevations, and made it hard to read the landscape. But the 1837 map and the 1876 Bird's Eye help. Those maps make it clear that Maine Street (now Congress) came down from high ground (where the hospital is now) with the slope off to the southwest and northeast. In 1837 it was connected with Portland Street (now Park) to the north by Alms House Lane. Portland went in a straight line to Libbys Corner (also called Libbytown). Maine Street described a semi-circle, meeting Portland at the Corner. The area bounded by these streets was low marshy ground. A stream flowed out of the marsh down to Back Cove, with several tanneries on it. When you drive today through this part of town on St. John from Congress to Park, it is hard to imagine that this was a marsh in the mid-19th century.

While the maps make it clear that the space bounded by these streets was in the Back Cove HDA, they are ambiguous about two other sections close by. On the 1837 map there was a pond south of Maine Street close with a connection to the marshy area. Comparing relative positions of the streets to where they were in the 1871 Cumberland County atlas and on the 1876 Bird's Eye, it seemed this pond was close to where the Maine Central Railroad tracks would be in 1876, and a decade later, Union Station. It probably served the Dow & Sons tannery by the tracks on the 1886 Sanborn [1.4-T-41], although the pond is not on that map. Evidently then, the watershed leading to the Back Cove was southwest of the intersection of Congress and St. John.

The other section, to the north of the intersection and now beyond I 295, was as difficult to put in one or the other watershed. The topographic map is ambiguous, and a quick windshield survey did not lead to clear conclusions because of I-295. Where the school and its playground are today south of Douglass Street, Jim Robbins of the Portland Public Works Department said was a dump in this century and a marsh earlier. The 1871 county atlas shows a brickyard someplace in the vicinity. It was not clear whether the area drained off into the old "Canal Basin" to the west, or to the marshy area with the stream to Back Cove. The first draft of the HDA boundaries had the drainage into the basin. It was not until Robbins and the investigator studied the 1868 plane table sheets of Portland a year after the

research started that the answer became evident. That map shows a brick yard was there on the margin of the marsh. A stream flowed to the marshy area between Maine and Park, with the outlet to Back Cove. This research required revision of the HDA boundaries drawn on the first draft.

1840-1899

Pollution Sources Keyed to GIS

Brickyard:

P. Clark's Brickyard

[1.3-BY-1-1]

Ogden Street, toward the shore from Congress in the 1894 State atlas (pl. 48).

Food processing:

Thompson Fowler Slaughter Houses

[1.3-FP-1-1, 1.3-FP-2-1]

To the west of the P & O shops on the 1886 Sanborn (pl. 33), right on the shore was the "Thompson Fowler & Co" slaughter house, the source of the name of the point. (See also 1894 State atlas, pl. 48). This facility was no longer present on the 1896 Sanborn.

Apparently a second slaughter house of the firm was located on the next point to the south, on the shore of the canal basin now covered by the approach to the I-295 Bridge (1894, pl. 48).

Quint's Soap Factory

[1.3-FP-3-1]

North side of the "canal basin" off Congress (1884 and 1894 State atlases, pl. 48). This was a symbiotic industry with the slaughter houses which presumably supplied the fat needed.

Railroad facilities:

The Portland & Ogdensburg Railroad [1.3-R-1-12] ran northwest along the shore of the Fore River and out over the water, across the "Canal Basin" on a trestle to the base of the wooded neck of land known as Thompsons Point. The canal basin was located approximately where the western part of the Congress Street interchange is on I-295. This basin was the only remnant of the old Cumberland and Oxford Canal visible on the 1871 atlas (pl. 47) or 1876 Birds Eye map. [1.3-CA-4-1].

The Bird's Eye does not show the southern end of the base of the triangle, but does show clearly the tracks of the Maine Central running north, crossing Maine and going on a trestle over the marshy ground between that Street and Portland into Historic Development Area 1.4.

Portland and Ogdensburg yard and shops

[1.3-R-1-12]

This area was more developed by 1886. Thompson Point was not on either the Birds Eye or the 1871 atlas. However, the 1886 Sanborn shows the Portland and Ogdensburg "R. R. Repair Shops and Engine House" (pl. 33.) The orientation of the buildings was perpendicular to those of today. Included was a machine shop with an adjacent blacksmithing shop, a paint shop connected with the shops for building freight cars and repairing passenger cars. A round house was there, as well. Ten years later these buildings had the same configuration. The Maine Central was indicated as the owner of the repair facilities (pl. 60).

Boston and Maine yard and round house

[1.3-R-2-12]

Located between the Vaughan Bridge to the south, and its own railroad bridge to the north. This facility formed the southern end of the base of Railroad Triangle. The 1884 State atlas (pl. 48) shows the "Engine House" and the "Coal Shed" close to the "new" Ligonla railroad bridge that crossed the Fore River [1.3-RB-3-123].

Union Station

[1.3-R-3-12]

This formed the apex of the triangle when it was built in 1888.

1900-1969

Background Information

General:

At the beginning of this period, this triangular area was not only defined by railroad tracks which ran close to the Fore River and to the apex at Union Station, but still by important railroad-related activities. By the end of the period, this was no longer so. In the 1954 Sanborn, Thompson Point at the northern end of the base begins to appear as an industrial park (pl. 83). The car shop, of which only the southern half remained, was used by Burnham & Morrill as a warehouse, and the former machine shop similarly by the Ellis Paper Co. and Eastern Carton & Container Co. The transfer pit had been filled in. Suburban Propane had a tank loading facility just about where the roundhouse had been.

At the southern end of the base of Railroad Triangle the Boston & Maine roundhouse and repair shop had been long gone (pl. 62). Union Station still was being used, but it did not have much more time left (pl. 65).

In the early 1960s Thompson Point continued as an industrial park, with two new enterprises: the Maine Cement Block Co. west of the former railroad machine shop, and a new small machine shop east of the central structure of the old car shop. But Union Station at the apex of the triangle had not found an adaptive use and was shown as "vacant." (1954+, pl. 65).

1900-1969

Pollution Sources Keyed to GIS

Automobile and truck-related:

94-110 St. John

Tire recapping (1954+, pl. 66).

161 St John

"Auto body shop" (1954+, pl. 66).

Filling stations and repairs:

St. John Street (1909+, 1954)

291 St. John: at corner with Congress, filling station in the early 1960s (1954+, pl. 65). Now Greyhound bus station.

235 St. John: at corner with C Street, "auto repair" (?).

108 St. John: filling station. (1954+, pl. 66).

Danforth

527 Danforth: filling station with two tanks in the 1930s (1909+, pl. 62). 553 Danforth: filling station with three tanks in the 1930s, where the "repair shop of the old B & M yard was (?).

565 Danforth: *Jenny* filling station with two underground tanks in the 1930s (?).

597 Danforth: *Gulf* filling station in the 1930s (?).

Thompson Point

[1.3-Fs-8-2]

Just west of former railroad machine shop, "private garage and repair shop" (1954, pl. 83). Still there in 7/92 under the name of "Mike's" with auto parts scattered around outside; gone by 3/93.

Electricity generation and distribution:

Transformer station

[1.3-EG-1-23]

Cumberland County P & L co. at entrance to Thompsons Point.

Petroleum storage and distribution:

565 Danforth: Jenny Manufacturing Co. Gasoline Supply

[1.3-Ps-1-2]

Four large tanks (1909+, pl. 62).

597 Danforth: Gulf Oil

[1.3-Ps-2-2]

Gasoline tank farm on site of the former B & M yard by Danforth, on the Fore River (1909+, pl. 62). The Sanborn map revised to the late 1930s indicates it had three large tanks, six medium tanks and six small tanks.

Petroleum storage at Industrial facilities

[1.3-Ps-3-23]

Thompson Point: West of former car building and repair shop where the "transfer pit" was located: "fuel oil tanks buried under earth mound" (1954, pl. 83).

Railroad facilities:

Maine Central yard and roundhouse

[1.3-R-1-12]

Thompson Point at the northern end of the base of Railroad Triangle was Maine Central Railroad's repair facility in the 1909 Sanborn (pl. 83). The earlier buildings were gone, having been replaced by those in the configuration of today. Present was a large round house, now gone; the "blacksmith shop" that burned in the summer of 1992; the large car repair shop (half to the south remains today); the "transfer pit," a moving platform, to the west to move cars from track to track; a large machine shop beyond the transfer pit.

Boston & Maine yard and roundhouse

[1.3-R-2-12]

This facility in 1909 at the southern end of the base of the railroad triangle area was not so extensive as that of the Maine Central at Thompson Point. Close to Danforth where it met West Commercial was a large roundhouse and a rectangular repair shop (pl. 62). By the 1930s the site was occupied by a Gulf Oil storage and distribution facility, and several filling stations (1909+, pl. 62).

Sewers and outfalls:

[1.3-S-1-1]

The 1914 City atlas shows a line going along St. Johns with an outlet into the Fore River near the Veterans Memorial Bridge [Br-4-23]. The line continues along Congress, Portland and joins up with the Almshouse and North Side Intersect lines which open into Back Cove near the old tidal inlet. The modern sewer map (City of Portland, General Plan Existing Sewer System, 1984) shows the directions of flow. It is apparent that from north by the car barn the sewage went into the Fore River as the CSO does today; in the other direction, it went into the lines that ended up down at the Back

Cove outlet. See the GIS maps accompanying the report on this area, 1.3, and the Back Cove/Forest Avenue area, 1.4.

Urban Transportation:

117-33 St. John: Trolley car barn

[1.3-UT-1-123]

Here was the main car bar for the city trolleys (1909, pl.). See the 1914 atlas (pl. 5). By the early 1960s it had become the bus garage (1954+, pl. 66). A completely new structure seems to be at the site today (3/93).

1970-present

Background Information

General:

Thompson Point came of age as an industrial park in this period. Until it burned in the summer of 1992, the large brick blacksmithing shop served for office and shop space. Suburban Propane is still at the Point. The remaining half of the old car building shop serves Colonial Supply Corp., wholesalers of plumbing and heating supplies, and a small bakery of "handmade desserts."

The former railroad machine shop still seems to be used for a warehouse. Just in back of it is the small auto repair shop that was there in 1954, now closed (3/93). "Maine Cement Block" facility had become "Durastone Concrete." Many truck-sized containers for shipping were stored at the site. Much concrete riprap is placed around the shore, possibly by-products of the Durastone works. Filling may have occurred to extend the point, though how much is hard to say.

1970-present

Pollution Sources Keyed to GIS

Filling stations and repair facilities:

See 1900-1970, "Filling stations"

Food processing:

Barber Foods: 70 St. John

[1.3-Fp-4-3]

Recognized pollution: Industrial Pretreatment Program: "Report for the Portland Waste District" (1981): Projected possible problems from meat scraps, detergents and grease from processing, and easy steps to insure removal recommended.

Petroleum storage at industrial facilities:

[1.3-Ps-3-23]

Thompson Point, an above-ground tank on the west side of the old car shop, observed in 7/92. The underground tank could still be present as well.



Back Cove Watersheds
Historic Development Areas
No. 12 HDA 1.4 West Side/Deering

Portland City Harbor Watersheds:

1.8 East Deering/Bay Shore Area (See Map 16)

1840-1899

Background Information

General:

The 1871 atlas depicts this area, but the Sanborns of 1886 and 1896 include none of its industrial sites. It is not even visible in the 1876 Bird's Eye. This must mean the East Deering was not important in the minds of Portlanders. The Presumpscot Yard of the Grand Trunk came later.

1840-1899

Pollution Sources Keyed to GIS

Food processing:

Portland Rendering Works H. Peters

[1.1-FP-12]

Most likely located between the yard and the bay. The insert on pl. 19 of the Sanborn of 1896 shows a building with four tanks, and "tallow and fertilizer."

Metal working:

The Presumpscot Iron Co.; Eastern Forge

[1.8-MW-1-1]

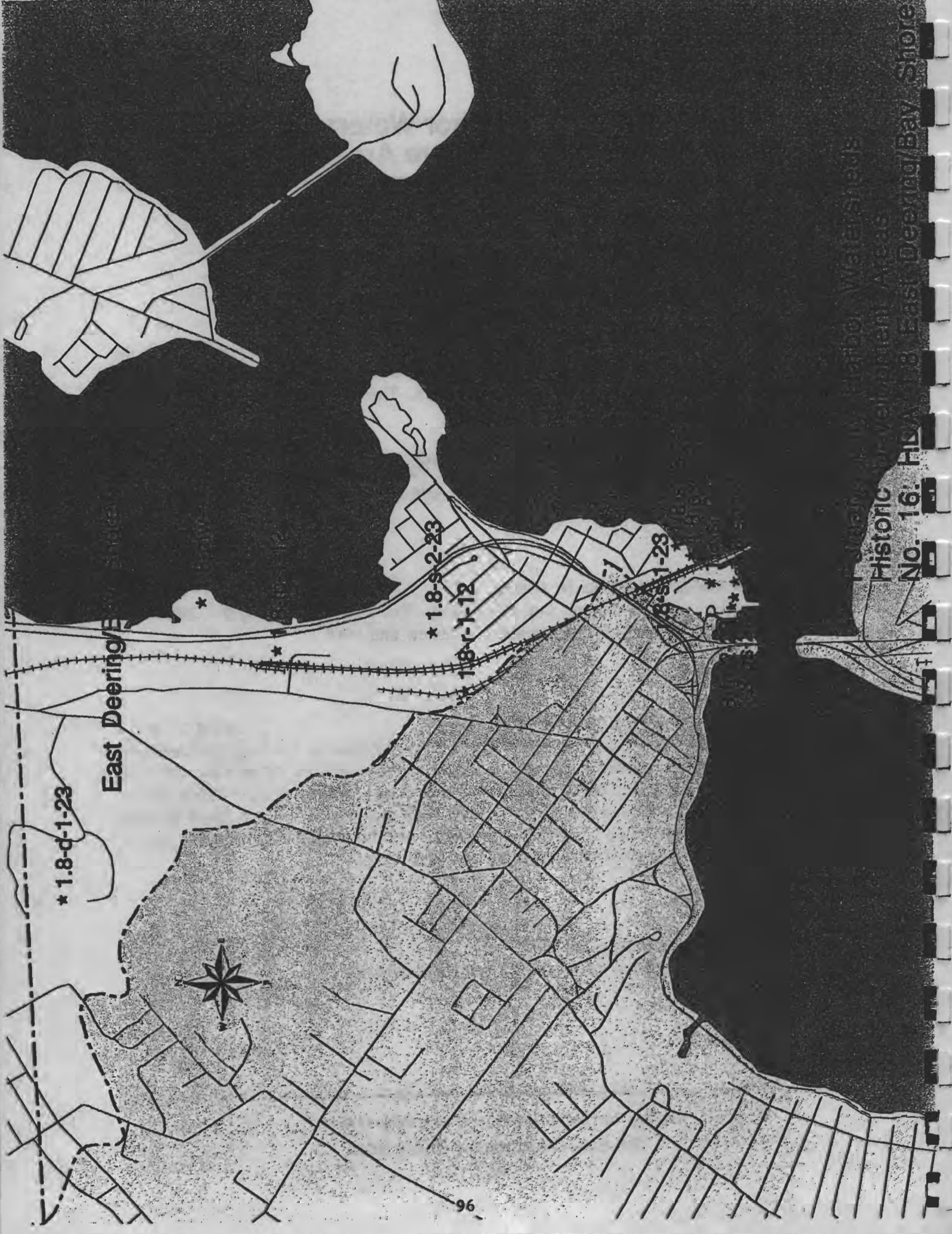
Depicted in the 1871 County atlas east of Martin's Point under the name Presumpscot Iron Co. The site included a foundry located on a small island set off from the mainland with a "canal" going east and west. By land access was off Presumpscot Street. In the 1886 Sanborn it is named the "Eastern Forge Co. Forge Shop" and the layout includes four furnaces. Ten years later next to the layout with the forges and now two machine shops are the words "Not running at present" (pl. 19 insert).

Railroad facilities:

Grand Trunk's Presumpscot Yard

[1.8-R-1-12]

Constructed at the end of the century including roundhouse.



East Deering/Bay Shore

* 1.8-d-1-23

* 1.8-s-2-23

* 1.8-r-1-12

* 1.8-s-1-23



Historic Traveler's Guide

Historic Traveler's Guide

No. 16: Historic East Deering/Bay Shore

Shipyards:

Merrill's shipyard

[1.8-SR-1-1]

Water Street, north of the Grand Trunk tracks and close to or at the location of today's B & M plant on the 1871 Cumberland County atlas. On the 1884 Colby State atlas and the Stuart 1894 State atlas (pl. 49).

Kelly's shipyard

[1.8-SP-2-1]

East of Merrill's, north of the Grand Trunk tracks in 1871. Not on the 1884 or the 1894 State atlases.

Russell's shipyard

[1.8-SP-3-12]

South of the Grand Trunk tracks in 1871. On the 1884 and 1894 atlases. Still present in 1919 (see below). Possibly where Webber Oil is today.

1900-1969

Background Information

General:

By 1909 the area was important enough to Portland to warrant five plates in the Sanborn atlas, and by the end of the 1930s, another plate was added (pl. 77). Burnham and Morrill has had a plant on the present location for most of the period. Petroleum storage and distribution facilities have been located where they are today for most of the time, likewise.

1900-1969

Pollution Sources Keyed to GIS

Dumps and landfills:

The Ocean Avenue Landfill

[1.8-D-1-23]

Located on a stream that flows down into Casco Bay close to the Falmouth town line. It is on the upstream side of Ocean Avenue where Presumpscot Street meets it. (Jim Robbins, 12/17/92). On the 1956 Portland West USGS Quadrangle it is shown as a quarry and wetland.

Food processing:

Burnham and Morrill

[1.8-FP-2-23], [1.8-PS-2-2]

The plant is shown at its present location on the 1914 atlas (pl. 12). See 1909+ (pl. 38). The 1954 Sanborn (pl. 55) indicates a "skinning and washing" building with "pickling tanks" on the second floor, and a small building with a "machine shop" on the

first floor, and a "sheet metal workshop" on the second. The main building built in 1946 had the kitchens and packing rooms, offices and storage on five floors. The last updating of the 1954 Sanborn in the early 1960s shows "fuel oil tanks" next to this main building on the south side toward the bay shore (pl. 55).

The Portland Rendering Co.

[1.8-FP-1-12]

Still had its plant east of the yard with the facilities partially shown on the 1914 atlas (pl. 13).

Metal working:

Eastern Forge

[1.8-MW-1-1]

The iron foundry was no longer in existence by 1914. The atlas shows "Ruins Forge Co." on the point where it had been located. The site was then owned by Portland Terminal Co.

Petroleum storage and distribution:

Sun Oil Co.

[1.8-PS-1-23]

Nothing was shown at the site in 1909, but was the Russell shipyard there anyway? By 1922 the Sun Oil Co. had a small tank farm on the waterfront, next to the railroad tracks and at the end of Kensington Street. The site is shown with six medium sized vertical tanks, and six very small ones, possibly on supports (1909+, pl. 41 insert). The site was still the same in 1954. Later there may have been an asphalt plant there, according to Joe Payne (conversation, 6/11/92) who heard the information from a local resident. Several photographs in the collection of the MHS show the facility in the distance from the air with the work on the new Route One in the early 1960s.

Railroad facilities:

Presumpscot (Grand Trunk) yards

[1.8-R-1-12]

To the east of Presumpscot Street were the yards depicted on the 1914 atlas with a round-house and, toward the bay shore, its stock yards (pl. 13). By the late 1930s the roundhouse was augmented by a foundry (pl. 39), and the stockyards were expanded (pl. 40).

Sewers and outfalls:

Winslow Street?

[1.8-S-1-23]

Although it is not quite clear on the 1914 City atlas, it appears that a sewer and outfall came out below Winslow. Today there is a CSO outfall at the location

Acadia Street

[1.8-S-2-23]

Outfall on inlet well east of the previous, close to Grand Trunk tracks. CSO outfall today.

Shipbuilding:

Russell's Shipyard

[1.8-SP-3-12]

The 1914 atlas shows none of the three yards where they had been in 1871 (pl. 12). However, an engineer at the Dept. of Public Works said during W. W. I there was a shipyard in the area. Moreover, the Maine Historical Society recently acquired a painting of the Russell Shipbuilding Co. yard in 1919. The Fall issue of the Society's newsletter has a black and white copy of the painting (vol. 6, no. 1 [1992]). It shows two ships on ways with two long workshop buildings in between. In the distance is the trestle and swing bridge section of the Grand Trunk. The newsletter indicates the yard was on Berwick Street from 1864 to 1921.

_____1970-present_____
Pollution Sources Keyed to GIS

Filling stations:

With the coming of I-295 many filling stations in this area no longer had a reason to exist, and today most are gone without an above-ground trace.

Food processing:

Burnham and Morrill

[1.8-FP-2-23]

The 1981 Report for the Portland Industrial Pretreatment Program foresaw few problems for the sewer system: beans, detergents and syrups. Traps for solids, effluent filtration and grease skimming were expected to remove any potential pollutants.

Petroleum storage and distribution:

Webber

[1.8-PS-1-23]

The petroleum storage and distribution facility at the end of Kensington has been there since 1922 at least. The present one, that of Webber Oil Co., has a different layout than the one of the 1909+ and 1954 Sanborns. Joe Payne, Casco Baykeeper, heard from an employee that the old tanks had been removed at some point.

A note on recent petroleum pollution on this area:

In 1990, a persistent smell of fuel oil in the Kendall Street neighborhood led to an investigation by the Maine Department of Environmental Protection. Below the end of

the street at the shore, there was an oil sheen, and traces of fuel oil were seeping out from the bank below the end of the street. The DEP checked home fuel oil tanks in the houses on Kendall and Lennox, but found no leaks. The department had soil from the bank removed and thought the problem was taken care of.

In spring of 1992, however, the problem was worse than before. The smell was in the air (I was there on May 29, a rainy day, with Payne), and oil was clearly on the surface of the water and the mud of the intertidal area. To trace the source, the DEP had an engineering firm do drilling on the street and carry out gas chromatograph tests to see if the oil was following the sewer lines from somewhere. John Gordon of the Tanks Program who was the manager for this project did not think that Webber Oil was the source because Kendall was uphill from there (Interview 6/1/92).

A conversation (1/4/93) with Payne to update the situation yielded the following: The city had occasion to dig up and replace the sewer pipes on Kendall and the intersecting street last summer, and no trace of fuel oil was found. However, the odor continued; another set of gas chromatograph tests was carried out and the front yard of the house closest to the bluff was excavated. Monitoring wells have been installed. With the freezing of the ground, the odor and the seeping have stopped.

Portland City Harbor Watersheds:

1.9 Grand Trunk Area (See Map 17)

1840-1899

Background Information

General:

The Grand Trunk Railroad was the foundation for the growth of this Historic Development Area. During the early 1840s Canadian grain merchants and others realized that their country needed an ice-free port from which wheat could be shipped in the winter months, and consequently, a rail connection to a port on the New England coast. The dramatic tale of how two Portland entrepreneurs convinced the Canadians to decide on Portland over Boston is told in several local histories. A winter ride through wild storm to Montreal enabled the timely delivery of the Portland group's proposal. Its adoption led to Portland being eastern Canada's winter port for 120 years.

The major heavy industry in this area was founded in part to produce locomotives for this line to Montreal. That was just the beginning. The Portland Company went on to become known as a locomotive producer that sold to many railroads, as well as a maker of steam engines for marine and stationary use. During the Civil War it produced cannon for the Union.

1840-1899

Pollution Sources Keyed to GIS

Cemetery:

Eastern Cemetery.

[1.9-C-1-123]

The 1871 Country atlas shows the cemetery at Congress and Mountfort.

Food processing:

Burnham and Morrill

[1.9-FP-2-1]

At 12-21 Franklin in 1896 (pl. 21), a few buildings up from Commercial, was the canning factory for "meats and soups." At MHS under "Portland: Streets: Commercial" is a photo of the Burnham and Morrill plant at this location.



Grand Trunk

* 1.9-v-1-1

* 1.9-m

* 1.9-c-1-12

* 1.9-p-1-1

* 1.9-r-2-1

1.9-mw-3-123 * 1.9-g-1-23

* 1.9-r-1-12

* 1.9-3

* 1.9-fp-3-3

* 1.9-m-2-2

1.9-fp-2-1

* 1.9-m-1

1.9-s-

* 1

REPRODUCTION OF ORIGINAL MAP

Eagle Sugar Refinery

[1.9-FP-1-1]

The refinery was first shown on the Colby 1884 State atlas (pl. 49). On the 1886 Sanborn the plant was at 137-55 Fore between Hancock and Mountforte (pl. 34). Ten years later the Laughlin Works had replaced it.

Machining:

John A. Lidback's machine shop

[1.9-M-1-1]

Close by the new Laughlin plant in 1896 was this shop at the intersection of Franklin and Commercial (pl. 4). The book Leading Businessmen of Portland (Portland, 1887) said the machine shop produced and repaired "marine, stationary, portable and hoisting engines" at 25-27 Commercial, and had been founded in 1865 as Libby, Lidback & Co. "The plant of the house consists of a two-story building, 45 X 70 feet, and a twenty horse-power engine supplies the steam force." Ten men on the average were employed. The "large number of the engines now in operation in this city is the best testimonial to the appreciation they have received" (p. 177).

Metal working:

The Portland Co.

[1.9-MW-1-123]

The 1876 Bird's Eye of Portland pictures the extensive works below Fore and Water streets. The first of the Sanborn Insurance maps in 1886 shows the layout in detail (pl. 3). Just below Fore Street was its small brass foundry. Next toward the harbor was a long building housing two machine shops and two foundries with coke ovens and a pickling room, followed by one more foundry in a separate building. Parallel to this structure was, starting from the west end, a railroad car building shop, a blacksmithing and "tank" shop then a boiler shop. Further over toward the harbor and next to the Grand Trunk railyard was a small tin shop and a larger blacksmith shop. To the west of these were a paint shop and various storage buildings.

Leading Businessmen of Portland (Portland, 1887) adds important details (p. 84-85): The plant produced "Locomotives, Marine and Stationary Engines, Railroad Cars, Snow Ploughs, High and Low Pressure Boilers, Dredging Machinery, Mill Gearing and Shafting." Repairs of all of these were carried out. "All kinds of dry and green sand composition and iron castings are made." Two and one half acres of the nine-acre site were "under roof," and "steam power is extensively used." More than four hundred fifty men worked in the plant, representing "ten distinct trades without mentioning

draughtsmen and clerks."

The 1894 State atlas shows the facilities but in nothing like the detail of the Sanborns (pl. 49). It does note the location of the "wharf of the Portland Co." across the railroad tracks right on the harbor. Maine Historical Society has a fine glass plate negative of the facility with the Grand Trunk yards in the foreground. It has a photo of an illustration in a book of an interesting engine made for a monorail, but none of the regular locomotives.

Laughlin Co.

[1.9-MW-3-123]

Another major foundry-machining complex that continued in operation until recently was located between Hancock and Mountfort on Fore, the Thomas Laughlin Hardware Mfr. Co. In 1886 the site was occupied by the Eagle Sugar Refinery (pl. 34), but by 1896 the foundry was present (pl. 15). According to the Report of the Commissioner of Industrial and Labor Statistics in 1898 the company "manufactures all kinds of marine goods and ship chandlery hardware. . . . It employs about sixty hands the year round" (p. 121). It is pictured in a photograph in the Maine Historical Society collection from an unknown book showing six buildings, including two forging shops, a foundry and a four story machine shop. (File: "Portland: Views").

The Milan Mining Company; Portland Smelting

[1.9-MW-2-1]

This plant was at the foot of Congress and the mouth of Back Cove right on the water. The 1886 Sanborn map (pl. 19 inset) indicates a smelting works was here that used zinc oxide in its processes. The 1894 State atlas labels this was the Portland Smelting Works (pl. 49). By 1914 it was gone.

Railroad facilities:

Grand Trunk Railroad yards

[1.9-R-1-12]

The 1876 Bird's Eye shows the first passenger depot, the elaborate roundhouse, repair shops and freight yards. Three piers, two with tracks laid out on them, were owned by the railroad. The dramatic development of the grain shipping facilities was to come later. The 1886 Sanborn maps reveals the exact locations of the facilities: the passenger depot and train shed at Commercial and India, the roundhouse to the north of it, and close by to the northwest, an oil storage shed (pl. 4).

Grand Trunk car repair shops

[1.9-R-2-1]

East of the roundhouse were two long buildings: one devoted to passenger car repair with a machine shop and a dirt floored foundry, the other to freight car building and repair (pl. 3).

Shipbuilding and repair:

Dyer's shipyard

[1.9-SR-1-1]

According to the 1894 State atlas, this site was located at the foot of Congress, south of the smelting works (pl. 49).

Varnish and paint making:

Burgess-Fobes

[1.9-V-1-1]

The 1876 Bird's Eye shows another major polluting enterprise in this area, the Burgess-Fobes White Lead Works with a tall stack billowing out smoke. Located on Munjoy below Moody, several buildings composed the complex. The 1884 Colby State atlas (pl. 49) and the Stuart 1894 atlas both showed its location. The layout was shown in the 1886 Sanborns (pl. 19), but the firm was not named. Ten years later the facility at the corner of Munjoy and Wilson was shown in greater detail and a note was included: "Grinding Dry and In Oil. No cans made here" (pl. 8).

1900-1969

Pollution Sources Keyed to GIS

Machining:

222/28 Fore

[1.9-M-2-2]

Machine shop in the 1930s (1909+).

Corner of Franklin and Commercial

[1.9-M-1-1]

By 1954 the Sanborn maps reveal none of the potentially polluting industries that were there in 1886, but the buildings were still in place. A portion of the block was now devoted to the Chase Transfer Corp. trucking facilities.

Metal working:

The Portland Company

[1.9-MW-1-123]

The firm continued to prosper. Changes in several buildings were revealed on the 1909 Sanborn map (pl. 7). The foundries were brought together in one larger building with a clerestory roof. The boiler shop was expanded, but otherwise the facilities appear the same as they did in 1886. During WW I among other things it fabricated shell casings. The Maine Historical Society has a photograph of the interior of one of the company's machine shops in that era under "Portland: Factories." Some good photos of the facility are at Sullivan's Photocraft, as well.

The 1954 Sanborn map shows that the machine shops had been expanded to the west with the addition of another building. The former car shop was used for steel fabrication. The next-in-line blacksmithing shop was now a machine shop, in part used by the Chapman Electric Neutralizing Co. The blacksmithing shop next to the railroad yard was gone (pl. 7). Note that in the 1930s this had been used as another forge shop and tin shop (1909+).

Laughlin Co.

[1.9-MW-3-123], [1.9-G-1-23]

The 1914 City atlas shows on Fore to the west between Hancock and Mountfort the location of the "Thos. Laughlin Hardware Mfr. Co." The 1909 Sanborn details several buildings, with the four story machine shop and adjacent building in place. However, larger buildings with different orientations than those in the later 19th century illustration for the forge and heat treating shops were in place.

In the 1930s the Laughlin facility included a building for galvanizing on Fore, and a paint shop on Mountfort. The L-shaped building on Hancock contained forge shops, and shops for heat treating, blacksmithing and machining (1909+, pl. 16). As would be expected, the plant was involved in war production during 1940s (see Pr. Her., 4/27/43, pp. 1, 6). During the 1950s the local papers hardly took notice of the plant. There was one article lauding "labor-management cooperation" in the plant that was now controlled by American Hoist and Derrick (Pr. Her., 5/29/57, p. 2; see also Sun. Tel., 6/9/50, mag. sect., p. 8).

Printing:

19/21 Commercial [Not on GIS map]
Offset printing in the 1930s (1909+).

[1.9-P-1-2]

Railroad facilities:

Grand Trunk depots and yard

[1.9-R-1-12]

The railroad prospered during most of this period. In 1903 a new passenger station was constructed at the corner of India and Fore, and the long depot with the double curved roofs on Commercial was torn down. See photos in the Maine Historical Society collection under "Portland, Railroads" of both in 1903. Sullivan's Photocraft has available some excellent pictures of the "new" passenger station, and the yards. The 1909 Sanborn shows the layout of the new station. See also pl. 17 in the 1909+ and 1954 Sanborns. The roundhouse was gone by then, replaced by the one at the Presumpscot Yard in 1.8.

Grand Trunk freight yard and elevators

[1.9-R-2-12]

By 1909, as the Sanborn map indicates, the shops for passenger and freight car repair were gone. In the 1930s the Sanborn indicates that east of where the original passenger depot had been located were two grain elevators and three freight piers (pl. 18). By then elaborate grain loading facilities had been constructed [See photo in MHS under "Portland: Wharves"]. In 1954 only one of the elevators was still there (pl. 18).

Newspaper accounts tell the story after this. In 1956 the Grand Trunk railroad planned the modernization of its elevators. Steam service ended and was replaced by diesel. But these events constituted more of an end than a beginning. In 1960 passenger service ceased. In 1964, the pier with the cattle yards for shipping overseas was closed; two years later the interesting passenger terminal of 1903 was taken down, and announcement was made that the elevators would be sold or demolished.

Sewers and outfalls:

Franklin Street

[1.9-S-1-2]

The line was laid where the Franklin Arterial is now and out into the harbor between Franklin and Galt in 1914. The Casco Bay Ferry pier covers the site now.

India Street

[1.9-S-2-2]

The line went down India Street and come out between Galt and Atlantic in 1914.

1970-present
Pollution Sources Keyed to GIS

Food processing:

Jordan Meats

[1.9-FP-3-3]

This firm is a food processor of the modern era, as is Barber Foods in the Railroad Triangle Area (1.3-FP-4-3).

The 1981 Report for the Industrial Pretreatment Program envisioned possible pollution problems from meat scraps, detergents, and grease from processing. Modest care seemed sufficient to eliminate these problems.

Metal working:

Portland Company

[1.9-MW-1-123]

In the late 60s and early 70s, the owners of the Portland Company planned expansions (Ev. Exp., 9/15/67, p. 1; 6/29/75, p. 113; 6/2/75, p. 5). However, prosperity did not come. A Scarborough businessman, Phineas Sprague, bought the "financially troubled" Portland Company in 1978, then sold the name and several divisions (Ev. Exp., 7/24/78, pp. 1,8; Pr. Her., 7/25/78, p. 10).

Eventually the foundry was closed. In 1989 the son of the Scarborough businessman commented that he was not able to use the buildings because of "the city's restrictive waterfront referendum" (Pr. Her., 3/10/89, p. 13). Today (12/93) the facilities are in a "marine-related use," boat repair and storage. Portland Machine Tool Rebuilders is there. In addition, The Maine Narrow Gauge Railroad Museum is open at the site.

Laughlin Co.

[1.9-MW-3-123]

The Laughlin history is another part of the tale of Portland's deindustrialization. Great hopes for expansion of the business had been expressed in 1974 (Ev. Exp., 9/9, pp. 1, 12). But eleven years later the end began to appear. Twenty-nine workers were laid off in 1985 (Ev. Exp., 4/29, p. 3).

In 1981 the Laughlin foundry was apparently still in operation. In the "Report for the Portland Water District" the following appeared: A range of heavy metals, solvents and lubricants was expected to be problematical. The galvanizing quench tanks could be a source of zinc, the quench tanks in the forge room of iron and other metals, and the machining operations of metal chips. Pickling acids, caustic paint removers, the lubricants and solvents used in machining and cleaning parts were all listed. Interestingly enough, city sampling and lab tests revealed little zinc contamination.

Railroad facilities:

Grand Trunk yard

[1.9-R-1-12]

One of the Grand Trunk Railroad grain elevators was still part of the Portland skyline in 1970. In 1972 Canadian National signed a contract for its demolition, a process that took ten months instead of the expected three. In the late 1980s, the trackage along the waterfront around to and including the trestle bridge to East Deering was sold to Emons Industries of York, PA. Portland Trails is now (1992) negotiating to acquire the right of way for a walking trail under the Eastern Promenade across to East Deering.

Shipyards:

Bath Iron Works

[1.9-SR-2-3]

BIW leased the former Grand Trunk yards and pier space in the early 1980s for its new Portland Yard. Naturally, BIW is part of Portland's Industrial Pretreatment Program.



1.10-j-2-2 *

1.10-p-6-2 *

1.10-p-5-2 *

1.10-p-2-2 *

1.10-p-4-2 *

1.10-j-3-2 *

1.10-p-1-2 *

1.10-s-6-2 *

1.10-j-4-2 *

1.10-j-1-2 *

Central Commercial Street

1.10-s-5-2 *

1.10-s-4-2 *

1.10-s-3-2 *

1.10-s-2-2 *

1.10-s-1-2 *

1.10-eg-1-1 *

1.10-v-1-12 *

1.10-mf-1-3 *

Central Commercial Street

1.10-fp-3-2 *

1.10-fp-1-1 *

1.10-fp-4-2 *

1.10-fp-2-1 *

1.10-fp-5-2 *

1.10-ps-1-2 *

1.10-mf-2-2 *

1.10-fp-3-2 *

1.10-fp-1-1 *

1.10-ps-2-2 *

Portland City Harbor Watersheds:

1.10 Central Commercial Street (See Maps 18a, 18b)

1840-1899

Background Information

General:

This is a classic waterfront commercial area with bits of industry mixed in, along with possibly polluting transportation activities. Commercial Street did not exist in 1840. Tidal flats were filled in during the 1850s to construct it. The wharves existing then were simply extended further out into the harbor, as a comparison of their orientation on the 1837 Portland map with later ones shows.

Numerous wharves are still present that can be found by name on the map of the waterfront in the Cumberland County atlas of 1871 and shown in great detail on the Bird's Eye of 1876. The latter indicates that ones on the western end up to Center Street all had railroad tracks going out onto them.

Tracks were laid to connect the Grand Trunk to the east with the Portsmouth line in the West Commercial Area (1.11). Recently they were taken up and replaced by supposedly more aesthetic brick paving.

1840-1899

Pollution Sources Keyed to GIS

Electricity generation:

Consolidated Electric Light Co. of Maine

[1.10-EG-1-1]

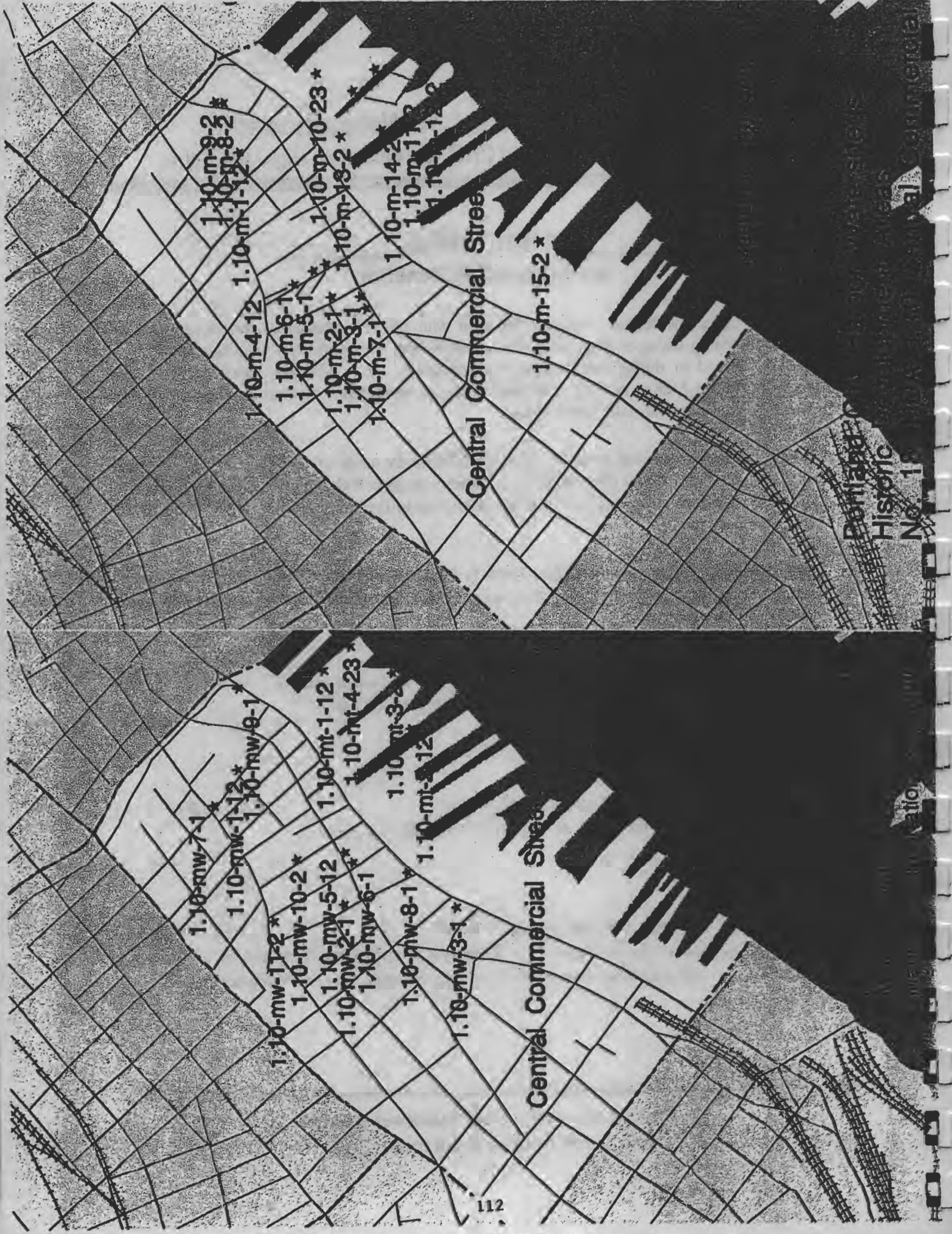
At 12-18 Plum. "Dynamo Room" in 1896 Sanborn (pl. 19).

Food processing:

Portland Packing Co. on Widgery's Wharf

[1.10-FP-1-1]

One of its plants was at the head of Widgery's Wharf below Plum shown on the 1876 Bird's Eye. The map key noted it produced "Hermetically Sealed Provisions."



1.10-mw-7-1 *

1.10-mw-1-12 *

1.10-mw-9-1 *

1.10-mw-11-2 *

1.10-mw-10-2 *

1.10-mw-5-12 *

1.10-mw-2-1 *

1.10-mw-6-1 *

1.10-mw-8-1 *

1.10-mw-3-1 *

1.10-mt-1-12 *

1.10-mt-4-23 *

1.10-mt-3-2 *

1.10-mt-12 *

1.10-m-9-2 *

1.10-m-8-2 *

1.10-m-1-12 *

1.10-m-4-12 *

1.10-m-6-1 *

1.10-m-5-1 *

1.10-m-2-1 *

1.10-m-3-1 *

1.10-m-7-1 *

1.10-m-10-23 *

1.10-m-13-2 *

1.10-m-14-2 *

1.10-m-11-2 *

1.10-m-12-2 *

Central Commercial Street

Central Commercial Street

1.10-m-15-2 *

Portland

Historic

No. 18

Central Commercial

Portland Packing Co on Commercial

[1.10-FP-2-1]

Close by the 1886 Sanborn (pl. 8) shows the same company with a facility between Commercial and York, Center and Maple. Possibly the "Fish Packing" plant at the head of Widgery Wharf is the same one that appeared on the Bird's Eye. See also 1896, pl. 23.

Machining:

Note: See under "MW" for 1.10-M-1-12]

Note: The following sources were used in this section: Stuart's 1894 State atlas (pl. 49 where locations are numbered and keyed to list of firm names) and the 1886 and 1896 Sanborn maps (the source of the street numbers).

D. Winslow & Sons

[1.10-M-2-1]

At 50-53 Cross, a "Machine shop" at the lower end toward Fore (atlas no. 6). In 1886 Sanborn (pl. 9) "Machine and Pattern Shop;" also 1896 (pl. 22).

462-70 Fore

[1.10-M-3-1]

"Machine Shop" at the corner with Cross on the 1886 Sanborn only. Probably Jones and Hitchings.

Jones and Hitchings

[1.10-M-3-1]

At 40-42 Cross, a "Machine Shop" at the corner with Fore (Stuart's 1894 State atlas, no. 10). Not present in 1896.

C. M. and H. T. Plummer

[1.10-M-4-12]

On Union halfway down the block between Middle and Fore (atlas no. 3-5). Also in 1886 Sanborn (pl. 9) and 1896 Sanborn (pl. 22). Leading Businessmen of Portland (Portland, 1887) describes the firm as "Boilermakers, Machinists, and Dealers in Steam and Water Pipes, Valves, Fittings, Railroad and Mill Supplies, 48 and 52 Union Street." It was founded in 1825 as Plummer and Eaton and went under various Plummer names until 1863 when it acquired the name used later. It had a two story shop on Union of 100 X 90 feet, and another on Cross Street of 60 X 50 feet. "Some twenty-five hands are employed." It was both a retail and wholesale business, and had customers "throughout New England and Canada" (p. 104).

W. H. Scott

[1.10-M-5-1]

At 29-33 Union, the lower end toward Fore (atlas no. 6). In 1886: "Tin Shop and Sheet Metal Work (pl. 9). Same in 1896 (pl. 9).

W. H. Pennell Co. [1.10-M-6-1]
At 51 Union "Steam piping" (atlas no. 7). In 1886, "machine shop;" vacant in 1896.

L. Brodigan & Co. File Works [1.10-M-7-1]
On Fore, at the corner with Cotton (atlas no. 7 on Fore).

Marine transportation:

Portland and Cape Elizabeth Ferry [1.10-MT-1-12]
Terminal at the Customs House Wharf at the foot of Dyer (Stuart's 1894 State atlas, pl. 49).

Peoples Ferry [1.10-MT-2-12]
Terminal at the Long Wharf at the foot of Sawyer (*ibid.*). For the terminal in South Portland see [2.2-MT-1-12].

Metal working:

Regouler & Jones [Same as [1-10-M-1-12] [1.10-MW-1-12]
On Ashland, between 31-33 Pearl/ 24-26 Vine. "Brass Foundry with Machine Shops" in 1886 Sanborn (pl. 5). Firm name in 1896 (pl. 21).

D. Kelley Foundry [1.10-MW-2-1]
At 49 Cross. Present in 1886 (pl. 9); (atlas, no. 8); 1896 (pl. 22). Also had a foundry at Kennebec and Marginal Way (1896, pl. 33); see H. D. A. 1.7.

T. Laughlin & Sons [1.10-MW-3-1]
At 295 Commercial, "Block and BSS [brass?] Works" at corner with Center (atlas, no. 9 on Commercial. Presumably the earlier location of the works which by 1896 were located in HDA. 1.9 on Fore between Hancock and Mountforté.

L. Crockett Foundry [Not on GIS map. Opp. MW-6-1?] [1.10-MW-4-1]
At Fore on the corner with Union (atlas, no. 3). "Brass Foundry and Copper Smelter" in 1886 Sanborn (pl. 9).

C. A. Donnell Brass Foundry [1.10-MW-5-12]
At 440-42 Fore. In 1896 Sanborn (pl. 22). Atlas, no. 1 on Fore (not found).

Stevens, Smart & Dunham

[1.10-MW-6-1]

Leading Businessmen of Portland (Portland, 1887) describes their 444 Fore Street location (p. 125): The firm had been founded in 1840 by Rufus Dunham; the name in the Sanborn was used from 1883 to 1887 when A. A. Stevens and N. Smart assumed sole control. Their location was at 444 Fore Street, and the building had "four floors, 40 X 60 feet in size, and furnished with steam power." Fifteen men worked there.

Stevens, Smart & Dunham Brittanla works

[1.10-MW-7-1]

On Middle, their "Brittanla Metal Factory" at southeast corner with Pearl (Stuart's 1894 State atlas, pl. 49, no. 3).

Standwood & Shanning

[1.10-MW-8-1]

At 285 Commercial. In 1887 Leading Businessmen of Portland indicated that "all kinds of Galvanizing, Vessel and Iron Work [is] done at short notice." The main business was as shipsmiths dealing in "Chains, Anchors, Ships Pumps, etc. etc." Three men worked there. Not apparently in the Sanborns.

Quinn & Co.

[1.10-MW-9-1]

45-49 Commercial Street at the northwest corner with Franklin in 1887, as described in Leading Business Men of Portland (Portland, 1887), p. 105: Founded in 1869. "All the work generally undertaken by Boiler Makers, Blacksmiths and Machinists is done, and Bolts, Nuts, Washers, Rivets, Hemp and Rubber Packing and Engineers' Supplies are dealt in; Plate Iron will be cut to any dimension for any purpose, and a specialty is made of Quinn's Patent Ferrules, which have proved so successful in the repair of leaky tubes." Fifty men worked in the plant. "The premises occupied are of the dimension of 60 X 300 feet, and twenty horse power is used." The firm wasn't found on the Sanborns.

Varnish and paint making:

Burgess-Fobes Paint Co.

[1.10-V-1-12]

The Thomas Block, a historic landmark building on the harbor side, is clearly depicted on the 1876 Bird's Eye. One occupant was the varnish and paint company which had an operation there as indicated on successive Sanborn Insurance maps. It also had a plant on Munjoy Hill (see 1.9). The 1896 Sanborn (ppl. 4) does not identify the firm; only that "wholesale paints and oils" were sold there. It is not clear whether manufacturing went on here then; although after WW I it did (see below).

1900-1969

Background Information

General:

Toward the eastern end were several wharves that may have been sources of pollutants. Back on Fore and Middle streets in 1909 there seem to have been no potentially polluting activities. Toward the western end were several blocks of businesses devoted to metal working and machining. By 1954, on Fore, more light industry facilities were located toward Franklin end of the area.

In the 1960s "urban renewal" destroyed much of the above ground past in this area. Big swaths on the western end are now parking lots.

1900-1969

Pollution Sources Keyed to GIS

Automobile and truck related:

292 Fore

"Truck garage and a motor freight terminal;" east of the Customs House, in the 1930s (1909+, pl. 19) and in 1954 .

37 Danforth

"Auto body shop" (1909+, pl. 30).

Filling stations and repairs:

1930s on the waterfront

Merchants wharf: Auto and truck repairs (").

Richardson's wharf: Filling station with at least one tank (pl. 33).

1930s up the hill toward Congress

- 47-51 Cross: near corner with Fore, repairs (1909+, pl. 26).
80-82 Cross: "General Ice Cream Corp." garage and repairs (").
70 Free: opp. Brown, filling station with one tank (pl. 30).
106-12 Free: filling station with six tanks (").
136-38 Free: filling station (pl. 29).
4-12 York: between Dunphrys and Center, "Auto Truck Sales and Service" (pl. 26).
60 Spring: at corner with Oak, filling station with three tanks (pl. 30).
Fore, Pleasant, Center crossing: filling station with one tank (").
I across from Customs House, two buried gas tanks and one fuel oil tank (pl. 19).
136 Park: filling station with three tanks (pl. 43).
148-50 Park: filling station with two tanks (").
36-38 Plum: truck repairs and express terminal (1909+, pl. 25).

Food processing:

Long Wharf Cannery

[1.10-FP-3-2]

A small "canning factory" in 1909 that was not there in the 1930s.

Portland Cold Storage

[1.10-FP-4-2]

On Central Wharf a freezing plant and a large building for sulphur storage in 1909. In the 1930s it was still present, minus the sulfur storage (1909+, pl. 34).

Monmouth Canning

[1.10-FP-5-2]

On Merrill's Wharf in the 1930s (1909+, pl. 33).

R. J. Peacock

[1.10-FP-6-2]

One of two sardine packers on Brown's Wharf in the 1930s in the amended Sanborn (1909+, pl. 32).

Brown Co.

[1.10-FP-7-2]

One of two sardine packers on Brown's Wharf in the 1930s (1909+, pl. 32).

Junk and machinery:

Widgery's Wharf

[1.10-J-1-2]

Junk dealer in 1914 City atlas (pl. 1). Also in amended Sanborn of 1909, meaning present in the 1930s (1909+, pl. 26).

494 Fore

[1.10-J-2-2]

"Dealer in New and Second Hand Machinery, Motors and Generators" in the 1930s (1909+, pl. 26).

Portland Pier

[1.10-J-3-2]

"Junk" in 1909 (pl. 34). "Machinery exchange and storage" (1909+, pl. 34).

Central Wharf

[1.10-J-4-2]

Junk dealer (1909+, pl. 34).

Machining on the waterfront:

Custom House Wharf

[1.10-M-10-23]

Two machine shops in the 1930s (1909+, pl. 20) and in 1954 (not present back in the atlas of 1914).

Mianus Motor Works

[1.10-M-11-2]

One of two machine shops on Portland Pier on the 1909 Sanborn (pl. 34). "Motor Repairing." On west side of pier. Also on 1914 City atlas (pl. 1).

Pike and Horn Machine Shop?

[1.10-M-12-2]

One of two machine shops on Portland Pier on the 1909 Sanborn (pl. 34), (unnamed shop on east side of pier). May have been the one with sign on the pier in back of the Portland fireboat in a photo in the collection of the MHS (under "Portland-Vessels")? By the 1930s neither of the machine shops were there (1909+, pl. 34).

Commercial wharf

[1.10-M-13-2]

Next over to the west from Portland Pier, below Market, a "gas engine repair shop," along with various fish and clam dealers in 1909. By the 1930s the wharf was largely vacant, and no engine repair shop was there (1909+, pl. 30).

Smith and Langmaid Machine Shop

[1.10-M-14-2]

On Long Wharf below Moulton, to the west of Commercial wharf in 1909. By the 1930s only Pocahontas Fuel (coal) used this dock (1909+, pl. 34).

Fred F. Boyce Machine Co.

[1.10-M-15-2]

On Brown's Wharf in the 1930s (1909+, pl. 32).

Machining on Fore Street and above:

Regouler and Jones Machine Shop

[1.10-M-1-12]

On Ashland between Pearl and Vine in 1954. Was it still doing metal working? (see above). Is the successor now (1992) Broadway in South Portland [2.4-MW-2-3]?

60-65 Union

[1.10-M-4-12]

"Plumbing and machine shop" in the 1930s (1909+, pl. 26). This was probably the same location as that of C. H. and A. T. Plummer shown in 1894.

302-304 Fore

[1.10-M-8-2]

East of the Customs House, "machine shop" in 1954 (pl. 19). The machine shops present in 1954 are no longer there.

296-98 Fore

[1.10-M-9-2]

"Machine shop" in 1954 (?). Where "Parks Furniture Gallery" is now (1993)?

Marine transportation (fuel storage):

People's Ferry

[1.10-MT-3-2]

On the Portland Pier below Silver the ferry to South Portland had its terminal in 1909, moved from Long Wharf where it had been in the 1894 State atlas [1.10-MT-2-1]. Gasoline was stored in a large building on the same pier. No wonder Fire Boat No. 7 is shown moored right next to the pier in a Maine Historical Society photograph. The People's Ferry was gone by 1954 (Sanborn, pl. 34).

Casco Bay Lines

[1.10-MT-4-23]

On the Customs House Wharf the ferry terminal was located in the 1930s (1909+, pl. 20). In 1954 it was still at the same location. The Portland Pier was then the terminal of the Peaks Island ferry (pl. 34). No fuel tanks indicated for either the Casco Bay Lines or the Peaks Island ferry.

Metal working:

Regouler and Jones

[1.10-MW-1-12]

On Ashland, between Pearl and Vine. In the 1930s with brass foundry, shops for nickel plating, machining and painting (*ibid.*). See also 1.10-M-1-12.

440-42 Fore

[1.10-MW-5-12]

Corner with Union, iron foundry and copper smelter with machine shop in the 1930s (1909+, pl. 25). Machine shop still there in 1954. The former Donnell site.

49-51 Union

[1.10-MW-10-2]

Blacksmithing and welding in the 1930s (pl. 26). Former Pennell site [1.10-M-6-1].

98-100 Union

[1.10-MW-11-2]

Tinware factory in the 1930s (*ibid.*).

Military facilities:

U. S. Navy Supply Station

[1.10-MF-1-2]

On the Franklin Wharf in the 1930s (1909+, pl. 20).

Naval Patrol Base

[1.10-MF-2-2]

On the Brown Wharf with machine shop in the 1930 (1909+, pl. 46).

Petroleum product storage, distribution in the 1930s:

Merchants Wharf

[1.10-PS-1-2]

Three underground 10,000 gal. tanks (1909+, pl. 32).

Sturdivant Wharf

[1.10-PS-2-2]

Four tar tanks (1909+, pl. 46).

Printing in the 1930s (1909+ Sanborn, pl. 25):

54 Union

[1.10-P-1-2]

67-69 Union

[1.10-P-2-2]

Linotype Composition Co.

[1.10-P-3-2]

At 392-94 Fore between Dana and Moulton

5 Exchange

[1.10-P-4-2]

Corner with Fore, second floor.

43-49 Exchange

[1.10-P-5-2]

"Printing and bookbinding."

142-44 Middle

[1.10-P-6-2]

Corner with Pearl.

Sewers and outfalls:

State Street

[1.10-S-1-2]

Apparently between Park and State at the eastern end of Commercial, coming out between State Street and Deak Wharves. On plate 4, 1914 City atlas. No CSO outfall in 1984.

High Street

[1.10-S-2-2]

Down High Street between Berlin Mills and High Street Wharves. CSO outfall in 1984.

Maple Street

[1.10-S-3-2]

Down Maple Street, with outfall off Wrights and Berlin Mills Wharves. Outfall for CSO at slightly different location.

Browns/Merchants Wharves

[1.10-S-4-2]

Outfall in 1914. Still CSO outfall.

Exchange Street

[1.10-S-5-2]

Down Exchange with outfall off Long Wharf. Outfall today.

Market Street

[1.10-S-6-2]

Down Market with outfall between Commercial and Portland Piers. CSO outfall today.

Varnish and paint making:

Burgess-Fobes

[1.10-V-1-12]

The Thomas Block was partly still was occupied by the company in the 1930s (1909+, pl. 20) and in 1954. The Sanborn maps indicate that the firm had a "paint factory" here. This is supported by oral evidence. According to an unidentified woman who worked in the building in the 1950s, the firm was still there and probably producing paint (conversation at CBEP Citizen Advisory Committee meeting on 10/10/92).

1970-present Background Information

General:

Development took another turn. Major issues arose over preserving a working waterfront or devoting the area more to residential and office purposes. The issues are not yet resolved. The old railroad tracks are gone, but some have suggested laying them down again for the narrow gauge railroad museum, and possibly run trains on the street. No longer is the Thomas Block a place of paint manufacturing. It has been restored and occupied by offices and, on the ground floor, restaurants and shops. Machine shops and metal working industries are no longer active in this area.

1970-present Pollution Sources Keyed to GIS

Machining:

Customs House Wharf

[1.10-M-10-23]

A motor repair shop operates now (1992).

Portland City Harbor Watersheds:

1.11 - West Commercial Street Area (See Map 19)

1840-1899

Background Information

An Area Defined by Transportation Linkages:

Road and railroad bridges made this area a key one in the growth of the city before 1840, as well as after. To understand why certain industrial facilities were located here, it is necessary to present some data about the bridges, including locations and when they were built.

Vaughn Bridge

[1.11-Br-1-12]

The Vaughan was constructed in 1800 at the west end for horse, wagon, carriage and foot traffic to connect Portland to the south, over what is now known as Old Route One. All that remains of the last version of the bridge are abutments, and on the South Portland side, a section of iron railing set in granite blocks just beyond the sewage pumping station that occupies the center of the former roadway by the river.

Old Portland Bridge

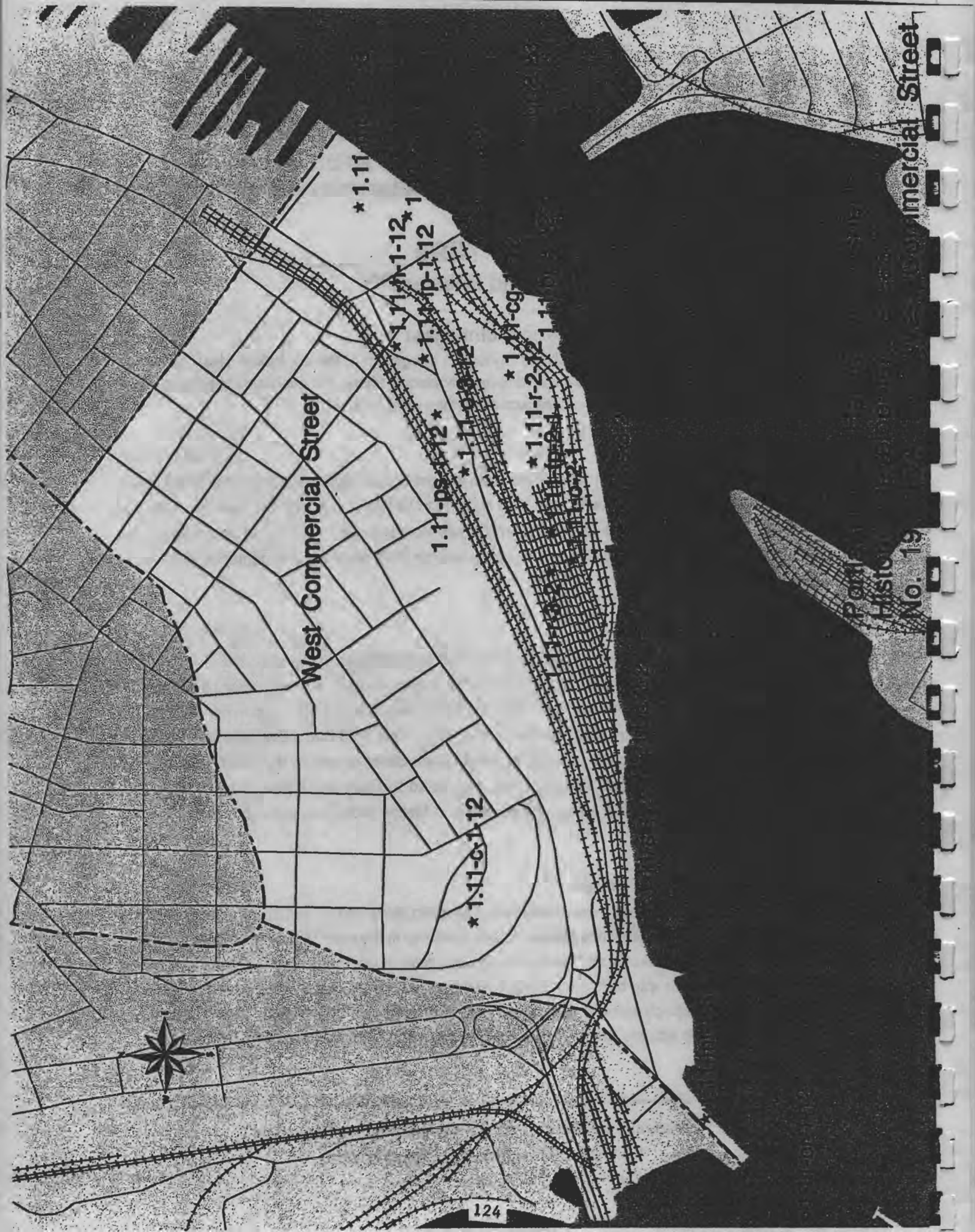
[1.11-Br-3-12]

The Old Portland Bridge, a wooden structure first built in 1823, was at the east end of the area to connect Portland with Knightville. The Portland side had a dangerous grade crossing across the railroad yards east of the gas works. The 1865 Bird's Eye shows a small lift section on the bridge to Knightville for passage of ships close to the Portland end. The 1876 Bird's Eye reveals much more detail, including a bridge approach over the yard from Clark Street as well as the grade crossing from Commercial. Bracket Street at that point was connected to Clark just before the bridge, but for pedestrians there was a bridge across the Boston and Maine tracks just under the cliff with stairs down to Commercial.

Turners Island railroad bridge

[1.11-RBr-1-12]

Railroads made this area what it was, along with the sailing ships and steamboats that docked at the eastern end of the area. Today one railroad bridge remains; in the later 19th century there were two. The first chronologically went from Turners Island over close to the Portland end of the Old Portland Bridge to Knightville. It was built in the early 1840s by the Portland, Saco and Portsmouth railroad. The east end of the bridge with two approaches is shown on the 1876 Bird's Eye. Tracks went down Commercial to link up with the Grand Trunk, a connection made in the 1850s which continued until



West Commercial Street

* 1.11-g-1-12

1.11-ps-1-12 *

* 1.11

* 1.11-r-1-12 *

* 1.11-p-1-12

* 1.11-cg

* 1.11-r-2-1

* 1.11-p-2-1

* 1.11-r-2-1

Commercial Street

Pont
Histor
No. 19

recently. In 1886 the bridge is labeled as part of the "Boston & Maine R. R. Eastern Div." (Index plate; same in 1896). The 1894 Portland area map in the State atlas shows the whole bridge linking the railroad's yard on Turners Island and the line to the southwest with the Commercial Street trackage and to Union Station (pl. 48).

Ligonla railroad bridge

[1.3-RBr-3-1], [1.3-RBr-3-123]

The second railroad bridge was built northwest of the Vaughan Bridge. The first version was built some time after 1871, for it is not included in the Cumberland County atlas maps. It was intended to give a railroad access to the rolling mill. The second larger version appears on the 1894 State atlas (pl. 48). A photograph in the collection of Sullivan's Photocraft shows the earlier single track trestle bridge with the rolling mill and company houses in the background. The second version still exists and is parallel to the Veterans' Memorial Bridge.

1840-1899

Pollution Sources Keyed to GIS

Coal gas generation:

Portland Gas Co.

[1.11-CG-1-12]

On the other side of the Old Portland Bridge to the west were the works of the Portland Gas Light Co. Here the company produced coal gas for home and business lighting from 1849 to the late 1930s. The 1871 County maps reveals the buildings and associated structures in outline. The 1876 Bird's Eye depicts them clearly located between the Old Portland Bridge and the Turners Island railroad bridge. The Sanborn maps of 1886 (pl. 21) and 1896 (pl. 45) reveal details, including the locations of the retorts where coal was burned to produce gas, the purifiers and the gas holders for storage until distribution. No coal tar pit is shown. However, on-site disposal of this carcinogenic substance is likely, given the practice in other parts of the country, and the coal tar reported seeping from the river bank below the former site.

Food processing:

Soap Making - Leathe and Gore; Lunt

[1.11-FP-1-12]

The "Leathe and Gore Refined Soap Factory" occupied the triangle formed by Commercial and York Streets in 1876 (no. 70). Ten years later the "Frank D. Lunt & Co. Soap Factory" was there making "Steam refined Soap" (pl. 21); it was still present in 1896 (pl. 45). Note that the 1894 State atlas shows this site as at 20 Commercial Street and with firm name of "Leathe and Gore." By 1909 the soap manufactory was gone (pl. 55).

Forest City Sugar Refinery

[1.11-FP-2-1]

On the Birds' Eye map of 1876 to the west of the gas works and the Turners Island railroad bridge was the Forest City Sugar Refinery between Commercial and the Fore River (no. 60). The 1886 Sanborn (pl. 14) shows the plant in detail with its store houses for raw sugar and boiler rooms, "bone black kilns" and filter house. Ten years later the Sanborn showed the same layout, but printed across it were the words "closed and not in repair." (pl. 46).

Hat manufacture:

Ayer-Houghton Co.

[1.11-H-1-12]

East of the gas works in 1886, but on the other side of Commercial on Clark was the Ayer-Houghton Co. which manufactured wool hats (pl. 21). See also State atlas of 1894 (pl. 48) and 1896 Sanborn (pl. 45).

Other possibly polluting industries:

Note: For orientation with regard to this and the other sites described, eastward along Commercial next on the harbor side was the gas works. On the other side where Beach met Commercial was the Standard Oil Co. Works in 1896 discussed below.

Land Plaster - Cummings Co.; Carleton Co.

[1.11-O-2-1]

West of the refinery by 1886 was the L. C. Cummings Co. which manufactured "land plaster from marble using kilns (pl. 14). In 1896 the facilities were occupied by Carleton Bros. & Co. but they were "not in operation" (pl. 46). By 1909 the Maine Central yards had expanded onto this site and that of the refinery.

Portland Star Match Co.

[1.11-O-3-12]

The Portland Star Match Co. occupied a site across Commercial from the refinery. Its several buildings in 1876 lay between Commercial and the tracks of the Boston and Maine which ran just under the cliffs of the Western Prom (no. 65). See also the 1886 Sanborn (pl. 14); 1896 (pl. 46). The plant continued in operation until after 1909.

Petroleum storage and distribution:

Pine State Oil Works (Standard Oil)

[1.11-PS-1-12]

At 33 Commercial across from the gas works was the Standard Oil Co. of N.J. Pine State Oil Works in 1896 (pl. 45). Inside the facility were two small "oil tanks," and outside four medium sized "oil tanks." The works were the same ten years before (pl. 21).

Railroad facilities:

Maine Central yards

[1.11-R-1-1], [1.11-R-2-12]

The waterfront area below the West End was ideal for railroad yards and support facilities. Mudflats must have been filled in here, judging from the successive maps. The first yard was where the International Terminal is now. It was a simple facility as shown on the 1876 Birds Eye. [1.11-R-1-1]. The second larger facility is shown on the 1886 Sanborn on the other side of the bridge to Knightville, including a roundhouse and yard (pl. 14). [1.11-R-2-12] Next to the east came the gas works (see below) and the railroad bridge.

Freight stations and yards

[1.11-R-3-1]

East of the Old Portland Bridge [1.11-Br-3-12], the 1876 Bird's Eye shows on Commercial the passenger depot of the Eastern and Maine Central railroad, and behind it toward the water that earlier small yard of the Maine Central (no. 56). By the 1886 Sanborn this older yard was serving as a freight depot. On the water was the combined wharf of the International Steamship Co. and the Portland, Bangor and Machias Steamship Co., both located where the International Terminal of the Nova Scotia ferry is now. Just under the heights of the West End, the tracks of the Boston and Maine and the railroad's freight shed were located. At Commercial and State, the Boston and Maine had its passenger depot. The Portsmouth railroad also served the area (pl. 20).

1900-1969

Background Information

General:

The West Commercial Street area remained important for railroads and industry for much of the time. The 1909 Sanborn maps and the 1914 atlas provide material for an overview of development at that time. Later Sanborns (1909+, 1954, 1954+) show subsequent development and abandonments.

Million Dollar Bridge

[1.11-Br-3-23]

In 1916 replacement of the Old Portland Bridge was authorized for one million dollars; hence the name given the new structure which opened a few years later. A photographic postcard at the MHS shows the bridge from the Portland side across. Another card from the same collection shows the whole area with the gas works storage tanks standing out dramatically against a setting sun. In the Sullivan collection are similar photographs which give an idea of the whole industrial context in this Historic Development Area.

1900-1969

Pollution Sources Keyed to GIS

Coal gas generation:

Portland Gas Co.

[1.11-CG-1-12]

Across Commercial from Standard Oil, the gas works continued producing for most of the period. The 1909 Sanborn shows the site, somewhat changed from 1896, in great detail (pl. 55). Included were a connected series of buildings for generating gas, and several for purifying it. Several naphtha (gasoline) tanks are indicated. Four gas holders were at the north end of the site; toward the harbor were three coal sheds. See also the 1914 City atlas (pl. 4).

By the late 1930s two oil tanks had been added at the east end of the site (1909+, pl. 55). This probably was related to shutting down the old process of coal gas generation, and replacing it with another. An article in the Press Herald of July 4, 1940 (p. 12) reported that several years before "production of coal gas ceased" after "new water gas machines" were installed. The sales manager was happy to report increased sale of gas and gas appliances, including Servel Electrolux refrigerators. In contrast to the 1920s when gas was used mainly for lighting and cooking, by 1940 it was used for keeping food cool, home and water heating. In 1958 control of the company passed to a New York based holding company.

An Evening Express article of January 14, 1966 (p. 18) told of the big change that had happened. Portland Gas Light was now distributing natural gas from Texas and Oklahoma. It had purchased a New Hampshire transmission line, and converted home and industrial burners over the previous few years. The article included a picture of the old plant in 1917, torn down during W. W. II. It also stated that 1938 was the year of conversion from coal gas to the "carbureted water gas process."

Filling stations and repair facilities (In the late 1930s):

570 West Commercial

[1.11-FS-1-2]

Filling station with two tanks (1909+, pl. 62).

Hat manufacturing:

Ayer-Houghton Co.

[1.11-H-1-12]

East of Standard Oil at 2-12 Clark between Commercial and Beach was the Ayer-Houghton Hat Factory still in 1909 (pl. 55). A careful look at the Sanborn indicates possible pollutants. Raw materials were dyed, shaped into hat forms, trimmed and boxed in boxes made on site. It is not clear whether mercury was used in the processes, but it is likely. There was a large naphtha storage room. Power came from a dynamo driven by a steam engine. By the late 1930s, the site was used for a "Motor Freight Station" (1909+, pl. 55).

Other possibly polluting Industries:

Diamond Match Co.

[1.11-O-3-12]

In 1909 the Diamond Match Co. still had its works west of the Standard Oil facility and opposite the Maine Central yard on Commercial. Given the details about the automatic sprinkler system, and auxiliary water tanks it must have been regarded as a significant fire risk (pl. 58). The 1914 atlas shows the buildings, but does not indicate the firm was active. By the late 1930s, the site was used for the storage of "iron and steel" (1909+, pl. 58).

Petroleum storage and distribution:

Pine State Oil Works; Koppers Products

[1.11-PS-1-12]

The 1909 Sanborn shows the facility between the Boston & Maine tracks and Commercial west of the Old Portland Bridge. In the main brick building of the Pine State Oil Works of Standard Oil of N. Y. were two small oil tanks, and on the first floor space for filling barrels. Outside in the yard were three medium-sized oil tanks, one of those present in 1896 having disappeared. By the late 1930s, Koppers Products Co. used the old site for "Tarmac Road Oil" (1909+, pl. 55). It had expanded to the east along Beach Street.

Railroad facilities:

Maine Central yard

[1.11-R-3-2]

Toward the middle of the area along the shore, Maine Central's yard and roundhouse is shown in the 1909 Sanborn with the approach to the railroad bridge to Turner Island (pl. 58; 1914 atlas, pl. 5). The yard had expanded to include the site of the Forest City refinery (see above). Just east of the gas works, the railroad had its huge coal unloading wharf (pl. 55). By the late 1930s the round

house was gone, but the turntable was still there (1909+, pl. 58). The railroad to Turners Island had disappeared by then [1.11RBr-1-12], as well (pl. 55). The coal unloading and storage facilities were present, and remained there at least until 1954 (pl. 55), for they appear in the last Sanborn.

Sewers and outfalls:

The 1914 City atlas shows four outfalls in this area.

Danforth sewer and outfall

[1.11-S-1-2]

A short one comes down from Danforth at the western end.

Vaughan

[1.11-S-2-2]

Carries sewage down the Street from the upper watershed.

Emery

[1.11-S-3-2]

Carries sewage down the Street from a distance.

Clark

[1.11-S-4-2]

The longest one comes down Clark, meets with interceptors at Commercial and continues to the shore. The interceptor to the west starts about where Orange would hit Commercial if it came down over the bluffs. The interceptor to the east goes along into the next HDA; 1.10. At some time afterward this, the Commercial Street Interceptor was continued to the west to join up with the other sewers in this area. Now it continues up the Fore River shore.

1970-present

Background Information

Transportation linkages:

Plans to replace the Million Dollar Bridge have been drawn up, and are presently being reviewed (1992).

1970-present

Pollution Sources Keyed to GIS

Coal gas generation:

Portland Gas Co.

[1.11-CG-1-12]

In 1971 Portland Gas became a division of Northern Utilities. Nothing was left at the old location but possibly coal tars in the ground. Now there is a propane distribution facility on the surface.

Junk and scrap yards:

[1.11-J-1-3]

Close to where the Vaughan Bridge was located is a huge scrap metal yard.

Marine transportation:

Merrill's Terminal

[1.11-MT-1-3]

In the 1980s at the west end Merrill Industries developed a marine terminal to handle bulk cargos by Veterans Memorial Bridge. (Pr.-Her. [Oct. 26, 1983], p. 13).

The International Terminal

[1.11-MT-2-123]

At the east end, is the International Terminal, now used by the Nova Scotia Prince, the car, truck and passenger ferry.

Railroad facilities:

The old yards are a wasteland today. One proposal for the new Amtrack station was the area where the coal pocket was located west of the Million Dollar Bridge; another was to locate the facility in the International Terminal area (see Casco Bay Weekly, vol. 5, no. 50 [Dec. 10, 1992], pp. 1, 9-10). This would place it close by where the Maine Central station was before 1888 when the Union Station was built. From the standpoint of remnant pollution the former has the disadvantage of being close to the gas works site.

Sewers and outfalls

[1.11-S-1-2 to 1.11-S-4-2]

The Commercial Street Interceptor has been extended from below Orange westward and around along the Fore River. Today there is a CSO below each of the crossing points of the four sewer lines of 1914 with that Interceptor, and at the location of the old outfalls, storm water is discharged. See City of Portland, General Plan, Existing Sewer System, 1984. Thus off the Emery and Clark Street outfalls, pollution from the former industries located along Commercial and over to the

shore could be expected. This could include mercury from the hat factory, PAHs and lead from the filling stations, the Standard Oil storage facility, the Maine Central roundhouse and yards, and other heavy metals from the latter's machine shop.

South Portland Harbor Watersheds

General Note:

South Portland split off from Cape Elizabeth in 1895 because the people living in the settlements along the Fore River and Portland Harbor wanted various improvements including a water system. It became a city in 1898 with seven villages that formed it becoming seven wards. (See League of Women Voters, South Portland History (1971), pp. 31-32). Growth planning issues are well-discussed in a series of articles in the Evening Express in 1988 (8/29, pp. 1, 10; 8/30, p. 1, 20).

South Portland Harbor Watersheds: 2.1 Spring Point Area (See Map 20)

1840-1899

Pollution Sources Keyed to GIS

Military facilities:

Fort Preble

[2.1-MF-1-12]

The "dirty history" of this facility has not been investigated. It was built just before the War of 1812, used during the Civil War, and the First and Second World Wars and turned over to the State in 1952. See brochure: "A Guide to Fort Preble" by Donna L. McKinnon and Joel W. Eastman (c. 1992). According to William Bayreuther, Director of the Spring Point Museum, the Vocational Institute located there now has a committee entrusted with dealing with any polluted sites that emerge.

1900-1969

Pollution Sources Keyed to GIS

Dumps and landfilling:

[2.1-D-1-23]

The land from Preble Street eastward where there was a cove on the 1914 City atlas is now filled in flats. Much of the fill probably came from the area where the flats were excavated for the East Yard drydocks. But there city refuse and waste may have been used as well. This area includes much of what became the West Yard and all of the Naval base. Bug Light in 1914 was well out at the mouth of the harbor. Today it is a bit off shore, and the old jetty that led to it is visible as a stone embankment on the harbor side of Spring Point from the Public Landing eastward.

* 2.1-fp-2-2

* 2.1-f

* 2.1-sr-3-2

* 2.1-d-1-23

* 2.1-fp-1-2

* 2.1-sr-1-2

* 2.1-ps-2-23

* 2.1-mw-3-2

2.1-sr-1-3

* 2.1-m-1-23

* 2.1-mw-2-23

* 2.1-ps-1-23

-mf-1-3

* 2.1-mw-1-23

* 2.1-mf-

* 2.1-ps-1-23

Spring Point

South
Historic
No 20

Filling stations and repair facilities:

Truck Service

Former West Yard structure: "Auto Truck Service" in 1954 (pl. 71). Now (1992) "Truck Service."

Note: No filling stations are in this HDA.

Food and fertilizer processing:

Quality House Specialty Corp. Sardine Factory

[2.1-FP-1-2]

Close by the oil terminal on the harbor by the former West Yard in 1954 was a sardine cannery and a fish meal processing plant (pl. 71), neither in operation today. The cannery was located apparently in one of the West Yard buildings that had been next to the ways. It had a short pier, several outdoor fish oil tanks and a small machine shop.

Deep Sea Products Inc.

[2.1-FP-2-2]

On the 1954 Sanborn, located on what looks like a former outfitting pier in the West Yard. It was described as "mfg. fish meal and fish oil," and had several small "fish oil tanks."

Metal working and machining:

While Portland Pipeline Co. has been a viable enterprise since the war, the two shipyards were not (see below under "Shipbuilding and Repair"). Though the facilities were "mostly vacant" in 1948, by 1954 things were changing. They have continued to do so since, with upswings corresponding to the development surges of the 1960s and the 1980s.

Portland Copper and Tank, Machine Tool Rebuilders, South Portland Shipyard, General Electric

[2.1-MW-1-23]

In 1954 the old buildings of the East Yard were being used by Portland Copper and Tank which had its main facilities over on Mill Cove in the Ferry Village Area and by Portland Machine Tool Rebuilders (pl. 77). The latter was using half of the huge plate bending shop as a machine shop as well as large building adjacent for the same purpose.

Energetic efforts to keep industry in the area and bring in new firms continued. Newspaper accounts in the 1960s tell of South Portland Engineering's contract to produce a research fishing vessel, its recovery from a fire that destroyed its largest building, its contract to produce steam turbines for General Electric and finally GE's purchase of the facilities. (*Ev. Exp.*, 5/22/64, p. 1; 7/28/67, p. 1; *Pr. Her.*, 6/16/66, p. 1; *Sun. Tel.*, 1/23/65, p. 12B). For a time, the latter's Heat Transfer Products division made steam condensers, generators and heat exchangers, as the League history relates (p. 61).

Former West Yard: Walsh Construction

[2.1-MW-3-2]

The Walsh Construction Co. had the large building that faced where Front and Preble met. It was

listed as "Mfg. Cast Iron Pipe," but whether production or storage took place here was not clear. (pl. 71).

Former West Yard: Portland Machine Co.

[2.1-MW-2-23]

The other huge building in the former West Yard was occupied by the Portland Machine Co. as well.

Military facilities:

[2.1-MF-2-2]

The Navy developed a base on filled-in land at the beginning of W. W. II, resulting in Bug Light's no longer being far offshore at the end of a long jetty. After the war this facility became a Reserve Training Center that is now (1992) vacant (1954 Sanborn, pl. 71).

Petroleum transport, storage and distribution:

Portland Pipeline Co.

[2.1-PS-1-23]

The other wartime venture was the construction of the Portland-Montreal pipeline to transport petroleum to the refineries there from the ice-free port. In five months a 12 inch pipe was laid between the two cities while the big new shipyards were beginning operation in 1941. The Portland Pipeline Co. built a four-tank farm to receive the oil off-loaded. The pipeline served a need after the war, and has remained a viable operation to this day. (See the company history published in a booklet of 26 pp., Portland Montreal Pipe Line 1941-1991).

In 1949 the tank farm was expanded. In 1950 an 18 inch pipeline was laid, and by 1957 the two lines were handling up to 270,000 gallons per day. By then Pier No. 2 had been constructed extending one of the old South Portland Shipyard outfitting piers. In the mid-60s a 24 inch line was constructed, the first line having been put to ancillary uses. Storage tanks are at two locations in this HDA indicated on the GIS map.

Pocahontas Terminal, Chevron, Northern Petroleum

[2.1-PS-2-23]

By 1954 Pocahontas had a seven tank farm with off-loading wharf (Sanborn, pl. 71) on the Portland harbor waterfront. It was located apparently on the site of the ways of the former West Yard. In the 1960s Chevron and Northern Petroleum developed terminals in this area, as well.

Sewers and outfalls:

None indicated in this area in the 1914 City atlas. Today sewage flows from this area to a CSO in the Ferry Village area.

Shipbuilding and repair:

The dramatic history of the Spring Point Area beginning in 1940 has obscured the earlier period. The "clean history" from the Second World War has been told in a book published in 1945 (Portland Ships Are Good Ships [Portland: Machigonne, 1945], the League history and in various newspaper articles from the 1960s onward that dealt with finding new uses for the facilities.

Cumberland Shipbuilding

[2.1-SR-1-2]

The "Cumberland Shipbuilding Company Wooden Shipyard" was located in the area in this century. Jones only made passing mention of it (p. 32). But in the microfilm edition of the 1909 Sanborn on what is described as a "loose sheet" from 1918, the yard is shown in detail. Its precise location cannot be ascertained from the context. Four shipways were shown, a few structures including a small blacksmithing shop, and a "transformer station." The 1992 History of South Portland says it was located where the East Yard was later (p. 7). In Sullivan's collection is a fine image of a launching from traditional ways.

East Yard

[2.1-SR-2-23]

Before the U. S. entered the war, the British contracted for the construction of 30 coal-fueled Ocean Liberty ships. The work was done in specially designed and built dry docks located where the Spring Point condominiums and marina are today. Sullivan's Photocraft collection has an excellent image of the yard under construction with the excavation for the drydocks going on.

Innovative methods of ship construction were used including building the ships in drydocks instead of traditional ways, and welding instead of riveting. The facilities included a 550-foot long bending shop with oil furnaces to heat the great steel plates. There are some fine photographs from the air of this yard at a change of shift in the Sullivan collection.

A Sanborn map of 1948 (microfilm ed., 1926+, pl. 77) shows the drydocks of the East Yard and support facilities clearly. At that point they were in the hands of the U. S. Maritime Administration and the buildings were described as "mostly vacant."

West Yard

[2.1-SR-3-2]

On the harbor opposite Portland, the South Portland Shipbuilding Corporation began constructing the famous "Liberty" ships for the U. S. government shortly after. As the League history states, this yard "was built with the conventional ship ways, allowing the vessels to slide down into the water in a traditional manner" (p. 59). When the British contract was completed in 1943, the South Portland Shipbuilding Corp. took over the East Yard and produced Liberties there, also. The Spring Point Museum and the Maine Historical Society have useful photographs of ships under construction in the two yards. So does the Sullivan Photocraft collection.

Given the urgency with which these operations were conducted and the lack of environmental awareness at the time, there can be no question but that there must be hazardous and toxic substances left in the harbor from these yards. Jones in his book was interested in celebrating the achievements in constructing the yard and the ships. There are only a few statements that give hints about environmental impacts. Jones stated that even though ships were built on inclines in conventional ways in the West yard, "tons of grease were required to get them to slide" into the water (p. 38). Toward the end of his account he said that 25 tons of paint were required for each ship (p. 70). The Spring Point Museum has an excellent photograph of the outdoor storage area for materials.

South Portland Engineering

[2.1-SR-2-23]

Newspaper accounts in the 1960s tell of South Portland Engineering's contract to produce a research fishing vessel, its recovery from a fire that destroyed its largest building. (Ev. Exp., 5/22/64, p. 1; 7/28/67, p. 1.)

1970-present
Pollution Sources Keyed to GIS

Machining:

Ametec [Not on GIS map]

A producer of laundry and dry cleaning machinery during the 1970s in the area. In the later 70s, it gave the property to the city. The precise location is not known.

Tyler Machine Tool

[2.1-M-1-23]

The Tyler Machine Tool Co. is producing (1992) in a new modular building that appears to be on the site of one of the buildings between the two yards.

Portland Machine Tool

[2.1-MW-2-23, 2.1-MW-3-2]

Two of the buildings of the former West Yard are used now (1991-93) for boat storage, the one that had been occupied by Walsh Construction, and other by Portland Machine Tool.

Marine transport:

Spring Point Marina

[2.1-MT-1-3]

Plans were developed for a marina in the early 1980s, and eventually two local entrepreneurs were found to develop and operate in the former East Yard (see Ev. Exp., 8/8/83, p. 13). Spring Point Associates purchased 40 acres in the former G. E. complex (East Yard) and the South Portland Shipyard (West Yard) in 1983. (Ev. Exp., 7/29/83, p. 17). The city's Development Commission transferred 60 acres to them "without fanfare" as a newspaper article said the next year. The Associates developed the condominium complex and related facilities in the former East Yard at the head of Broadway (Pr. Har., 8/15 or 18/90, copy of clipping in the South Portland Public Library Vertical Files). This article is confusing as are some of the others, because the reporters did not know where the yards were, and for what purposes parts of them and the Naval base were used over time).

Petroleum storage and distribution:

Portland Pipeline

[2.1-PS-1-23]

The tank farm of the Portland Pipeline Co. is very much in evidence, as are those of two other oil companies. In 1972 the Pipeline Co. started using booms during unloading to contain any oil

spilled. Certainly before then the contributions to the PAHs in South Portland's sediments may have been significant; afterwards they still may have been noticeable until the very intense concerns of the past few years. In the mid-80s the 18-inch line was converted for use to transmit natural gas from Quebec to Portland (see the company history booklet).



South Portland Harbor Watersheds: 2.2 Ferry Village Area (See Map 21)

1840-1899 Pollution Sources Keyed to GIS

Shipbuilding and repair:

South Portland Shipyard

[2.2-SR-1-123]

George Turner who at the same time was developing the Turners Island railroad facility went together with James B. Cahoon to open a shipyard with a marine railway on Front Street and Institute ferry service in the 1850s, according to the League history (pp. 20-21). Their South Portland Shipyard is shown on the 1871 Cumberland County atlas. The Sanborns show it in detail (1886, 1896, pl. 63). According to the League history, the present name was used from 1887 on, with the firm building passenger steamers, trawlers and ocean-going tugs (pp. 20-21).

Pickett's Shipyard

[2.2-SR-2-1]

Next to the ferry landing on the 1871 County atlas (p 33).

Shipyard

[2.2-SR-3-1]

At the foot of Dyer Street in 1871.

Marine transportation:

The ferry service goes back to early in this period. By 1894 two services connected this area of what was shortly to become South Portland to Portland:

People's Ferry Service

[2.2-MT-1-12]

Shown on the 1871 Cumberland County atlas (p. 33). On Stuart's 1894 State atlas, the terminal was at the foot of Sawyer (they had a coal storage facility there). Went to Long Wharf on the Portland side. See [1.10-MT-2-12].

Portland and Cape Elizabeth Ferry

[2.2-MT-2-1]

Not shown on the 1871 atlas. In Stuart's atlas the terminus was at Dyer (State atlas, pl. 48; 1896 Sanborn, pl. 63). Went to the Customs House Wharf on the Portland side. See [1.10-MT-1-1].

Metal working:**[2.2-MW-1-123]**

The 1871 county map shows a foundry and smelter on the east side of Mill Cove where Rockwell is now. Although it was not shown on the 1894 State atlas, it was on the 1896 Sanborn (pl. 61). Moreover, it is clear from maps done in the present century that the site has been continuously occupied by metal working facilities for at least 120 years.

1900-1969

Pollution Sources Keyed to GIS**Dumps and landfilling:****[2.2-D-1-2]**

In the 1914 City atlas, Preble was the waterfront street on a cove to the east. After that, especially in 1940-41 the cove which must have been largely mudflats was filled in to create land that is included under the Spring Point HDA. Much of that fill could have been mud and clay from the shore where the East Yard was built. But it is not impossible that the flats were used as dump in the 1920s and built up in that fashion.

Food processing:***Brown's Sardine Factory, Seaboard Packing Plant*****[2.2-FP-1-2]**

The 1914 City atlas (pl. 15) shows a sardine plant east of "the old ferry terminal" at the foot of Stanford. As the "Seaboard Packing Plant" it was still there in 1954 on the Sanborn map (pl. 68). The plant still used coal for fuel in 1954, and had tanks for the storage of "vegetable oil" and "soybean oil." See photo in the 1992 History of South Portland (p. 18).

Marine transportation:***People's Ferry*****[2.2-MT-1-12]**

Close by was what the 1914 atlas termed the "old ferry terminal," the site of which was not shown in the 1954 map. In 1900 according to the Portland area directory, the People's Ferry was still in operation. See [1.10-MT-2-12]

Bennett Wharf Construction**[2.2-MT-3-2]**

The 1954 Sanborn (pl. 68) reveals another marine-related industry close to the marine railway. This firm was just west of the shipyard.

Metal working (with machining and petroleum storage):***Portland Copper and Tank Works, Ellas-Portland*****[2.2-MW-1-123]**

The 1914 Portland area atlas shows the plant that made marine hardware. As the Portland Copper and Tank Works it shows up on a plate added to the 1909 Sanborn apparently in 1924 in a small inset (pl. 65). The plant had a large machine shop and several crude oil furnaces. By the

shore were three above-ground oil tanks, presumably to supply the furnaces. The notes indicate that coal was used as a fuel, as well. Not only did the plant use copper in its products but stainless steel also.

The same layout is evident on the 1954 Sanborn map (pl. 65) with a small extension of the tank shop. During W. W. II, according to the League history it "undertook many defense contracts." No details given! After the war it produced jet engine, missile and components, and nuclear reactor equipment. In 1961 it merged with E. W. Bliss to become Bliss-Portland (p. 60). For a period of time it used the old main building at the East Yard at Spring Point. See [2.1-MW-1-23].

Military facilities (with machining):

Coast Guard

[2.2-MF-1-23]

Further west on Front at the meeting of High and Mussey Streets was the Coast Guard base. Upon the layout the Sanborn people (1954, pl. 65) noted "admittance refused" but included the location and sizes of two machine shops, one located on the water.

Petroleum storage and distribution:

Portland Pipeline

[2.2-PS-1-2]

"Marine terminal" at Pier 1 and two tanks on Portland Street.

***Texaco* (Site not found. 169 High is residential)**

[2.2-PS-2-2]

At "169 High," this company is listed as having a facility in both the 1940 and 1970 directories. Was it really in 2.4?

Sewers and outfalls:

Pickett/Preble Streets

[2.2-S-1-2]

Lines from three streets, Pickett, Jefferson and Preble, met and drained into the cove that was still there in the 1914 City atlas (pl. 15). Filled in later, esp. early in the Second World War for the yard and Navy base in the Spring Point HDA. The 1991 "South Portland CSO Drainage Area" map shows a major confluence is still located here, with sewage from the Spring Point area coming in, too. The 36-inch CSO outfall goes out in front of the tank farm from Preble.

Dyer Street

[2.2-S-2-2]

An outfall below the line on Dyer Street by the South Portland Shipyard and Marine Railway in 1914. The 1991 CSO Drainage Area map shows an outfall located here still.

Oak/Harriet Streets

[2.2-S-3-2]

Sewers from two streets, Oak and Harriet, joined with an outfall between them into the harbor in 1914. No CSO outfall was in evidence here on the 1991 map.

Clemens Street**[2.2-8-4-2]**

Line went down Clemens Street into Mill Cove in 1914. The outfall now serves a small CSO outfall.

Shipbuilding and repair:**Portland Shipbuilding****[2.2-8R-1-123]****Story Marine Railway and Shipyard****South Portland Shipyard and Marine Railway**

The 'Story Marine Railway and Shipyard' is named and shown with its layout on the 1954 Sanborn map (pl. 68). This is at one of the longest continually-used sites for building and repairing ships in South Portland, perhaps in the whole Casco Bay region. Located between Pine and Dyer at 257 Front, it seems largely unchanged since 1854. The building next to the street housed a forge and other workshops, and next to the railway was a machine shop.

In the 1900 Portland area directory this old yard and marine railway was known as the "Portland Shipbuilding Co." "Vessels built and repaired with dispatch. . . . All sizes hardwood, oak and locust plank and timber" (p. 15 in the ads). It was mentioned in passing in the League history under the name of the "South Portland Shipyard & Marine Railway Corp." (p. 61), and that is what was still on the sign out front in September, 1992.

1970-present

Pollution Sources Keyed to GIS

Food processing:**Pine State By-Products****[2.2-FP-2-3]**

At 69 Front, doing "rendering" in the 1980 Maine Register, p. 394: According to the records of the South Portland Industrial Pretreatment Program, this facility no longer operates, but when it did, there was an in-house pretreatment facility as the files of the S. Portland program indicate.

Machining:**D. & G. Machine Products****[2.2-M-2-3]**

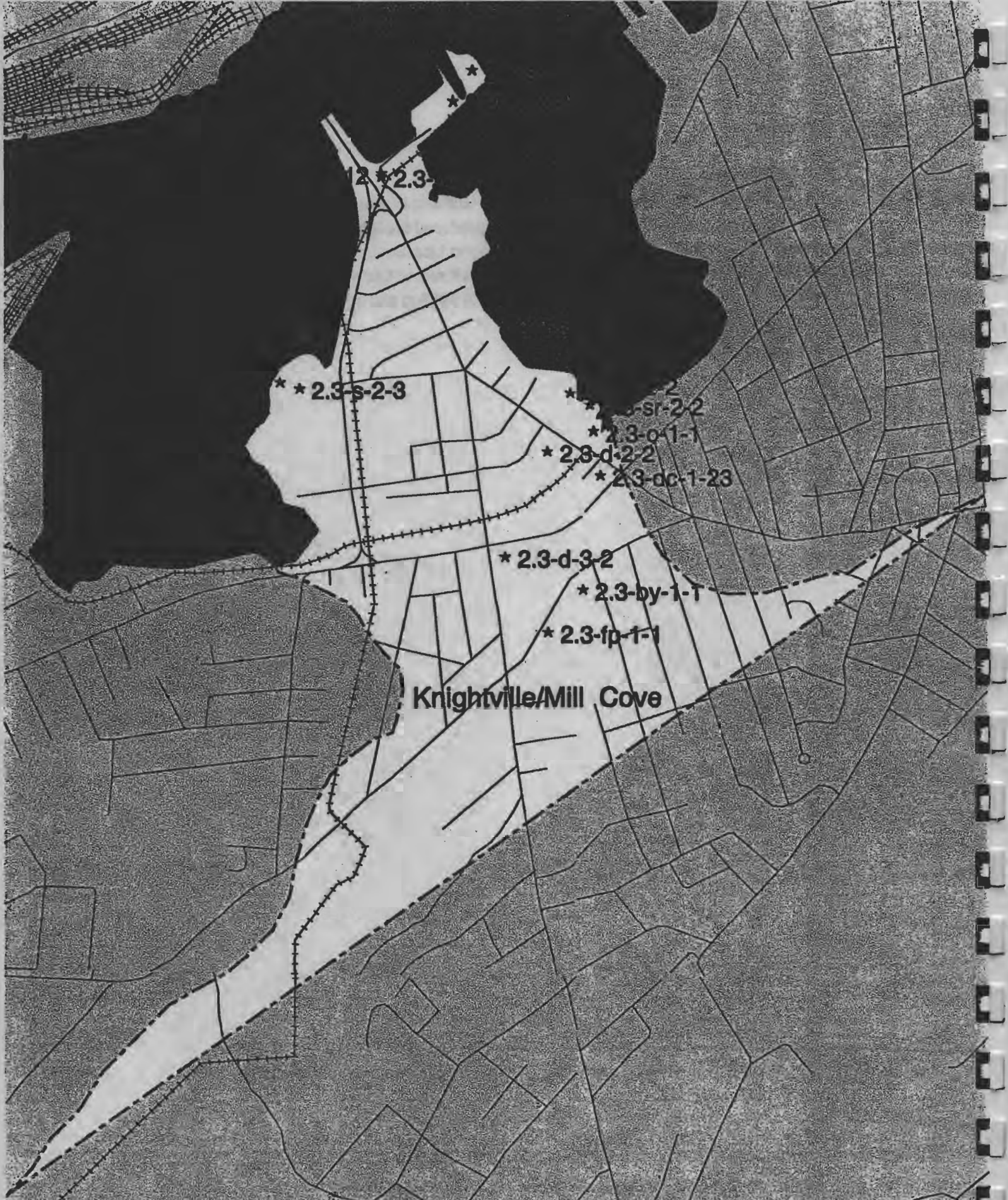
Next to former West Yard. At 169 Front in the 1980 Maine Register, p. 392. Machining business no longer present (12/93). According to Lisa Songco, in charge of the Industrial Pretreatment Program in South Portland, the facility had no discharges for which a permit needed to be issued.

Metal working:

G. W. Rockwood

[2.2-MW-1-123]

In 1971 Rockwood was described as one of the Gulf and Western Industries divisions. The long established metal-working facility on Mill Cove produced firefighting nozzles, valves and aircraft engine components (League, p. 60). According to Lisa Songco of South Portland's Industrial Pretreatment Program, the last permit issued was three or four years ago. The plant no longer operates. Now it is an "office-industrial facility" with welding and auto body shops [1993].



South Portland Watersheds
Historic Development Areas

South Portland Harbor Watersheds: 2.3 Knightville/Mill Cove Area (See Map 22)

1840-1899 Pollution Sources Keyed to GIS

Brickyard:

[2.3-BY-1-1]

J. Bradley's brickyard

On Brewery (now Highland) road close on the other side of Kimball Brook from the Forest City Brewery.

Food processing:

Forest City Brewery

[2.3-FP-1-1]

McLaughlin and Henry Forest City Brewery is shown on Brewery (now Highland) Road between Ocean and Cottage. It was just upstream on Kimball Brook a short ways from the end of the tidal pond in the 1871 atlas.

Other:

Two tidal mills

[2.3-O-1-1]

At the mouth of the tidal pond on the 1871 County atlas (p. 35), the tidal mills were located, but what they processed is not indicated. See also the 1992 History of South Portland (p. 10).

Shipbuilding and repair:

Portland Drydock

[2.3-SR-1-12]

The remnants of a drydock with origins in the Civil War period can be seen to the east of the Million Dollar Bridge. According to the League history, the "Portland Drydock and Warehouse Co." functioned from 1869 to 1921 and was the second largest drydock on the Atlantic coast. The 1876 Bird's Eye shows the site with two dry docks in detail. Excellent early photographs of this facility are in the Maine Historical Society collections, and in those of the Sullivans Photocraft on Forest Avenue (See also State atlas, 1894, pl. 48; 1896 Sanborn, pl. 65 inset).

Urban transport:

Portland and Cape Elizabeth Railroad

[2.3-UT-1-12]

In brick structures that are still (1993) present, the trolley line had its generating plant and car barn. The 1896 Sanborn (pl. 62) shows the details of the "engine and dynamo room."

1900-1969

Background Information

General:

Lower watershed: From the mid-50s onward, redevelopment of Knightville took place with the construction of the Mill Creek Shopping Center on Cottage, and then Mill Creek Park. Aside from what these may have contributed directly to the regular and storm sewers, there is the immense potential for non-point source pollution of the parking areas and streets. In addition, there was the landfill with unknown contents used to build up the area.

Upper watershed: Trout Creek divides with one branch, Kimball Brook, going off to the southwest below Highland Avenue close to the city line. The other branch continues as Trout Creek to the southeast, then turns east, then south into Cape Elizabeth passing through many older and new suburbs. The non-point source pollution potential has been and is substantial.

1900-1969

Pollution Sources Keyed to GIS

Dry cleaning:

Dry cleaner

[2.3-DC-1-23]

119 Cottage, dry cleaner, formerly site of an auto service facility (1954), now Pratt-Abbott. At one point in the 1980s a plume of solvent reportedly was found to extend from this facility down to the Shop and Save parking lot on Mill Cove.

Dumps:

Harbor Dump

[2.3-D-1-2]

On the west side of the Knightville peninsula where the sewage treatment plant is now located was a city dump for many years. This became apparent during excavations for the plant (from Dave Pineo, South Portland Engineering Dept., 12/18/92).

Mill Creek

[2.3-D-2-2]

Where Mill Creek Park is now was a dump (Pineo from G. Erskine, Dir. of Public Works).

Corner Broadway and Ocean

[2.3-D-3-2]

The site of the school at the corner of Broadway and Ocean (Pineo from Ge Erskine, Dir. of Public Works).

Electricity generation (with Petroleum storage):

Portland Street Railway, Central Maine Power

[2.3-EG-1-12]

Portland Street trolley took the old Cape Elizabeth railroad into its system and operated the generating station. In 1922 the trolley line's generating plant was acquired by Central Maine and the plant rebuilt, probably into the "transmission station" with storage building that is shown on the 1954 Sanborn (pl. 55). At 10 Ocean Avenue. Today a part of these structures is used adaptively as a restaurant and apartments, part remains empty.

Maine Central's Power Plant

[2.3-EG-2-23]

A new generating station was built to the east of the old trolley dynamo building on a point of land that had been part of the dry dock facility [2.3-SR1-1]. A 1922 additional sheet in the 1909 microfilmed Sanborn has an inset at the top with the generating station layout. A photograph in the collection of the Maine Historical Society shows the power plant clearly. The Sullivan collection has several useful images, as well. The 1954 Sanborn map shows this Central Maine Power Co. plant with two medium sized fuel oil tanks on the point of land.

Filling stations and repair facilities in 1954:

Many gas stations were located here on this important approach to Portland, and one of the two main entries to South Portland (the Vaughan Bridge being the other). Note: None of the "gasoline gates" at the approaches to Portland have been mapped on the Casco Bay GIS.

Ocean Avenue

15-19 Ocean, corner, 33 A Street: "auto repairs" (pl. 55). Now (1992) is "Ship Shape Car Waxing."

31 Ocean at southwest corner with A: filling station (pl. 55). Now (1992) vacant lot.

30-38 Ocean on east side between A & B: filling station (pl. 55).

45 Ocean at northwest corner with B: "filling station." Building now (1992) adaptively used as a quick film developing shop.

51-55 Ocean at southwest corner with B: "auto sales yard." In 1992 a car wash.

95 Ocean at the southeast corner with D: filling station with three tanks (pl. 56). In 1992 an Exxon station.

112 Ocean at corner with E Street, across the way from the filling station on the triangle where Cottage and Ocean meet (7 Cottage), (pl. 56): In 1992 a vacant lot.

145-48 Ocean: "auto sales and service" (pl. 56).

Cottage

7 Cottage at triangle formed with Ocean: one filling station (pl. 56). Vacant lot in 1992. The 1896 Sanborn (pl. 62) shows this as a school site.

12-14 Cottage at corner with F Street: "auto sales and service," with two gas tanks. Building now (1992) in adaptive use as a store.

119 Cottage and Broadway: auto service station in 1954 (pl. 83), just up the hill from the pond in the park. In 1992 a dry cleaner.

Waterman Drive

In 1993, filling stations and auto dealerships with repair facilities. Not on early 1960s Sanborn.

Other possible pollution sources:

Old Sparhawk Mills Rug Factory

[2.3-O-2-2]

At 60 Cottage in 1954 (pl. 83), close to the pond in the park, at site now covered by the parking lot of the Shop and Save store. Photo in the 1992 History of South Portland (p. 7).

Sewers and outfalls:

E Street

[2.3-S-1-2]

Line went down E Street into Mill Cove on the 1914 City atlas (pl. 16). On the 1991 CSO Drainage Area map the "E Street Pumping Station" is located here with no outfall. At the cove end of B Street is another pumping station.

Ship building and repairs:

Portland Drydock

[2.3-SR-1-12]

Shown on the 1914 City atlas by name and as active.

"Shipyards"

[2.3-SR-2-2]

Indicated on the 1914 City atlas with no specific name.

Urban transport:

Portland Street Railway

[2.3-UT-1-12]

The electricity generating plant had been built close to the site of the 19th century dry dock. By the the turn of the century the Portland Street Railway had taken over the Cape Elizabeth railroad and continued to use the facility. See 1909 Sanborn.

1970-present

Pollution Sources Keyed to GIS

Sewers and sewage plant:

South Portland Sewage Plant

[2.3-S-2-3]

The city decided to build its own sewage treatment system, and embarked upon construction in 1974. The plant opened in 1978. This facility was at the location of a former city dump, as was the plant at the mouth of the Back Cove in Portland. See articles in the Pr. Her. in that year (5/31, p. 10; 9/21, p. 8). A 54-inch outfall sewer goes from this plant into the center of the Harbor. The Portland Industrial Pretreatment Program records are kept here.



Turners Island/Pleasantdale

South Portland Watersheds
Historic Development Areas

2.4-s-2
* 2.4-s
* 2.4-s-3-2
* 2.4-c-1-123
* 2.4-mw-2-3
2.4-ps-2-23 *
* 2.4-ps-2-3
* 2.4-ps-2-23
* 2.4-ps-2-23 *

South Portland Harbor Watersheds: 2.4 Turners Island/Pleasantdale Area (See Map 23)

1840-1899 **Pollution Sources Keyed to GIS**

Cemetery:

Forest City

[2.4-C-1-123]

Close by the mouth of Barberry Creek on its east bank is the cemetery. Part of the cemetery at least is in this watershed, though a portion is in 2.5, Rolling Mills/Ligonia.

Railroad facilities:

Portland, Saco and Portsmouth, Boston and Maine

[2.4-R-1-12]

Turners Island presumably was an island connected to the mainland by marsh and tidal mudflat when George Turner was developing the Portland, Saco and Portsmouth Railroad in the 1850s. The Cumberland County atlas of 1871 shows the yard with the roundhouse and trestle to Portland (p. 30). The 1896 Sanborn map reveals the layout in detail with blacksmithing and machine shops included (pl. 57). By then the site was labelled the "Boston and Maine Railroad Repair Shops."

1900-1969 **Pollution Sources Keyed to GIS**

Cemeteries:

Forest City

[2.4-C-1-123]

In this HDA it is evident that the cemetery was expanded by landfilling between 1914 (City atlas, pl. 17) and the present, since it takes up more space toward the harbor than it did then.

Petroleum storage and distribution:

Texaco

[2.4-PS-1-23]

As early as 1914, the Texas Oil Co. had facilities on the "island" as the City atlas shows. By 1940, the Portland area directory indicates, the company had its off-loading and tank car loading facility on Mechanic Street. The 1954 Sanborn map (pl. 57) makes it seem a modest facility, but the topographic map of 1956 shows another tank farm south of Mechanic. An additional tank farm indicated on the 1956 topographic map is at the mouth of the Barberry Creek.

Anthoine Creek tank farms

[2.4-PS-2-23]

South of Broadway on both sides of Anthoine Creek are tanks shown on the 1956 USGS topographic map. A number of tank sites are indicated on the GIS map.

Railroad facilities:

Portland Terminal

[2.4-R-1-12]

The railroad operated what was left from the larger later 19th century facility, according to the 1954 Sanborn (pl. 57) The roundhouse and trestle bridge that had been there in 1914 (City atlas, pl. 16) were gone. However, there was a long wharf with a movable freight handler, and numerous storage and loading skids, including those for the Texas Co. tank cars.

Sewers and outfalls:

Six outfalls are shown in this HDA in the 1914 City atlas (pl. 16).

Bagley Street

[2.4-S-1-2]

A short street between Broadway and the cove. Sewer emptied into south side of cove into which Anthoine Creek flows. An overflow is present on the 1991 CSO Drainage Area map.

***Unnamed street* (just west of Bagley)**

[2.4-S-2-2]

Emptied into south side of cove into which Anthoine Creek flows. No overflow on 1991 map.

Chapel Street

[2.4-S-3-2]

Emptied into west side of cove into which Anthoine Creek flows. On 1991 map, a 10 inch main joins up to Pearl Street line at the pumping station.

Pearl Street

[2.4-S-4-2]

Emptied into west side of cove into which Anthoine Creek flows. On the 1991 map, a pumping station is located here with a 24 inch main going across the cove directly to the sewage treatment plant in Knightville.

Atlantic Street

[2.4-S-5-2]

Emptied into west side of cove into which Anthoine Creek flows. No CSO outfall on map in 1991.

Mechanic Street

[2.4-S-6-2]

The 1914 map shows a line going down Mechanic Street on Turners Island into the river below Barberry Creek. On the 1991 map, a 36 inch main leads from the Mechanic Street Pumping Station in the other direction.

Barberry Creek

On the 1991 CSO Drainage Area map, there is a major overflow sewer going into Barberry Creek close to where Broadway and Evans meet. No sewer indicated here in the 1914 City atlas.

Antholne Creek

The 1991 map shows an overflow coming into the creek from Hoyt and Broadway up in the watershed.

1970-present Background Information

General:

Barberry Creek has proven to be a carrier of pollution. This is not surprising. In back of Turners Island is the part of the city called Pleasantdale, bounded on either side by streams. To the west the creek has its origins in the wetlands where the Main Street Industrial Park Area (2.6) is now. To the east is Antholne Creek flowing down from the extensive tanks farms above Broadway.

1970-present Pollution Sources Keyed to GIS

Metalworking

Megouler & Jones

[2.4-MW-2-3]

"Steel distributors," at the corner of Evans and Broadway (League history, p. 62). This may be the descendant of the firm with a similar name that used to be located in the metal working and machine shop section of Portland in the Central Commercial Street Area [1.10-MW-12]. At 1156 Broadway in the 1980 Maine Register, p. 392. Not apparently included in the South Portland Industrial Pollution Pretreatment Program.

Petroleum storage:

Antholne Creek tank farms

[2.4-PS-2-23]

The Portland West quadrangle shows close to Antholne Creek additional tanks (indicated in purple) added after the original topographic map was done in 1956. These are indicated with the alpha-numeric designation on the GIS map.



South Portland Watersheds
Historic Development Areas
No. 24 HDA 2.5 Rolling Mills/Ligionia

South Portland Harbor Watersheds: 2.5 Rolling Mills/Ligonla Area (See Map 23)

1840-1899

Background Information

General:

The historical identity of this area was shaped by the iron rolling mills started in the late 1860s. The 1871 Cumberland County atlas has a detailed map of the facilities and the town which was laid out to be eight blocks long and four wide (p. 25). A tidal creek went the whole length of the town, uninterrupted by any dams except at the mouth by the Vaughan Bridge.

Across the creek to the south were two other polluting industries that remained in the area for a long time, Atwood Lead Company and the Portland Kerosene Oil Company Works. The latter occupied a location at the corner of Lincoln and Main that still is devoted to petroleum storage and distribution.

As time passed the tidal creek was filled in so that today what remains are two "fresh water ponds" that have been seriously polluted by the industrial activities surrounding them. Looking at the 1954 Sanborn (pl. 76) it is impossible to tell that these ponds were once part of a long tidal creek that reached back a great distance

1840-1899

Pollution Sources Keyed to GIS

Cemeteries:

One cemetery and a portion of another are within this Historic Development Area. Both appear on Stuart's 1894 State atlas (pl. 48).

Forest City

[2.5-C-1-123]

Southeast of the rolling mills and company town, and the kerosene refinery. The watershed between this HDA and Turners Island (2.4) passes through this cemetery.

Calvary

[2.5-C-2-123]

To the southwest of the rolling mills and company town, on the "fresh water" ponds that are the dammed remnants of the tidal creek of 1871.

Chemical manufacturing:

Atwood Lead Co.

[2.5-CM-1-12]

On the other side of Main Street from Portland Kerosene, to the north, the 1871 County atlas shows the facilities with the tidal brook to its back. This was the only chemical manufacturing plant in the Portland/South Portland region. The 1896 Sanborn details the plant at the corner of what was then called Fourth Street (by 1922, Lincoln). There were two sets of "sulfur furnaces" that took up the first and second floors in one section, and a section with storage on the first floor and "acid chambers above." The company was described as "manfrs. of sulphuric and muriatic acids." See also the 1894 State atlas (pl. 48). Note that the 1922 Sanborn shows this as the site of the Valvoline tank farm (see 1.5-PS-2-23).

Prof. David Page says that the process used would have been the older one with a closed lead container (the acid chambers). Here sodium nitrate was used (the little shed labeled "nitrate of soda" is a clue). The hydrochloric acid (muriatic) would have been used in the pickling acid baths in the rolling mills to remove oxidized scale on the surface of the iron or steel (interview, 12/14/92). The two foundries in 1.9, the Grand Trunk Area, would have provided additional markets for the acid, as well, along with the Portland Stove Co. plant in 1.7, the Back Cove, South Side Industrial Area.

It becomes obvious that the rolling mill and this chemical plant had a symbiotic relationship. This is brought out in another way. William Jordan, author of a fine history of Cape Elizabeth and South Portland, had a great grandfather and a grandfather who were superintendents at the rolling mill, and another grandfather who was superintendent at the Atwood Co. Unfortunately he has no family records of either works, any possible ones having probably been destroyed in a fire at a grandfather's house years ago (telephone conversation, 12/14/92).

Metal working:

Portland Rolling Mills

[2.5-MW-1-12]

The rolling mills were the first heavy industrial facility in the collection of villages in Cape Elizabeth that joined together in the 1890s to become South Portland. This mills shaped events in this area until recently. The 1871 atlas (p. 29) shows an outline of the facilities which were connected to the railroads in Portland by a spur that ran over the first bridge from the Railroad Triangle area [1.3-RBr-3-1]. According to the League history, the mills used New Jersey pig iron, at least when it began in 1866, producing bar iron, rails, and other items that needed to be heated, rolled, shaped and cut (pp. 90-92). In 1887 the firm was described as a producer of "Extras, Standard, Forest City, Refined and Common Bar Iron," as well as "Fish Plates and Railroad Spikes," using both iron and steel where 180 men were employed (Leading Business Men, p. 79). A postcard photo in the Sullivan collection shows the facilities from the Portland side with the old railroad spur running from the foreground.

The 1896 Sanborn (pl. 67) shows details of the facilities clearly. By then the wooden bridge had been abandoned, and the mill was served by a spur off the main line double Boston & Maine tracks on the South Portland side. The double tracks went on over the new bridge to Portland [1.3-RBr-3-123]. The mill must have been similar to what it had been in 1871, for the outline of the facilities was virtually the same. But now it could be seen that there were three heating furnaces and four puddling furnaces, all with "boilers over" them. There were "two gas producers, a gas furnace, two engines, two Knowles pumps and one Davidson pump" in the main mill.

In a small building was a machine shop. Storage houses for bar iron, castings and patterns and two buildings with shears existed on the site. All these point to an establishment that took bar iron, heated it, rolled and shaped it, and also produced iron castings. The fuel was coal which came in by water judging by the long wharf, and the large "coal dump" with a complex "trestle" over it. Probably the "gas producers" were making coal gas. The pumps were probably for water used in acid baths in the rolling process. The polluted water was no doubt discharged in the Fore River.

Petroleum refining, storage and distribution:

Portland Kerosene

[2.5-PS-1-123]

In 1871 the Portland Kerosene Works was shown in outline in the atlas. The 1886 Sanborn (pl. 22) shows the site at the corner of Lincoln and (2029-34) Main in considerable detail. It operated under the name of Portland Kerosene Oil Co. It was a complex facility that carried out refining operations. Two "agitator" houses, a "naphtha still," condenser rooms, "sun tanks" in a building with a "glass roof," a storage house for "mach. oil" (machine), a number of outdoor tanks for "refined oil," and several smaller "iron naphtha tanks" were key parts of the facilities. Supporting facilities included a cooper shop, a pipe and blacksmithing shop, storage houses for empty and filled barrels.

According to Prof. Edward Gilfillan, naphtha (gasoline) is the first distillate that comes off in refining, with kerosene next. Next come the machine oils, then tars, and finally, paraffin. The problem for the refiners and consumers was that it was hard to fully separate the gasoline from the kerosene, and that is what made the latter an explosive lighting fuel in the 1870s. Standards of purity began to be applied in the 1880s to eliminate the danger. David Page, professor of chemistry, suggests that the glass roofed building may have been to bleach the kerosene so that it would be clearer (interviews at Bowdoin College, 12/14/92).

By 1896 it is very likely that refining operations were no longer carried on at the site. One of the "agitator" houses of 1886 was now labeled a "steaming house," the other, "filling house." The naphtha still was gone and the tanks associated with it, as well as the condenser room and the building for storing machine oil. (Sanborn, pl. 61).

Portland Kerosene Railroad Pumping Station

[2.5-PS-2-1]

The 1894 State atlas (pl. 48) shows a pumping station for the refinery on the Boston & Maine tracks to the north of the company town. It was located where the then tidal pond curved around the cemetery and met the tracks. Presumably a pipeline connected the station to the works.

Varnish and paint manufacturing:

A. P. Fuller

[2.5-V-1-12]

Not far up Fourth from the Atwood plant but on the opposite side and across from the "fresh water pond" was the "A. P. Fuller & Co. Varnish Man'fy." Few clues about the processes employed are visible in the Sanborn map compared to that of the kerosene works up the street. The main plant had three chimneys, and what appears to be a boiler in a small building with an adjacent coal shed. The notes indicate there was "steam heat. . . no lights." (1896 Sanborn, pl. 61).

1900-1969

Pollution Sources Keyed to GIS

Chemical manufacturing:

Atwood Lead Co.

[2.5-CM-1-12]

Still listed in the 1900 directory, but by the 1920 edition it no longer was. See above under "Petroleum storage and distribution, Valvoline" or [2.5-PS--23] for the site in 1922.

Dump:

[2.5-D-1-2]

Dave Pineo heard from Ge Erskine, Director of Public Works, that the "tidal pond" shown in the 1914 atlas right next to the rolling mills was used for dumping industrial refuse for many years, and gradually filled in (12/18/92). There is no trace of this pond today.

Filling stations and repair facilities on Main Street:

Three gasoline stations were located on the north side just before cars and trucks would have crossed the Vaughn Bridge to Portland. None are there now (1992).

7 Main: "Richfield filling station" with two small oil tanks and a small "oil storage" building in back (1954, pl. 76).

35 Main: "filling station (").

59 Main, "filling station ("

Metal working:

Portland Iron and Steel Mills, Bancroft and Martin

[2.5-MW-1-12]

The layout of the works of what was in 1909 called the "Portland Iron and Steel Mills" had changed for the Sanborn map shows a completely different orientation of the rolling mill building (pl. 76).

The only part of the site that was the same was the machine shop. It would be useful to know what this meant for differences in the processes and products, as well as in the likely pollutants specifically.

The company town was still there in 1909. But by 1924 all of the Ligonla homes were gone according to the Sanborn map added to the 1909 edition. The tanks farms had begun their incursions.

In the 1954 Sanborn (pl. 76) the facilities showed dramatic changes from 1909 and now functioned under the name of "Bancroft and Martin Rolling Mills Co." Gulf, Shell and Tidewater Oil all shared the site. The rolling mill had one long "storage and factory" building next to the multi-track siding that went by it on around to the waterfront. Where the coal had once been stored now were smaller buildings for casting patterns and general storage. Where the small pattern storage buildings had been, and partly on the filled-in "salt water pond" of 1896 now was the other large building of the plant identified as a "steel who" (warehouse). The League history says that in 1965 Bancroft and Martin moved the production facilities to the Main Street Industrial Parks Area (2.6), but continued to use the old buildings for storage.

Lovell Cycle and Ether Motor Co.

[Location?]

A facility appears on the 1896 Sanborn under this name as an insert *on the same plate* (61) as the kerosene and chemical plants discussed below. The location was not indicated. The facility contained a large machine shop, and shops for brazing, filing, planing and polishing, and enameling, the latter with a drying oven. On the site was a "naphtha tank" (gasoline), and a "underground gas machine to be discontinued." In Maine Labor Statistics for 1898, it was described as a division of "the John P. Lovell Arms Co. of Boston" opened about 1895. "Since that time the manufacture of police goods has been added and still further additions are contemplated" (p. 121). [Note, 12/93: The 1992 History of South Portland says the plant made bicycles and was located near the "coast guard base," which would put it in Ferry Village, 2.2 (p. 10)].

Petroleum storage and distribution:

Standard Oil of New Jersey, Socony Vacuum, Mobil

[2.5-PS-1-123]

By 1922, the Sanborn map shows the Standard Oil oil storage and distribution facility at the corner of Lincoln and Main where the kerosene works had been. The site had been drastically simplified. Only one of the old "agitator" houses of 1886 was still present and a wagon shed along Lincoln. Two new buildings had been constructed in 1921 of reinforced concrete and brick. There were now several large oil tanks on the site, two with embankments protecting the environment against leaks (pl. 63).

Where Standard Oil had been in 1922 on the easterly side of Main Street in 1954 was Socony-Vacuum's distribution facility with its much expanded tank farm (pl. 63). Today this is a Mobil

facility.

Valvoline, Richfield, BP

[2.5-PS-2-23]

Across Main Street in 1922 was what may have the beginning of the later tanks farms at the Valvoline storage facility right next to the pond (pl. 63). This facility was on the site of the former Atwood Lead Co. See [2.5-CM-1-1]. One of the Valvoline buildings, used for "oil storage in tanks," appears to have been the old Atwood sulfur furnace place. Across the railroad spur serving the site was a small "refinery" building.

By 1954 Richfield Oil had three medium sized tanks, and one small one on this site on a "pond" and served by a railroad spur. Apparently part of the old Atwood building had been retained for storage with its "stone" first floor. That building is still (1993) present at the site. Today this a site of a BP tank farm and distribution facility.

Other: Cities Service, Shell, Gulf, Richfield, Tidewater, Esso [2.5-PS-3-23]

By 1940, the tank farms had expanded, for the Portland area directory lists at least seven oil companies doing business in the area. The 1954 Sanborn map (pl. 76) locates the tanks in the tank farms of named companies, including Cities Service, Shell, Gulf, Richfield, Tidewater and Esso. Tidewater was on the harbor, in between the Bancroft and Martin rolling mills; the others were to the west of it right next to what were now polluted fresh water ponds to the north and south of Lincoln Street. Extensive railroad sidings are shown to access the mill buildings and the tank farms.

Sewers and outfalls:

No outfalls were shown on the 1914 City atlas (pl. 17) in this area. Reportedly the pond by Calvary Cemetery receives direct discharges from the houses in the neighborhood. The 1991 CSO Drainage Area map shows two overflows in this HDA: One at the Main Street Pumping Station where the Vaughan Bridge used to be; the other at Cash Corner into the pond by Calvary Cemetery.

Varnish and paint manufacturing:

Fuller, Burgess-Fobes

[2.5-V-1-12]

In 1900 the city directory lists the Fuller Co. at 107 Lincoln; the 1920 edition, Burgess-Fobes, itself. A 1922 addition to the 1909 Sanborn shows the facility, changed and expanded from 1896 (pl. 63). It is shown on the 1954 Sanborn (pl. 63) with some changes. To determine the relationship of this facility to those of the same company in the Grand Trunk and Central Commercial Street areas would be useful. Certainly this one produced pollutants.

1970-present

Pollution Sources Keyed to GIS

Petroleum storage and distribution:

In 1970 there were oil firms at all of the addresses indicated in the 1940 directory. The chief function of the area now (1993) is petroleum storage. The Maine Historical Society has an oblique aerial view of the tank farms, with Portland and South Portland in the distance.



Main Street Industrial Park

* 2.6-r-1-23

* 2.6-m-1-3

* 2.6-d-2-3

* 2.6-d-1-2

* 2.6-c-1-23

* 2.6-mw-1-2

South Portland Watersheds
Historic Development Areas

No. 25 HDA 2.6 Main Street Industrial

South Portland Harbor Watersheds: 2.6 Main Street Industrial Park Area (See Map 25)

1840-1899

Background Information

General:

This was not an industrial area before the turn of the century. A trotting track was located close to where the Rigby Yard was constructed after the turn of the century, according to the League history (p. 23). The 1896 Sanborn shows the trotting track and supporting facilities (pl. 59). Dave Pineo of the South Portland City Engineering Dept. says the track is still visible on aerial photos (12/18/92).

1900-1969

Pollution Sources Keyed to GIS

Cemeteries:

Highland Memorial Garden

[2.6-C-1-23]

Located east of the wetlands below Highland Street and within the watershed.

Dumps and landfills:

Alfred Street Dump

[2.6-D-1-2]

On the upper watershed of Barberry Creek off of Alfred Street was a set of trench landfills used in the mid-sixties, Dave Pineo heard from Ge Erskine, Director of Public Works (12/18/92).

Filling stations and repair facilities in 1954:

393-97 Main opposite where Rigby meets it, "auto sales and service" in 1954 (pl. 86).

277-79 Main, at Cash Corner opposite where Broadway meets it, "auto sales and service" and "auto paints."

Metal working:

Bancroft and Martin

[2.6-MW-1-23]

The company opened their structural steel fabrication works at the Wallace Avenue part of the Industrial Park in 1965. Here were their new facilities for rolling, forging and shaping structural steel as well as for painting it with epoxies. Their old buildings in Ligonla were used for storage and the general office. According to the League history, "the plant fabricates structural steel of

every description and purpose -- steel for bridges, for building, for highway projects, for the large construction company and for the small general contractor." This new facility appears to have been built on the edge of wetland according to the 1955 topographic map, perhaps even *in* the wetland.

Railroad facilities (with petroleum storage):

Rigby Yard

[2.6-R-1-23]

This major railroad yard, still in operation, was constructed after 1914 [for it is not on the 1914 City atlas (pl. 18)]. The 1938 Sanborn map shows a large roundhouse with adjoining machine shop and forge (pl. 87). Coal bins and oil tanks are located. The 1954 map reveals the same layout with no additions (pl. 86). At Sullivan's Photocraft are several excellent aerial photographs of the facilities in 1951: the roundhouse, the coaling station and the yard as a whole from the Route 1 overpass. Judging from the 1955 topographical map, the yard itself appears to have been built *in* wetlands.

1970-present

Pollution Sources Keyed to GIS

Auto and truck repair facilities:

Maine Truck Maintenance Co.

At Rigby Industrial Park was this major facility by 1971 (League history, p. 62).

Veterans Bridge Paint and Body Shop

Yankee Industrial Truck Corp. (p. 62).

Both at Rumery Industrial Park off Cash and Rumery northeast of the Rigby Yard (League history, p. 62).

Dumps and landfills:

Highland Avenue landfill

[2.6-D-2-3]

The existing landfill is on the upper Barberry Creek watershed near Highland cemetery and is due for closing soon. (Dave Pineo of the South Portland Engineering and Tom Hughes of the Maine DEP, 12/18/92).

Machining:

Rigby Manufacturing Co.

[2.6-M-1-3]

In the Rumery Industrial Park, a producer of machine tools to salvage lead and copper from scrap (League history, p. 62).

Metal working:

Bancroft and Martin

[2.6-MW-1-23]

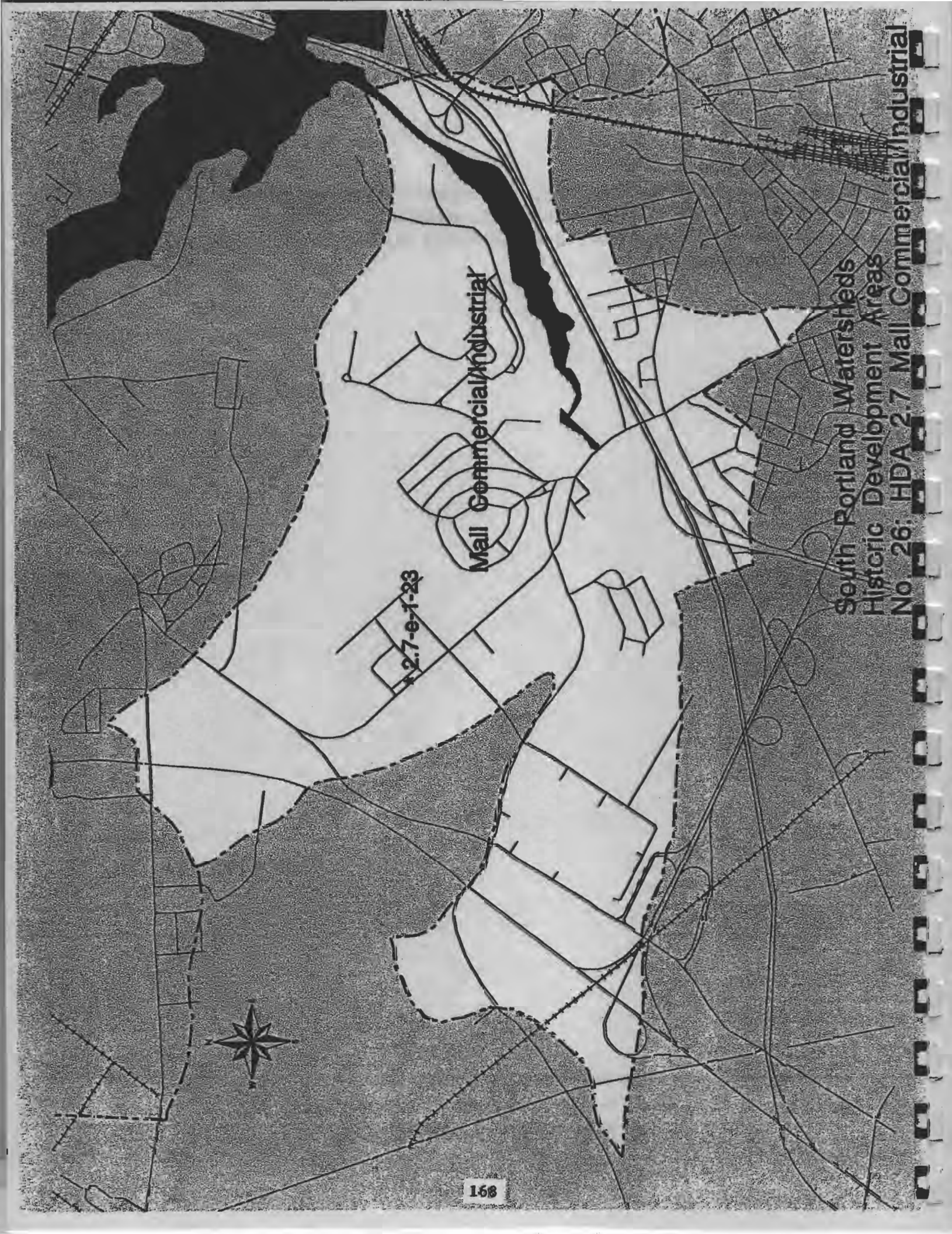
Became "East Coast Steel, Bridge Division" but is now closed(1993). According to Lisa Songco in South Portland's Pollution Abatement Department supervising the Industrial Pretreatment Program, no sewer discharge permit was needed because the plant's discharges went into Scarborough.

2.7-e-1-23

Mall Commercial/Industrial

South Portland Watersheds
Historic Development Areas

No. 26: HDA 2.7 Mall Commercial/Industrial



South Portland Harbor Watersheds: 2.7 Mall Commercial/Industrial Area (See Map 26)

1840-1899

Background Information

General:

Where "auto city" is now, there was farmland in the 19th century and first half of the 20th century. This was an area beyond the concern of the makers of the Sanborns. It remained so until after the era that the Sanborn company produced maps.

1900-1969

Background Information

General:

South Portland city planners and developers saw a great future in this area in the early 1960s after the Portland to Augusta section of the Maine Turnpike was opened. To encourage development in this area the South Portland Area Development Council constructed a building on speculation that it would attract an industrial tenant as the anchor, according to the League history (pp. 63, 65-66). It was Fairchild that bit the bait in the early 60s. Jordan Marsh opened in the summer of 1969, and soon was followed by a host of other stores in the 75-acre shopping center.

1900-1969

Pollution Sources Keyed to GIS

Electronic equipment manufacture:

In the 1960s several firms using potentially polluting production techniques and materials moved into the area

Fairchild Camera and Instrument, Fairchild-Digital

[2.7-E-1-23]

Fairchild bought the structure the city erected on speculation at 333 Western Avenue in 1962 and made it into a semiconductor production facility (League history, p. 63). Fairchild-Digital in the mid-eighties (see ad in Southern Maine Business Digest, Dec, 1985, p. 27).

Sanders Associates (Not located on GIS map)

[2.7-E-2-2]

Produced sonobuoys and anti-submarine warfare equipment (League history, p. 63)

Kilk Industries (Not located on GIS map)

[2.7-E-3-2]

Made "electro-chemical machinery" according to the League history (p. 63).

Machining:

Diamond Automation (Not located on GIS map)

[2.7-M-1-2]

Moved in during the 1960s, a maker of dies for paper packaging (League history, p. 64).

Sewers and outfalls:

None in 1914. On the 1991 CSO Drainage Area map at the head of Long Creek by the Pumping Station is major overflow.

1970-present Background Information

General:

The Mall first opened as a whole in 1970, with Sears and other stores joining Jordan Marsh. Early in the next decade there was further expansion, and since then restaurants, office complexes, auto dealerships, and more stores have come to the area. For planning issues see "Maine Mall City," *Maine Times* vol. 24, no. 51 (Sept. 25, 1992), pp. 1-7.

The Mall Industrial/Commercial Area is far from the waterfront, just as is the Main Street Industrial Park Area. Presumably in the planning processes at least some attention was paid to means to minimize the inevitable non-point source pollution possibilities. Nevertheless, an examination of the 1955-78 topographic map reveals that three branches of Long Creek flow right in the heart of this auto city complex. They lead down to Clark Pond and the Long Creek estuary which comes out into the Fore River by the Rolling Mills/Ligonla Area (2.5).

1970-present Pollution Sources Keyed to GIS

Electronic equipment manufacture:

Fairchild-Digital, National Semiconductor

[2.7-E-1-23]

Still at 333 Western Avenue in the 1992 Portland Red telephone directory. The descendant of Fairchild, National Semiconductor was recently "permitted" in the South Portland Industrial Pretreatment Program.

Filling stations and repair service:

Serving the automobile culture were and are a number of gasoline stations in this area, and dealerships with repair facilities. Many of the dealerships moved from Forest Avenue in the 1.4, Back Cove West Side/Deering Area.

Part IV

Annotated Resource List

Part IV

2000-2001

Associated Resource List

Part IV: Annotated Resource List

For Investigation of Historic Pollution Sources in the Portland and South Portland Region

Edward L. Hawes, Ph.D.

Note: The following abbreviations are used: Loc = location; Bow = Bowdoin College Library; MHS = Maine Historical Society; PPL: PR = Portland Public Library: Portland Room; SPPL = South Portland Public Library; Aug: SL = Augusta, the State Library.

Primary Sources for Level One Investigations

Atlases and Maps

Bibliography:

Podmaniczky, Christine B.; Shettleworth, Earle G. Jr. *Through a Bird's Eye: Nineteenth Century Views of Maine*. Rockland: Farnsworth Museum, 1981. 44 pp.

Individual Resources:

Atlases and maps are the most consistently useful sources for the study of probable historic pollution sources in Portland, South Portland, Westbrook and Gorham. All of the following were consulted:

Anon. [Portland]. MS, 3 sheets (one missing), c. 1868. Loc: Archives, Dept. of Public Works, City of Portland.

A plane table map of the city with parts of Deering shown. Shows topography, bodies of water and streams and the road and Street networks in great detail.

Beers, F. W., & Co. *Cumberland County Atlas, 1871*. New York: Beers. 1871. 62 pp. Loc: PPL: PR; Bow (Spec. Colls.). Republished in *The Old Maps of Rural Cumberland County, Maine in 1871*. Fryeburg: Saco Valley, 1986.

Wonderful details of Portland and South Portland halfway through the first period of dirty history. Especially useful are the maps showing the Ligonla-Rolling Mills and Ferry Village areas, as well as the Grand Trunk and West Commercial Street areas.

City of Portland, Dept. of Public Works. **General Plan Existing Sewer System.** 1974, updated 1984. Loc: Dept. of Public Works, Archives.

Detailed map showing all sewer locations, directions of flow, locations of CSOs. Useful when combined with the 1914 City atlas of Richards which shows the principal sewer lines and outfalls at that time.

City of South Portland, Engineering Dept. **CSO Drainage Area Map.** December, 1991.

Fairly accurate map of location of CSOs and directions of the main sewer flows. It is apparent that no sewers even today serve the residential part of Rolling Mills/Ligonla HDA.

Colby. **Atlas of the State of Maine.** 1884 ed. Loc: PPL: PR

Not consulted extensively since the Sanborn Insurance map of 1886, the first one published, gives more detail.

Richards. **Atlas of the City of Portland and South Portland.** 1914. Loc: PPL: PR; Portland Public Works Dept. Archives; Aug: SL, Archives.

Invaluable source, especially for locations of sewers and outfalls. These can be compared with the 1984 Sewer System map. The CSOs of today were the outfalls of yesterday.

Sanborn Map Co. **Sanborn Insurance Map of Gorham, of Portland** (Including South Portland), **of Westbrook.** New York: Sanborn Co., 1886 ff.

Locs: Original volumes: Univ. of Me., Spec. Coll. (the dispersed Library of Congress set): Publication details: Gorham: 1885, 1892, 1897, 1903, 1909, 1922, 1934. Portland: 1886, 1896, 1909, 1909 updated to 1940, 1954, 1954 updated to 1964. Westbrook: 1895, 1903, 1909, 1922, 1930, 1930-62.

MHS: Portland and South Portland, 1886, 1896, 1909, 1909 updated through the 1930s (two sets); Portland and South Portland, 1954, and 1954 updated to the early 1960s; Westbrook and Gorham included in larger 3 vol. set.

Locs: Microfilm ed.: Published by Chadwyck and Healy, Alexandria, VA. Loc: Bow: All published towns and cities in Maine (9 reels); Portland: USM.

Vital source of information available in original and updated volumes at a few locations, and in microfilm versions at others. Absolutely necessary for historic pollution source investigations. Contain scaled maps of streets, houses, commercial and industrial buildings and structures with indication of height, roof form, building material, fuel tanks, industrial activity, etc. In the original volumes they are color-coded for building material.

Smith Broths. [Bird's Eye of]**Portland, Me.** New York: Endicott [1855]. Locs: Two versions are in the Farnsworth Museum. A 1973 reproduction is available from Historic Urban Plans of Ithaca, N. Y. in a numbered series. It can be purchased in Portland from the Kennedy Studios on Exchange Street.

*Bird's Eye view from South Portland covering the Portland waterfront from east of Munjoy Hill to the Old Bridge and the Western Promenade. In the center foreground is a ship under construction, and to the right, what must be Ferry Village. This map has limited use, given the relatively small area covered. In 1865 this was printed by another publisher with a similar foreground but the new post-fire skyline. See Podmaniczky and Shettleworth, *Through a Bird's Eye*, pp. 8, 10-12.*

J. J. Stoner. *Bird's Eye View of the City of Portland, Maine, 1876*. Chicago: Schober, 1876. Locs: Reprint available from Kennedy Studios on Exchange Street. An original is in the Maine Historical Society.

Extremely useful map, constantly referred to in order to locate industries. Shows the whole peninsula, the Back Cove and Deering. The city is illustrated in great detail including houses, business establishments, wharves and railroad lines, with many commercial and industrial sites designed by a number keyed to a list.

Stuart, J. R. *Atlas of the State of Maine*. 9th ed., South Paris, ME: Stuart, 1894-95. Locs: Yarmouth PL.; Aug: SL

Folio volume. Useful for location of facilities. Many sites of machine shops and small foundries in the Central Commercial Street area indicated with numbers referring to "Trade Card" listing by Street name. At least some of the Portland plates appear to have been reprinted from an 1880s edition without changes, judging a comparison of the information on the 1886 and 1896 Sanborns.

U. S. Geological Survey. 7.5 Minute Series (Topographic): Portland East, Portland West, Gorham, Cape Elizabeth, Prouts Neck. Reston, VA, 1955-56, photorevised in 1970 and 1978.

The places to start with the study of historic pollution sources. The 1955 evidence can be compared with that in the Sanborn of the year before. The material added in the photorevisions is in purple.

Walker, G. H. *Bird's Eye View of Casco Bay: Portland, Maine, and Surroundings*. Boston: Walker, 1906. Issued by the Maine Central Railroad in color. Loc: South Portland: Spring Point Museum, color photocopy.

Of limited use since it is on a large scale, but does give a good sense of the whole and would be good as a graphic in a publication or as a stimulating visual in a slide show. Reprinted by Chisholm Brothers of Portland in 1992.

Weeks, W. W. *Deering, Cumberland County, Maine*. Portland: Weeks, 1886. Bird's Eye map. Loc: Reproduction in lobby of Casco Northern Bank, 651 Forest Avenue Available from William Weeks, on Berkeley st near Woodfords Corner.

Few industrial sites indicated.

Note: The archives of the City of Portland Dept. of Public Works has many map resources for further investigation of the environmental history of the area. There are the two highly detailed volumes of the sewer locations of the city of Portland in 1882 on the base maps of the City

Assessor; updates on single sheets accessed through a 3 X 5 card system. Also engineering plans for the CSO system.

Records of the Industrial Pretreatment Programs

Portland:

City of Portland and Portland Water District. "Industrial Pretreatment Program Monitoring Report Submittal Deadlines." Typescript. c. 1992. 1 page.

_____. "Industrial Pretreatment Permittees 1992." Typescript. 1992. 5 pp.

_____. "Potential Sources of Toxic Pollutants and Batch Dumps," 10 pp. in the appendix of "Report for the Portland Water District." Typescript. December, 1981.

South Portland:

City of South Portland. Municipal Code. [South Portland], 1992. See section 39 under "Rivers and Drains," Table A, "Limits of certain constituents acceptable in discharges."

City of South Portland, Waste Water Treatment Plant, Industrial Pretreatment Program Records: See "Sampling Reports" for Fairchild Instruments, National Semiconductor, Portland Valve and Rockwood Industries.

Primary Sources for Level Two Investigations

Newspapers and Periodicals

Bibliography:

The card index at the Portland Room of the Portland Public Library makes the newspaper sources accessible back into the 1930s. Portland and South Portland are fortunate to have this unique resource done on 3 X 5 cards. For the most important industrial firms such as the Portland Co., the Portland Stove Works, the gas works, the South Portland Shipbuilding Co, the index was consulted and articles that seemed particularly useful were examined on microfilm. The index itself has headline summaries of the contents, so an overview of a firm's history is readily constructed. The index was very useful to uncover articles on planning and development efforts in South Portland, and no doubt would be for the other municipalities.

Individual Publications:

Portland Evening Express, Portland Press-Herald. Selected articles from the 1950s to date indexed in the card catalog of the Portland Room of the Portland Public Library. Cited in text where appropriate. Loc: Bow (Press Herald); PPL (both papers on microfilm back to the first issues).

Portland Business Journal (1987-88). Became *Maine Business* (1989 only).

Southern Maine Business Digest (1978-date). Loc: PPL: PR; Bow (4(1981)-6(1984), 13 (1990)-(Jan., 1992). See no. 12 (1985), special issue on South Portland.

Photographs and Other Graphic Images

Maine Historical Society, Portland:

Three distinct collections are available for study. Reproduction costly. Credit line expected.

(1) Collection of black and white photographs of different sizes and period in folders by municipality, then under subtitles such as "Vessels," "Factories," "Railroads," and "Views."

(2) Witteman Post Card Coll. : Photographic post cards of fine quality by a Portland photographer. Working prints in manila envelopes filed by municipality and island. Portland coll. includes harbor scenes, shots of the Million Dollar Bridge and gas works from South Portland, of Spring Point, of the harbor from Munjoy Hill, and of South Portland across the Million Dollar Bridge from Portland. One image only from South Portland, a school. None of Westbrook.

(3) Postcard coll. in folders by municipality. No inventories.

Maine State Archives, Augusta - The French Collection:

Immense collection of negatives and prints by Mr. French who travelled for the state in the 30s and 40s gathering images for promotion. Working prints in boxes filed by number with access through a topical typed inventory. Not yet fully inventoried by the archive. Some photographs of Gorham, Portland (many), South Portland, Stroudwater (three homes only), Westbrook (two only: paper mill, business district). Available for reproduction at reasonable cost.

Portland Public Library, Portland Room:

Card index of graphic and photographic images in books, articles and ephemera. Organized under a variety of topics such as municipality, area (e. g., "Stroudwater," "Deering"), company name (e. g., "Portland Co.," "Portland Street Railroad), etc.

Spring Point Museum, South Portland:

Photographs, especially of the East and West Yards made between 1940-1943. Some are part of the museum's own collection, some belong to the Shipyard Society, and a few are photocopies of items in private hands.

Sullivan's Photocraft, Forest Avenue and Pleasant Street (Deerling) Portland:

The most useful collection with numerous black and white images from the 1840s to the present. Many industrial and railroad photographs, some filling stations, aerial views of malls and road construction. An index of useful ones made by the investigator and available for use by researchers. Some of these obtained in 4 X 5 format, and rephotographed into slides for the slide-talk in Appendix III. No fee necessary for publication, only a credit line to "Sullivan's Photocraft."

Note: The photographs in the City of Portland Portland Tax Assessor's Office: Coll. of "1920s Tax Photos," have not been reviewed.

Directories and Registers: State, City and Town

Maine Register. Augusta. 1823, yearly to date. Loc: Bow (1820-1836 in Spec. Colls.; 1837 to date in stacks).

The one directory used in a limited fashion. The 1970 edition was consulted for a few firms. The utility of this source is based on the fact that it is published every year, and businesses are listed under various categories that can be compared. For example, the volumes at the beginning of every decade can be examined to provide a clear view of development. To track any specific industrial firm, or activity (e. g. "foundries") more closely than in this report, this is the source to use.

Note: Since the updated Sanborn map of 1909 (to the early 40s) and of 1954 (to the early 60s) provided sufficient data, the following were not utilized in this investigation with the one exception above. They would prove useful in further research to determine precisely when individual firms were operating, and sometimes, through advertisements, what they made at that time.

Directory of Casco Bay. 1902-28. Loc: Bow.

Directory of Greater Portland, Maine. Portland: Various publishers (Tower is the current one), 1823-present under various titles. At times includes the Islands, South Portland and Westbrook. Loc: Bow (vol. 1-5+, Spec. Colls.; rest under various titles in stacks).

Directory of Suburban Portland. Portland, 1981-date. Loc: Bow (Reference: vol. 3 [1981], 4 [1986], 5 [1988], 6? [1990]).

Directory of Westbrook. 1888 - Intermittent- 1974. **Note:** Now included in *Directory of Greater Portland*. Loc: Bow (1891-94, 1897, 1900, 1902, 1904, 1909).

General Directory of Towns in Cumberland County. Loc: Bow (1892, 1895, 1900).

Statistical and Descriptive Annual Reports

The town annual reports would be useful in further investigation to sketch out developing public health and environmental concerns, the development of sewage and water systems, treatment plants, trolley and bus lines, slum clearance, etc.

Gorham. *Annual Report*. Loc: Bow (1857 to date, intermittent).

Portland. *Annual Report*. Loc: Bow (1846-48, 1851-64, 1866, 1868-1938); Aug: SL.

Portland, Board of Trade. *Annual Report*. Loc: Aug: SL has 1864, 1866 and 1867 only.

Railroad Commission Reports. Loc: PPL: PR (1889-1914).

South Portland. *Annual Report*. 1895 to date. Loc: Bow (1895-1929, 1932, 1934-35, 1938, 1940-41, 1945-47, 1949-date).

Westbrook. *Annual Report*. Loc: Bow (1852 to date, intermittent).

Note: No doubt state descriptive and statistical publications would be of use. The following was useful on foundries: Maine Commissioner of Industrial and Labor Statistics. *Annual Report of the Commissioner*, Augusta, 1898.

Town ordinances, etc.

In further investigation, these would give clues as to when environmental legislation developed through the concern for public health and safety. For instance, they might, as do Bath's 1922 ordinances, indicate that all owners of gasoline tanks needed to declare them yearly and pay a fee. This led to discovery of a series of license books going back to the 1850s, including the names of owners and locations of gas tanks from the 1920s on. No doubt the other municipalities covered in this study beside Portland would have some records similar to the following Portland materials.

Municipal Register of the City of Portland. Loc: Bow (1871-76).

Portland City Ordinances. Loc: PPL (1855, 1881-date).

Secondary Sources

Local History

Gorham:

Johnson, Walter H. (comp., ed.). *Bicentennial History of Gorham, 1736-1936*. Westbrook: Cobb, 1936. 171 pp. Loc: Bow.

A source that was of some use in this research.

Celebration of the 150th Anniversary of Gorham, May 26, 1886. Portland: Thurston, 1886. 133 pp. Loc: Bow.

McLellan, Hugh D. et al. *History of Gorham, Maine*. Portland: Smith and Sale, 1903. 860 pp. Pp. 383-843 contain genealogical information of little use. Loc: Bow.

Pierce, Josiah A. *History of the Town of Gorham*. Portland: Foster & Cushing, 1862. 239 pp. Loc: Bow.

Portland and Region:

Barnes, Albert F. (ed.). *Greater Portland Celebration 350*. Portland: Gannett, 1984. 247 pp. Loc: Bow.

A popular introduction to the history of the Portland/South Portland area with material on specific industries, transportation development and the political and economic contexts.

The Beauties of Portland and Scenic Gems of Casco Bay. Portland: Morris, [1895]. 80 pp. Loc: Bow.

Contains good photographs that might be of some use in a slide presentation.

Beckford, William H. *Leading Businesses of Portland and Vicinity*. Boston: Mercantile, 1887. 228 pp. Index. Loc: Bow.

Booster publication that is nevertheless very useful. It is virtually a primary source, at least of what the firms themselves wanted the public to think about them. Describes the various products of industrial firms, the facilities and the number of "hands" employed.

Elwell, Edward H. *Portland and Vicinity*. Portland, 1881. 142 pp. Index. Loc: Aug: SL (1881 and 1888 eds.). Reprinted: Portland; Greater Portland Landmarks, 1975.

Excellent source to construct the early environmental and economic history of Portland.

Federal Writers Project. *Portland City Guide*. Portland: Forest City, 1940. Reprinted.

Useful at the beginning of the research to gain an overview.

Gould, William. *Portland In the Past* Portland: Thurston, 1886. 543 pp. Loc: Bow.
History of the area in the 18th century and thus of use only as background for this report.

Note: The following might be of use in further investigation of the environmental history of Portland. They were not consulted in this present study.

Barry, William. *A Vignetted History of Portland Business, 1632-1982*. New York: Newcomen Society, 1982. 23 pp. Newcomen Society Pub'n. No. 1176. Loc: Bow (& Spec. Coll.); Aug: SL.

Elwell, Edward H. *The Successful Business Houses of Portland*. Portland: Jones, 1875. 192 pp. Loc: Bow.

Gillespie, Charles B. *Portland Past and Present*. Portland: Evening Express, 1899. 236 pp. Loc: Aug: SL.

Greater Portland Landmarks. *Portland*. 1972. 236 pp. 2nd ed.:1986, 229 pp. Loc: Aug: SL.

Hull, John T. *Centennial Celebration . . . Portland, . . . July 4-6, 1886*. Portland: Owen, 1886. 379 pp. Loc: Bow.

_____. *Handbook of Portland . . . Casco Bay*. Portland: Southworth, 1888. 246 pp. Loc: Bow.

Linnell, William Shepherd. *A Short History of the Portland Gas Light Co.* New York: Newcomen Society, 1950. 32 pp. Loc: Bow (Science).

Morris, W. W. *Portland and Its Island Gems of Casco Bay*. Portland, c. 1900. 104 pp. Loc: Aug: SL.

Murray, Constance Carolyn. *Portland, Maine, and the Growth of Urban Responsibility for Human Welfare, 1830-1860*. Ann Arbor: Univ. Microfilms, 1960. 441 pp. Loc: Aug: SL.

Neal, John. *Account of the Great Conflagration in Portland. 1866, and a New Business Guide*. Portland: Starbird, 1866. 64 pp. Loc: Bow.

_____. *Portland Illustrated*. Portland: Jones, 1874. 160 pp. Loc: Bow (Spec. Colls.); Aug: SL.

Robertson, Edwin B. *Remember the Portland Maine Trolleys*. Westbrook: Robertson, c. 1982. 92 pp. Loc: Bow.

Shettleworth, Earle G. Jr. *Mr. Goodhue Remembers Portland: Scenes from the Mid-19th Century*. Augusta: Maine Historic Preservation Commission, 1981. 63 pp. Loc: Bow.

Willis, William. *Guide Book for Portland and Vicinity*. Portland: Thurston, 1859. 104 pp. Loc: Bow.

_____. *History of Portland*. 2 vols.; Portland: Day, 1831-33. Rev'd ed. 1865.

South Portland:

League of Women Voters of South Portland. *South Portland, Maine. An All-American City*. South Portland: Forest City, 1971, 69 pp. Loc: SPPL.

Extremely useful source. A carefully prepared history of the city right up to the time of publication. Thus it was cited many times as the resource on industrial firms in the late 1960s.

Jones, Herbert Granville. *Portland Ships Are Good Ships. The Building of 30 British and 236 Liberty Ships by the New England Shipbuilding Corp.* Portland: Machigonne, 1945. 60 pp. Loc: Bow, SPPL.

A good history of the East and West yards during the war. Celebrates the industrial achievements. The author worked in the East Yard, and his focus is mainly on what happened there.

Jordan, William B. *A History of Cape Elizabeth, Maine*. Portland: Falmouth, 1965, 385 pp. Loc: SPPL.

A fine local history of the whole town from which South Portland separated in 1895.

South Portland History Committee. *History of South Portland, Maine*. [South Portland], 1992. 69 pp. Loc: SPPL.

Useful addition to earlier works, including some oral history.

Westbrook:

Rowe, Ernest R., et al. (comps.). Rowe, Marian B. (ed.). *Highlights of Westbrook History*. Portland: Westbrook Women's Club, 1952. 237 pp. Index. Loc: Bow.

A fine history that was a useful source of information about the railroads, the canal, and 19th century industry at Morrills Corner when it was called Stevens Plains and was part of Westbrook.

Planning Documents

The following planning documents would be useful in further investigation to develop a sketch of developing environmental concerns, and to broaden further the mini-histories of industries on the Casco. There was no opportunity to consult them in this investigation.

Portland:

Council of Social Agencies. *Greater Portland's . . . Provisions for Health, Education, Safety, Welfare.* Portland: Council, 1941. 281 pp. Loc: Bow.

Greater Portland Development Council. *Greater Portland Area Economic Profile.* Portland: U. M.-Portland, 1977. 68 pp. Loc: Bow.

Henry, Martha S. *A Brief History of the Greater Portland Public Development Commission.* Portland, 1983. 80 pp. Loc: Bow.

Little, Dana A. *Economic Review and Analysis of the Greater Portland Region: A Report to the Greater Portland Regional Planning Commission.* Brunswick: Bowdoin, Public Affairs Research Center, 1969. 53 + 27 pp. Loc: Bow.

Maine Historic Preservation Commission. *Portland. Historic Resources Inventory: 1976.* Augusta: Commission, 1976. 98 pp. Loc: Aug: SL.

Portland Planning Board. *Portland 1957: Conservation, Renewal, Redevelopment.* Portland, 1957. Loc: Aug: SL.

South Portland:

Comprehensive Planning Committee. *South Portland Comprehensive Plan. Final Draft.* Typescript, South Portland, 1991. Loc: South Portland Public Library.

Reports on Casco Bay

Casco Bay Estuary Project. *Preliminary Comprehensive Conservation and Management Plan.* Portland: The Project, October, 1992. 64 pp.

Doggett, Lee; Smith, Mark. *State of the Bay Report.* Portland: Casco Bay Estuary Project, 1992. 31 pp.

Geochemical and Environmental Research Group. *Assessment of Sediment Contamination in Casco Bay.* College Station: Texas A & M Univ., 1992.

Articles and Reports on Historic Pollution Sources

See Appendix II, Historic Industrial Technologies and Pollution: An Annotated Resource List."

Appendices

Appendix I

**Survey of Historic Pollution Sources and Pollutants
Using Primary and Secondary Resources**

Appendix II

**Historic Industrial Technologies and Pollution
An Annotated Resource List**

Appendix III

**"Dirty History in Portland Harbor"
A Slide-talk to be Presented by Staff and Volunteers**

Appendix IV

**List of Sites by HDA and Alphanumeric Designation
for Mapping of Specific Pollutant Locations**

Appendices

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Survey of Historic Polluting Sources and Pollution
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Appendix II

Historic Industrial Technologies and Pollution
and Associated Resource List

Appendix III

"Dirty History in Portland Harbor"
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Appendix IV

Study Sites by HMA and Associated Resource List
for Mapping of Specific Pollution Locations

Historic Sources of Pollution In Portland Harbor, 1840-1970

Appendix I

Survey of Historic Pollution Sources and Pollutants In Secondary and Primary Resources

AT Automobile and truck-related.

Pollutants: Some PAHs in lubricants. Cleaning solvents. Heavy metals and solvents in paints.

BY Brickyard.

Pollutants: Often used as dumps when inactive (see D). Clay sediment source when active.

Resource: Investigator's observations in Portland and South Portland. See also D.

C Cemetery.

Pollutant: Arsenic from leaking embalming fluids.

Resource: Melissa J. Williams and John L. Konefes, "Environmental Concerns of Older Burial Sites," American Cemetery (Feb., 1992), pp. 22-24.

CM Chemical manufacturing: Sulfuric and hydrochloric acid only.

Pollutants: Lead from closed processing vessel. Sulfur dioxide used in process. Acids spilled or leaked in storage or transport.

Resources: Ed Gilfillan and David Page of Bowdoin College. Williams Haynes, American Chemical Industry (5 vols., Toronto, 1954), pp. 254-67; Richard M. Stephenson, Introduction to the Chemical Process Industries (New York, 1966), pp. 79, 83-86.

CG Coal gas production.

Pollutants: Some PAHs in coal tars including dibenzanthracene, benzopyrene, idenopyrene. Hydrogen sulfide and other sulfur compounds, ammonia from "cleaning" gas discharged in air and waste water.

Resources: U. S. Geological Survey, "Ground-water Contamination at an Inactive Coal and Oil Gasification Plant Site, Gas Works Park, Seattle, Washington," c. 1989. Historical processes described and dangers to workers touched upon in Horace Greely, et al., The Great Industries of the United States (Hartford, 1872), pp. 785-91. Archibald Clow and Nan L. Clow, The Chemical Revolution (1952), pp. 426-46.

DC Dry cleaning and commercial laundries.

Pollutants: Chlorinated hydrocarbons as dry cleaning solvents according to Gilfillan. Colten in his Guidelines mentions the flammable "Stoddard solvent" (not described) that began to be replaced by less volatile solvents in the 1930s. Commonly perchloroethylene has been used since the 1950s, a very toxic solvent.

From the 1920s on Colten says cleaners had various methods to reclaim solvents, but "leaking tanks or careless dumping of waste liquors into sewers are possible sources of contamination." Solvents commonly have been recycled by other firms since the late 1980s according to the Times Record article. The Portland Industrial Pretreatment Program requires special handling of these solvents under a firm's "Chemical Management Plan."

Heavy metals were and are pollutants from laundering industrial work clothing, wiping cloths, mops, etc. The Industrial Pretreatment Programs require efforts to mitigate the release of these.

Resources: Ed Gilfillan of Bowdoin College. Industrial Pretreatment Program of Portland 1981 list describing pollutants likely from cleaners and laundries. G. A. Purdy, Petroleum. Prehistoric to Petrochemicals (1957), pp. 296-97 on solvents. Colten in Guidelines, p. 20. James M. McCarthy, "J & J cleaners goes 'green,'" [Brunswick] Times Record, vol. 27:35 (March 26-28, 1993), p. 1 on recycling of solvents. Katherine Staples (Portland Pretreatment Program, 3/12/93) on laundries.

D Dumps and landfills.

Pollutants: Unknown industrial, commercial and household wastes including toxic and hazardous materials in dumps in former brickyards, quarries, inland and coastal wetlands.

Resources: Oral evidence from Jim Robbins of the Portland Dept. of Public Works and Dave Pineo of the South Portland Dept. of Engineering in winter, 1992-93. See also Craig E. Colten, "Historical Hazards: The Geography of Relict Industrial Wastes," Professional Geographer, vol. 42:2 (1990), pp. 143-56, and "Industrial Middens in Illinois: The Search for Historical Hazardous Wastes, 1870-1980," Industrial Archeology, vol. 14 (1988), pp. 51-61.

EG Electricity generation/transmission.

Pollutants: Transformer coolant oil containing PCBs from 1920s-1980s.

Resource: Ed Gilfillan of Bowdoin College. See Peter F. Larsen, et al., "On the appearance of PCBs in the Surficial Sediments of Casco Bay, Maine," Marine Pollution Bulletin, vol 15-12 (1984), pp. 452-53 on results of 1981, 1983 sediment studies.

E Electronic equipment manufacture.

Pollutants: Used electronics cleaning solvents containing heavy metals.

Resources: South Portland Industrial Pretreatment Program records.

FP Food processing, fertilizer and soap production, sugar refining.

Pollutants: Lead from solder used in cans, esp. sardine canneries, at least to 1920. Caustic equipment cleaning waters. Biological wastes from canneries, fish fertilizer production, sugar refineries, slaughter houses. Lye (caustic soda) in soap making is hazardous.

Resources: The lead solder theory is the investigator's. Ed Gilfillan of Bowdoin College supports the possibility. He noted the biological wastes and the effects of lye. Portland Industrial Pretreatment Program material of 1981 on Jordans Meat and on the B & M plant discusses blowaste and the steps necessary to mitigate it. Scientific American Cyclopaedia, pp. 508-25, 70-1-702 describes soap making in the era of the Portland firms. Colten in "Industrial Middens" touches on sugar refining.

FS Filling stations and repair facilities.

Pollutants: Underground tank storage of fuels from the 1910s onward with the consequent dangers of leaking according to Colten. Lead from anti-knock additives, 1920s-1970s. Some PAHs in fuel and lubricants.

Resources: Ed Gilfillan of Bowdoin College. G. A. Purdy, Petroleum. Prehistoric to Petrochemicals (Vancouver, 1957), pp. 324-25 In their Guidelines and Methods for Conducting Property Transfer Site Histories(pp. 26-33), Colten and Diane Mulville-Friel (1990) discuss the required use of underground tanks from the 1910s in Illinois and elsewhere and the changing patterns of filling station locations in urban areas from then to the present.

G Galvanizing and plating.

Pollutants: Zinc, zinc oxide, copper (20th century, also cadmium, chromium). Processes involved cleaning, plating and washing, in which cyanide, arsenic and pickling acids were used.

Recovery treatments began to be used in the late 1940s according to Colten in his "Historical Middens" and his Guidelines. Since treatment required tanks and ponds, not evident on the Sanborns, local galvanizing and plating operations probably did not use these new methods but continued direct discharge. Portland's Industrial Pretreatment Program required the Laughlin works to deal with zinc from its tanks when it was in molten condition and from the quench tanks so that it was not discharged.

Resources: Portland Industrial Pretreatment Program on the Laughlin works galvanizing operation. Ed Gilfillan. Stan Johnson, chemist with the ME DEP, 1988 interview on cadmium and other pollutants. Colten in "Historical Hazards," Table 1 (p. 146), lists cyanide, arsenic and acids from the 1880s on as wastes. In his "Industrial Wastes and Groundwater Contamination," Geographical Review, vol 81:2 (1991), p. 221, 225, he documents that chromium contamination led to well closures in New York, and chromium and cyanide in Michigan to law suits in the 1940s. In "Historical Middens" (p. 57) he briefly describes the processes and wastes involved in metal plating, mainly in Rockford, IL., where the wastes, he suspected, were disposed of on site, in the sewers or watercourses. Colten noted that some recovery treatment began in the late 1940s with limited success. In his Guidelines, p. 11, he observed further that "reduction of chromium wastes" and "chemical precipitation of cyanide wastes to remove toxic constituents" started in the 1940s. Additional methods were developed in the 1950s (p. 13).

H Hat manufacture.

Pollutants: Mercury used in felt processing. Heavy metals and other toxics from dyes.

Resources: The Great Industries of the United States (Horace Greely, et al., 1972) describes the process of felting (p. 777), but no reference is made to mercury. It seems to be common knowledge among environmentalists that hat factories used mercury in preserving felt (David Page of Bowdoin College). See also Colten, "Historical Hazards" Table 1, p. 146 listing mercury from the 1800s with no documentation. Various dyes used heavy metals and coal tar derivatives as pigments and coloring means.

J Junk and scrap yards.

Pollutants: Heavy metals; some PAHs in lubricants and fuels. Solvents and other toxic and hazardous

wastes.

Resources: Think of what junk yards contain! Colten in "Industrial Middens" (p. 58) says that in Rockford metal fabricators and platers sometimes hired "junk men" to haul away wastes.

M Machining.

Pollutants: Copper, zinc, tin, lead from brass and bronze working. In 20th century, chromium, lead, manganese, nickel from steel alloys. Metal cleaning solvents including toluene, xylene and benzene. Arsenic. PAHs in cutting oils (mixed with water sometimes for cooling from late 1800s), machine lubricants and hydraulic oils (for semi-automatic machines from the 1920s).

Resources: Portland Industrial Pretreatment Program materials on Nichols (1981, 1992) and Crosby-Laughlin. Charles Searle (ed), Chemical Carcinogens (Washington, 1976), p. 318 on cancer in machinists. Colten in "Historical Hazards" Table 1 (p. 146) lists arsenic (source in process not indicated) and solvents. In his "Industrial Middens" (p. 56) he discussed innovations in cooling and hydraulics briefly.

MF Military facilities.

Pollutants: PAHs from spilled and leaked fuels. See M since machining often done at military facilities.

Resources: Various Sanborn maps of the Portland and South Portland facilities show fuel storage facilities and machine shops. See also "Defense Environmental Restoration Program-Formerly Used Defense Sites" list (1992) available from ME DEP, Bur. of Hazardous Materials and Solid Waste Control.

MT Marine transportation.

Pollutants: From antifouling paints, lead, copper. From the 1960s to the late 1980s, tributyl tin (TBT). Note that in 1989 the use of TBT was banned on boats less than 30 meters in the U. S. Larger ships may still have their hulls painted with this toxic paint, so it could be a problem pollutant in Portland Harbor. There is still no international ban on its use, although France had regulations against its use even before the U. S. PAHs from fuel spillage and leakage.

Resources: David Page of Bowdoin College. Mary E. Lanphear, "Concentration and Historical Analysis of Butyl tin species in Coastal Maine Sediments," typescript, Honors Project, Bowdoin College, 1993.

MW Metal working.

Pollutants: Copper, zinc, tin, lead, (20th century, also aluminum, cadmium, chromium) from smelting and forming brass and bronze. In 20th century esp., cobalt, chromium, lead, manganese, molybdenum, nickel, tin, zinc from casting, rolling and forming steel alloys. Acidic pickling liquors containing heavy metals after rolling and casting. Toxics associated with sand molding including graphite, phenols and polycyclic aromatic hydrocarbons are still dangerous for workers. Silica, a hazardous material, is used in molding and furnace operations. See also G and M since galvanizing and machining were often done at foundries.

Cotten in several articles says that in the 1930s fabricators began to treat the liquors to recover sulphuric acid and copperas, and control discharges. In the 1950s he notes in his Guidelines that pickling liquors began to be neutralized with lime and the slurry stored in lagoons. Since the Sanborn Insurance maps indicate no such facilities, it is unlikely that these recovery treatment methods were used here.

Resources: Portland Industrial Pretreatment Program materials for Crosby-Laughlin (1981). On period processes for making alloys see Scientific American Cyclopaedia (1893), pp. 4-18, 49-57, 65-66, 258-60, 288-89, 557-59, 606-609. Kirk-Othmer Encyclopedia of Chemical Technology (24 vols.; New York, 1978-84), vol. 6, pp. 194-229 on copper alloys. Ullmann's Encyclopaedia of Industrial Chemistry (1985-91), vol. A-7, pp. 519-20, on environmental health aspects of working in copper smelters. U. S. Dept. of Health and Human Services, "Recommendations for Control of Occupational Safety and Health Hazards. Foundries (1985), pp. 166-77. Cotten in "Industrial Middens" (p. 54) says that metal working industries released "waste water, acids and oils" directly into Lake Calumet in Chicago until the 1930s during manufacturing processes. In that decade they began to install settling ponds and holding tanks, and to release wastes in smaller quantities. Guidelines, p. 10 and 12.

O Other possibly polluting activities.

Pollutants: Match manufacture: red phosphorous? Other toxics? Rug manufacture: Aniline dyes, processing waters.

Resources: Clow and Clow, Chemical Revolution, p. 454 on matches. Cotten in "Industrial Middens" (p. 56) touches on textile mills.

PS Petroleum refining, storage and distribution.

Pollutants: Kerosene refining, 1860s-90: Sulphuric acid used to remove impurities including lead sulphide, resins and tars producing acidic sludges; naptha (gasoline) sometimes treated as a waste

until internal combustion engines provided a fuel market.

Storage, etc.: PAHs from spills and leaking tanks and pipes. 1900s-: Lead additives to oils to deal with pressure and temperature. Lead from tetraethyl lead additives from 1920s-1970s added at the end of refining.

Resources: Ed Gilfillan and David Page of Bowdoin College on kerosene refining processes and facilities. Purdy, Petroleum, pp. 151-66, 207-11, 324-25, 372-75. Haynes, American Chemical Industry, pp. 254-56. Colten in his Guidelines notes (p. 19) the problems of leakage from interstate pipelines. Not until 1959 was the first code for construction and maintenance developed; higher standards were included in the 1970 code.

PW Plastic working.

Pollutants: Solvents including phenols.

P Printing.

Pollutants: Lead from inks until recently. Arsenic. Mercury has been a pollutant from commercial printing from the 1910s on according to Colten. "Cyanide was also a component of some printers' inks," noted a museum curator writing about dangers in handling collections. Silver from photolithograph plates in this century. Solvents.

Resources: Portland Industrial Pretreatment Program materials indicate that lead and solvents need to be removed before disposal of solutions in the sewers. Patricia L. Miller, "Arsenic, Old Lace and Stuffed Owls May be Dangerous to Your Health," Technical Insert No. 50, Illinois Heritage Association (March-April, 1991), [p. 2]. Colten in "Historical Hazards" Table 1 (p. 146) lists lead, arsenic and solvents from the 1850s on. In his Guidelines, Figure 2.2, he lists mercury (p. 24).

R Railroad facilities.

Pollutants: Some PAHs from lubricants and, from the 1950s on, diesel fuel. Spillage and leakage of petroleum products in transport, and through flushing of tank cars in yards. See M since machining was often done in railroad yards; see V since railroads commonly built and repaired their own cars in 19th century, and repaired them well into this century. Coal ashes have been suggested as a source of mercury.

Resources: See PS, M. John Sowles of the ME DEP has suggested the coal ash source.

S Sewers and outlets.

Pollutants: Carry pollutants from industrial and commercial sources to outfalls where, because of this, now there probably are concentrations of pollutants, unless sediment transport has occurred.

Resources: Colten, "Historical Hazards, pp. 146-49 touches on the use of sewers to flush away wastes; "Industrial Middens," p. 56, on their use specifically by metal working industries.

SR Shipbuilding and repair.

Pollutants: Lead and copper from bottom paints. Also from the 1960s tributyltin. Lead from other "topside" marine paints. Heavy metals from machining. PAHs from lubricants.

Resources: See MT for bottom paints. From 1900, see MW and M, esp. from 1940 on when the Liberty ships were built in the two Spring Point shipyards.

SP Stoneware and pottery.

Pollutants: Lead and other heavy metals from glazes until recently.

Resources: Clow and Clow, Chemical Revolution, pp. 306-309, 386-87. Colten in "Historical Hazards," Table 1 (p. 146), lists lead as used in glazes from 1800 on but gives no specific documentation.

T Tanning.

Pollutants: Alum as a skin drier may be hazardous. Chromium present if "mineral process" used for tanning as was done certainly from 1800 on, and perhaps earlier. Arsenic.

Resources: Ed Gilfillan of Bowdoin College, MSDS sheets on data base. Allen Rogers, Laboratory Guide of Industrial Chemistry (New York, 1908), pp 121-35, describes the "mineral" and "vegetative" processes. Colten in "Historic Hazards" Table 1 (p. 146) lists chromium and arsenic from the 1920s on, but Rogers' discussion of tanning points to use at least back to the 1900s.

TL Testing laboratory.

Pollutants: Toluene, chloroform.

Resources: Portland Industrial Pretreatment Program, 1981 list.

UT Urban transportation.

Pollutants: See FS and PS since lubricants used on trolleys and buses, and diesel fuel in latter.

V Varnish and paint manufacture and use.

Pollutants: White lead used as pigment base and dryer in paints, white and red lead and other lead compounds (including lead oxide and lead acetate), zinc, cadmium and other heavy metals used as pigments in paints and varnishes. Also coal tars in some 19th century varnishes. The processes of making white lead, the pigments and mixing paints and varnishes are all well described in the Scientific American Cyclopedia of 1893, and in Rogers' Laboratory Guide. Synthetic solvents and resins were used from the 1920s on according to Haynes. Colten lists acetone and acrolein. From the 1940s he indicates that mercury was used in some paints and varnishes.

Resources: Scientific American Cyclopedia, pp. 197-201, 357-63, 428-36, 567-81, 695, 703-706; Laboratory Guide, pp. 81-107. Haynes, American Chemical Industry, pp. 355-59 on the synthetics. Colten in "Historical Hazards," Table 1 (p. 146), lists the two solvents from the 1920s on. In his Guidelines, Figure 2.2 (p. 24), he lists mercury as being in paints as well as in printers inks and hats.

Note: Paper mills as sources are not included, since none were located within the geographical area of this study.

1. The first section of the report discusses the historical context of pollution in the United States, focusing on the early 20th century when industrialization was in full swing. It highlights the role of factories, mines, and transportation in creating air and water pollution. The text notes that while the public was aware of the problems, there was little organized opposition until the 1960s.

2. The second section describes the environmental movement that emerged in the 1960s and 1970s. It mentions key figures like Rachel Carson and the publication of 'Silent Spring', which raised public concern about pesticides. It also discusses the formation of environmental organizations like the Sierra Club and the Earth Day movement.

3. The third section details the legislative response to environmental concerns. It covers major laws such as the Clean Air Act of 1970, the Clean Water Act of 1972, and the National Environmental Policy Act of 1969. It explains how these laws established federal agencies like the EPA and set standards for pollution control.

4. The fourth section discusses the challenges of implementing environmental laws. It notes that enforcement has often been inconsistent, and that industries have frequently found ways to circumvent regulations. It also mentions the importance of public participation and the role of the courts in enforcing environmental rights.

5. The fifth section looks at current environmental issues and future prospects. It discusses ongoing problems like global climate change, ozone depletion, and the loss of biodiversity. It concludes by noting that while significant progress has been made, much more work is needed to protect the environment for future generations.

Historic Sources of Pollution in Portland Harbor, 1840-1970

Appendix II

Historic Industrial Technologies and Pollution An Annotated Resource List

____ Primary Sources ____

Technological Encyclopaedias and Handbooks:

Greely, Horace, et al. *The Great Industries of the U. S.* Hartford: J. B. Burr, 1872, 1204 pp. Loc: Author's personal collection.

Randomly organized collection on everything from file making to grand pianos, mercury to Britannia ware, varnish to soap from the beginnings of the technology often to the 1870s. Describes processes at specific establishments, none apparently in Maine. I have looked with Prof. Edward Gilfillan at selected entries to see what pollutants certain industrial processes were likely to have yielded.

Hopkins, Albert A. (ed.). *The Scientific American Encyclopaedia.* New York: Munn, 1893. 708 pp. Loc: Personal collection, Edward Laine.

Very useful, alphabetically organized topical collection. Very detailed on many processes, but often there are tantalizing omissions. For instance, the article on tanning presents essentially home processes, but has a detailed discussion of a "Barkometer," apparently an important apparatus in industrial-scale production. (Pp. 549-50). I have gone through this volume carefully with Prof. Edward Gilfillan to see what pollutants certain industrial processes were likely to have yielded.

Rogers, Allen. *Laboratory Guide of Industrial Chemistry.* New York: Van Nostrand, 1908. 158 pp. Loc: Bow.

"The object of this book . . . is to acquaint the student of chemistry with a few commercial processes, by introducing practical methods of handling materials on a large scale." (Preface, p. VII). Includes chapters on dyeing, paints and varnishes, leather, paper manufacture, etc.

Thorpe, Frank Hall. *Outlines of Industrial Chemistry. A Text-Book for Students.* New York: Macmillan, 1919. 665 pp. Loc: Bow.

The writer has endeavored to describe briefly . . . the more important industrial chemical processes." (Preface, p. vii). Covers production of glass, ceramics, pigments for paints, various acids, coal gas, mineral oils, cane syrup, dyes, etc. A very rich and useful collection!

Secondary Sources

Current Encyclopaedias of Chemical Engineering:

Mark, Herman F., et al. (ed.). *Kirk-Othmer Encyclopedia of Chemical Technology*. 2nd ed., 24 vols.; New York, Interscience-Wiley, 1963-71. 3rd ed., 31 vols.; New York: Wiley, 1978-84. One volume abridgement: New York: Wiley, 1985. 1318 pp. Loc: Bow (Hatch Science, 2nd ed.).

More than one would want to know about technologies up to the 1980s. It is worth returning to digest articles on following topics: copper, iron, lead, petroleum, steel.

Arpe, Hans-Juergen, et al. (eds.). *Ullmann's Encyclopaedia of Industrial Chemistry*. 5th ed.: A ser., 28 vols.; B ser., 8 vols. Basel: Weinheim, 1985-91 + Index vol. Loc: Bow (Hatch Science).

An even more encyclopaedic work that takes technologies up the present, with very little material about 19th century processes.

Histories of Technology and Industrial Chemistry

Clow, Archibald; Clow, Nan L. *The Chemical Revolution. A Contribution to Social Technology*. London: Batchworth, 1952, 680.

"This book is a synthesis. It is an attempt to create something new out of hitherto unexplored ground common to economic history and chemical technology" (Introduction, p. xi). Looks at various English and Scottish industries and agriculture from the 1600s. A fine history of technology in which chemical advances are clearly described and put into a larger social context. Contains a good time line, excellent bibliography and adequate index.

Haynes, Williams. *American Chemical Industry. Background and Beginnings*. 5 vols.; Toronto: Van Nostrand, 1954. Vol. 1, 512 pp. Loc: Bow.

Solid and well-written history that presents the larger economic and political contexts as well as the organization and "technical progress" in volume 1 from 1608 to 1911. Contains a 65 page time line, substantial listing of "Book Titles," and indexes for names and subjects.

Purdy, G. A. Petroleum. *Petroleum. Prehistoric to Petrochemicals*. Vancouver: Copp Clark, 1957. 492 pp.

This book "is intended to serve as a text-book for training employees of Imperial Oil Limited. . . We know that the other companies that operate in Canada use similar processes and that their operations parallel ours. . . . The book meets the need for a general text on petroleum that combines basic ideas with the latest technical concepts." From the Introduction.

Stephenson, Richard M. *Introduction to the Chemical Process Industries*. New York: Reinhold, 1966, 474 pp. Loc: Bow.

Discusses the most important of the chemical process industries. Emphasis is on the basic chemical and thermodynamical principles of the individual processes and the interrelationship of one process with another" (Preface, p. lii). The focus is on developments since the Second World War. Index. No bibliography.

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"Industrial chemistry" has here been interpreted in a very wide sense, so as to include all modifications of the composition of matter that have been undertaken for profit or use, even though they may not in earlier times have been recognized as belonging to chemistry. . . . I have . . . chosen to concentrate upon the principles rather than the men." (Preface, p. xv).

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A railfan's history organized by producing companies.

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_____. *Industrial Wastes in the Calumet Area, 1869-1970. An Historical Geography*. Springfield: Ill. Dept of Energy and Natural Resources, Hazardous Waste Research and Information Center, 1985. 124 pp. ENR contract HW-16.

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McMahon, P. J. T. "The Impact of Marinas on Water Quality," *Wat. Sci. Tech.*, vol. 21:2 (1989), pp. 39-43.

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Historic Sources of Pollution in Casco Bay, 1840-1970

Appendix III

Dirty History in Portland Harbor

Slide-Talk to be Presented by Staff and Volunteers

Note: This is a brief introductory slide show to the dirty history project for presentation by CBEP staff, volunteers or the project investigator. In various versions it has been presented to the Public History conference in Valley Forge, PA, in April, 1993; a seminar at the Rural History Centre at the University of Reading, England, in May, 1993; to a class on watershed planning at Bowdoin College, Brunswick, Maine, in February, 1993; in a public talk sponsored by the Casco Bay Estuary Project at the University of Southern Maine in Portland, in April, 1994, and to a meeting of the Project's Technical Advisory Committee at the Southern Maine Technical College in South Portland, in May, 1994.

Introduction

A. Dirty history, a new term for a new kind of history

History of the polluting industries and commercial activities and the legacy of pollution they left behind. Involves locating sites of former foundry and machine shops, gas works, shipyards, tanneries, filling stations, etc. Forgotten dumps and old sewer outfalls. Their legacy can still hurt us, whether the pollutants are still in the soils in and around the facility, or whether one way or another they have reached the rivers and harbors.

B. Dirty history of the Portland-South Portland region

A first among the various estuary projects around the country. A comprehensive inventory of sites that could have produced and still may contain pollution and the sewer outfalls where it may accumulate in the sediments. Covers the most industrialized portions of the Bay called here "Portland Harbor," including the Fore River and Stroudwater Rivers, Portland and the Back Cove watershed, and the South Portland watersheds draining into the harbor. Time frame: 1840-1970.

C. This talk:

- Why do dirty history investigations?
- Dirty history 1840-1900
- Dirty history 1900-1970
- The present and future

I. Why do dirty history Investigations?

A. Immediate Reasons: To locate where pollutants might still be present in buildings and soils around them; where they may be in the rivers and harbor and where they came from. Part of the data gathering critical to several of the CCMP goals. Toxic pollutants such as:

- **Heavy metals** like lead, mercury, chromium, cadmium, zinc, tin, nickel and copper
- **PAHs** (polynucleated or polycyclic aromatic hydrocarbons - - i. e. oil, gasoline, coal tars and other petroleum products and byproducts)
- **PCBs**
- **Solvents and various ephemeral pollutants.**

B. Why look for old sites where toxic and hazardous substances were made and used? Development on land and dredging of sediments can release toxic pollutants deposited in the past.

- Can be dangerous to human health, health of other creatures and plants.
- May be threatening to the ecosystems of the Bay and its watershed, or any body of water.

C. Why locate them specifically?

- Help natural scientists with several tasks: Knowing what may be present in sediments and in organisms, explaining why it is there, judging if the pollutants are worrisome, planning research.
- Help planners and developers, officials and volunteers in local government avoid problems. If disturbed through construction on land or dredging in the water, can become problems today.
- Help general public know what is in its collective backyard. Be willing to identify with the problems and help solve them.

Now to a slide-talk on "Industries and Pollutants" to introduce you to the findings of the research.

II. Dirty History 1840-1900

Slides 1A-C: The Study Area. Three views closer right down to Fore River, and Portland Harbor, and Back Cove.

Before 1840:

Slide 2: Stroudwater Dam. No dirty history here! Grain grinding and flour production. Before 1840 water power was the common energy source for industry. Limited the size of plants. Few industrial processes in general with long term environmental impacts. Apparently no polluting processes before 1840 in Portland/South Portland.

After 1840: Look at six types of sites with associated pollutants before 1900. For perspective, 27 types of polluting sites identified in this study. A total of 286 sites between 1840 and 1970. Now look at one primary source of the many used.

Slide 3. The 1876 Bird's Eye map of Portland. A wonderful source for dirty history. From a perspective as if coming in for a landing at Portland Jetport, shows buildings, streets and bridges in detail.

Slide 4. Type No. 1: Tanneries in what is now Deering Oaks Park. What we now know as Deering Oaks Park was an industrial area with three tanneries on the stream leading down to Back Cove. Further upstream to the left where Congress and Park met were several more. Pollutants: Chromium and arsenic possible.

Slide 5. Type No. 2: The Portland Co., a foundry with machine shops on the Portland waterfront. Operated until recently. Produced steam locomotives, stationary steam engines, weapons for war. One of three major foundries in the 1870s in Portland and South Portland. In addition, many smaller machine shops and foundries.

Pollutants: Heavy metals such as zinc, lead, copper from brass and bronze alloys and ferrous castings and machining, and after the turn of the century, chromium, nickel when alloy steels developed. If galvanizing done, then zinc and cadmium. If brass or bronze casting or working, then cadmium, chromium, aluminum and always copper.

Slide 6. Type No. 3: Grand Trunk Railroad Yard on the Portland waterfront. Just west of the Portland Co. One of five yards in Portland and South Portland at the time. Pollutants: Heavy metals from machining. Lead from paints used in car building and repair shops. Mercury from coal ashes from locomotives.

Slide 7. Type No. 4: Burgess-Fobes White Lead Works on Munjoy Hill. One of the company's three paint factories in Portland and South Portland, all close to the harbor. At this one a few blocks from the Portland Co. and the Grand Trunk Yard, white lead mixed with other pigments to make white paint and other colors, as well as to serve as a "dryer" with linseed oil based paints. Maybe white lead produced here. Pollutants: White and red lead as drying agents and coloring pigments; cadmium, chromium and other metals to give color.

Slide 8. Type No. 5: Coal gas works by the Portland Bridge, now the Million Dollar Bridge. From coke and coal, gas produced for lighting, in this century also for cooking and cooling. Pollutants: Extensive air pollution (hydrogen sulfide). Legacies are the wastes, the various coal tars, solid or water soluble, that were left at the site. Some are cancer causing.

Slide 9. Type No. 6: Portland Drydock in Knightville in South Portland. On the other side of the Portland Bridge. One of many shipyards, but certainly the largest on the harbor of the time. Pollutants: Copper and lead from anti-fouling paints.

III. Dirty History 1900-1970

Slides 10 and 11. GIS maps of sites before and after 1900. Many other types of sites before 1900. Blue denotes sites before 1900.

Now look at sites after 1900. Second map shows ones after 1900 in red. Most of the on the map sites continued to be active through this second period, joined by others.

Now show photographs of the six sites just seen as they appear to the camera's eye today:

Slide 12. Type No. 1: Cumberland Tannery site in Deering Oaks Park. This tannery continued at least until 1914, opposite where the Post Office is now.

Slide 13. Type No. 2: Portland Co. today. Closed in the 70s. Now boat storage and repair, and home of the new Maine Narrow Gauge Railroad and Museum.

Slide 14. Type No. 3: Grand Trunk Yard today. Across to the Laughlin Foundry which had opened at this site in the 1890s and closed in the early 1980s.

Slide 15. Type No. 4: Paint factory site on Munjoy Hill. Replaced by a house on the corner of Wilson and Munjoy and next to a school ground.

Slide 16. Type No. 5: Gas works continued producing with old technology until late 1930s.

Slide 17. Type No. 6: Former drydock site in South Portland. Now site of marina, boat storage and electrical power station. Not surprisingly, PCBs found in the sediments from transformers.

Now show four additional sites from this century.

Slide 18. Type No. 7: Shipyards: Building Liberty ships in WWII. East Yard in Spring Point. Big scale shipbuilding, probably left variety of pollutants: Heavy metals from machining and metal forming, painting. PAHs from lubricants. [From photograph in Sullivan's Photocraft collection].

Slide 19. Today, marina, condominiums, light industry including machining, boat repair. Between 1945 and today site used by a shipbuilder, reconditioner of machine tools, GE for producing parts for jet engines, refrigerators, pumps.

Slide 20. Type No. 8: First of the two dirty history legacies of the internal combustion engine. Tank farms in 1954 in old rolling mill area on a Sanborn Insurance map. Tank farms in South Portland going back to the 1890s. Note the pond with the tanks close by. From 1860s to 1970s, an iron and steel rolling mill, at top of slide by waterfront.

Slide 21. Today, tank farms in South Portland near Veterans Memorial Bridge. Pollutants recognized: PAHs and lead from leaking tanks and spilling during transfer between ship, tank truck, and railroad tank car. What not realized is how long it has accumulated. Nor that here was another foundry with machine shops and attendant pollution.

Also on this polluted fresh water pond was the second of the Burgess-Fobes paint factories and between the 1860s and 1900 an acid works. Close by, a petroleum refinery in the 1880s and 1890s, and since then a tank farm and petroleum distribution site.

Slide 22. Type No. 9: The second legacy of the internal combustion engine. Filling stations at Morrills Corner in the 1940s. At major crossroads leading into Portland, and just before the bridges were clusters of filling stations from the 1930s until the Interstates completely rearranged things. At that time danger for the Bay from lubricants and fuels accidentally or intentionally going down into sewers. [From photograph in Sullivan's Photocraft collection].

Slide 23. Abandoned station site in South Portland. The forgotten underground fuel tanks present a danger today. Pollutants: PAHs with lead leaking from rusting underground storage tanks.

Slide 24. Type 10: Dumps. Below the Eastern Prom Today. A pleasant area, even in winter. But for many years in this century,...

Slide 25. ... the site of the East End Dump. Bulldozed over, but no one knows what toxic and hazardous materials may be buried there. Now being watched by the Maine DEP. Forgotten dumps other parts of Portland and South Portland contain pollution legacies..

Slide 26: A final map to show dirty history sites in Portland and South Portland of two sorts:

1. Parts of both cities on land built up from marshes. Indicated in brown. No one knows what the fill was, often dumped refuse and industrial waste.

2. Sewer outfalls where pollutants transported in these human-made watersheds arrived at the harbor, river and cove. Toxins may be concentrated in sediments at these points, since wastes including heavy metals, oils with PAHs, hazardous solvents were often flushed down sewers. Now that cannot be done, because of the Industrial Pretreatment Programs set up under the 1977 Clean Water Act.

IV. The Present and Future?

A. Needs for future research with citizen input

We need to identify historic pollution sources and pollutants and track them on a watershed scale. This is to learn how best to manage development and preserve the qualities of the Casco Bay region we love and require.

A key action for several of the goals in the emerging Comprehensive Conservation and Management Plan for the Bay and its watershed. Need to do Presumpscot and Royal River watersheds, and watersheds in Freeport, Brunswick and Harpswell going down to the Bay. Future projects involving citizens are necessary.

B. Relation to "Goals" and "Actions" in the CCMP:

Five goals have been identified, four of which this dirty history project contributes to:

- Minimize impacts from development, esp. through protecting habitat
- Minimize impacts from stormwater runoff and CSOs
- Determine effect of existing sediment contamination on the health of the Bay
- Promote responsible stewardship

Five "Actions" are directly related to the dirty history project:

- **Sediments:** Collect and analyze cores, decide on locations for further sampling. Location data on historic sources including historic sewer outfalls that are also CSO outfalls will help in this. Analyze extent of contamination.
- Produce GIS map of "pollutants of concern"
- Develop training program for environmental managers and local official, to include inventorying and controlling pollution sources.
- Map critical habitats and the threats to them [including historic pollution sources].
- Develop educational programs and outreach activities. This talk is part of this action. We are developing list of people interested in doing dirty history research under the direction of the person who did the first project, Ed Hawes. Signup?!

Index to Historical Pollution Site Pollutants

- 1 - sulfuric acids
- 2 - pickling acids
- 3 - alum
- 4 - antimony
- 5 - arsenic
- 6 - biological wastes
- 9 - cadmium
- 10 - chloroform
- 11 - chromium
- 12 - coal tars
- 13 - cobalt
- 14 - copper
- 15 - cyanide
- 16 - graphite
- 17 - heavy metals - general
- 18 - hydrogen sulfide
- 19 - lead
- 20 - manganese
- 21 - mercury
- 22 - molybdenum
- 23 - naptha (gasoline)
- 24 - nickel
- 25 - PAHs
- 26 - PCBs
- 27 - phenols
- 28 - phosphorus
- 29 - resins
- 30 - silica
- 31 - solvents, dry cleaning
- 32 - solvents, paint
- 33 - solvents, metal cleaning
- 34 - solvents in electronic production
- 35 - steel alloys
- 36 - sulfur compounds
- 37 - lead sulphide
- 38 - tin
- 39 - toluene
- 40 - unknown
- 41 - zinc
- 42 - tars
- 43 - hydrochloric acid
- 44 - ammonia
- 45 - zinc oxide
- 46 - aluminum
- 47 - tributyltin (TBT)
- 48 - lye

1.1-CA-1-1	Locks and the Audubon Sanctuary	
1.1-T-1-1	J. Smith Tannery	3
1.1-R-1-123	The Portland and Ogdensburg	
1.1-FP-12	Portland Rendering Works H. Peters	25
1.1-FP-1-1	Fickett & Milliken Grain Mill	6
1.1-T-2-1	Tat Brothers Tannery	6
1.1-T-3-1	Bark mill	3
1.1-S-1-2	West Side sewer	6
1.1-M-1-3	Nichols Portland	40
1.1-S-1-2	West Side sewer	11, 14, 19, 20, 24, 25, 33, 38, 41
1.1-S-3-2	West Side interceptor	
1.2-BY-1-12	Lucus Brickyard	
1.2-S-2-2	Forty-Two inch main	
1.2-CA-2-1	Canal from the Stroudwater Tidal cove to the river	
1.2-CA-3-1	Canal along the Fore river across Thompsons Point	
1.2-BY-1-1	Portland Brick Company	
1.2-BY-1-12	J.L. Lucas Brickyard	
1.2-C-1-123	Evergreen Cemetery	5, 19
1.2-C-2-123	Pine Grove Cemetery	5, 19
1.2-C-3-123	Mt. Sinal Cemetery	5, 19
1.2-C-4-123	Mt. Carmel Cemetery	5, 19
1.2-T-1-1	N.K. Sawyer Tannery	3
1.3-BR-4-23	Veterans Memorial Bridge	
1.3-CA-3-1	Cumberland and Oxford Canal at Thompson's Point	
1.3-FP-1-1	Thompson Fowler slaughter house	6
1.3-R-1-12	Portland & Ogdensburg yard, Thompson's Point	9, 11, 12, 14, 20, 21, 24, 25, 33, 38, 41
1.3-R-2-12	Boston & Maine yard and Roundhouse	9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 33, 38, 41
1.3-BY-1-1	P. Clark's Brickyard	
1.3-FP-1-1	Thompson Fowler Slaughter Houses	6
1.3-FP-2-1	Thompson Fowler Slaughter Houses	6
1.3-FP-3-1	Quints Soap Factory	6, 48
1.3-CA-4-1	Old Cumberland and Oxford canal	
1.3-R-2-12	Boston and Maine Yard and round house	7, 8, 9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 31, 33, 38, 41
1.3-R-3-12	Union Station	
1.3-FS-8-2	Thompson Point	19, 25
1.3-EG-1-23	Transformer station	26

1.3-PS-1-2	565 Danforth: Jenny Manufacturing Co. Gasoline Supply	19, 25
1.3-PS-2-2	597 Danforth: Gulf Oil	19, 25
1.3-PS-3-23	Petroleum storage at industrial facilities	19, 23
1.3-S-1-1	Sewers and outfalls	
1.3-UT-1-123	117 - 33 St. John: Trolley car barn	25
1.3-FP-1-3	Barber Foods: 70 St. John Street	6
1.3-PS-3-23	Petroleum storage at industrial facilities	19, 25
1.3-RBR-1-1	Railroad bridge to Rolling Mills	
1.3-RBR-3-123	Railroad bridge to south Rolling Mills	
1.4-BY-1-12	W. Parker's R. Tibbet's Brickyard	
1.4-BY-2-12	Other brickyards	
1.4-BY-3-1	Other brickyards	
1.4-EG-1-12	Portland Railroad Co./Cumberland County Power and Light	26
1.4-MW-1-1	Reidy and Kelly Foundry	2, 14, 17, 19, 30, 38, 41
1.4-SP-1-12	Portland Stoneware Company	17, 19
1.4-T-1-1	Portland Leather, Hayes and Britton: Gray's	3, 5, 11
1.4-T-2-1	H. & C. Fling Tannery	3, 5, 11
1.4-T-3-12	J.S. Ricker & Co.: Casco Tanning Company	3, 5, 11
1.4-T-4-1	J. Dow & Sons Tannery	3, 5, 11
1.4-T-5-1	Sheep Skin Tannery of Hart & Co.	3
1.4-V-1-1	Fuller's Varnish Factory	12, 17, 19
1.4-BY-1-12	Douglas Street Brickyard	
1.4-BY-2-12	S. B. Dinsmore Brick Mfr.	
1.4-DC-1-12	Dry Cleaning	17, 31
1.4-D-1-2	Douglas Street Dump	40
1.4-D-2-2	Dump at Woodford on the Back Cove	40
1.4-S-1-23	Almshouse Sewer	
1.4-S-2-2	North Side Intercept	
1.4-S-23	The Marginal Way Intercept	
1.4-S-4-2	Outfall at old stream location?	
1.4-S-5-2	Outfall from Belmont	
1.4-S-6-2	Outfall from Woodford	
1.4-T-3-12	Casco Tanning Company	3, 5, 11
1.4-SP-1-12	Portland Stoneware	17, 19
1.5-T-1-1	Tannery	3, 5, 11
1.5-T-2-1	Tannery	3, 5, 11

1.5-T-3-1	Tannery	3, 5, 11
1.5-BY-1-1	Brickyard	
1.5-T-1-1	F.M. Houghton Tannery	3, 5, 11
1.5-T-2-1	Chas. E. Morrill Factory	3, 5, 11
1.5-T-3-1	A. McKone Tannery	3, 5, 11
1.5-D-1-2	Washington Street Dump	40
1.5-G-1-2	Galvanizing and plating	2, 5, 9, 11, 14, 15, 41, 45
1.5-MW-1-2	American Can Company	2, 17, 19, 25, 38
1.5-PW-1-2	Burt Co.	27
1.5-S-1-2	on former tidal cove	
1.5-S-2-2	Johnson Street	
1.5-TL-1-3	Ventrex Laboratories	10, 39
1.6-D-1-1-23	Dumps and Landfill	40
1.6-T-1-1	George Cusick's Tannery	3
1.6-PS-1-2	Gould's Wharf	19, 25
1.6-DC-1-2	Dry cleaning	17, 31
1.6-D-2-2	The East End Dump	40
1.6-S-1-2	Under the Eastern Prom	
1.6-S-2-2	North Side Intercept	
1.6-S-3-2	Smith Street outfall	
1.6-T-1-1	Tannery	3
1.6-DC-2-3	Associated Textile Rental Services	17
1.6-P-1-3	Allen Screen Printing	5, 19, 21, 27, 33
1.7-D-1-1-23	Dumps and filled land	40
1.7-MW-1-1	Merrill File Cutting Shop	2
1.7-MW-2-1	E. M. Lang Solder and Die Works	14, 38, 41
1.7-MW-3-123	The Portland Stove Co.	2, 11, 16, 17, 19, 24, 25, 27, 30, 38, 41
1.7-MW-4-1	J. C. Frye & Co. Plow Factory	2, 30
1.7-MW-5-1	D. T. Kelley & Sons Portland Foundry and Machine Works	2, 14, 19, 41
1.7-R-2-1	Portland & Rochester railroad engine house & yard	12, 14, 17, 19, 25, 33, 41
1.7-R-1-1	P & O passenger station	
1.7-DC-1-2	Dry cleaning	17, 31
1.7-D-2-2	Dumps and filled land	40
1.7-J-1-2	Junk and scrap	17, 25
1.7-MW-6-2	Radiator & Heater Works	2, 11, 13, 14, 17, 19, 24, 25, 38, 41
1.7-MW-7-2	New England Metal Culvert Co.	2, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 38, 41

1.7-R-4-2	The Portland and Rochester	7, 8, 9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 31, 33, 38, 41
1.7-S-1-2	Pearl Street	
1.8-MW-1-1	The Presumpscot Iron Co.: Eastern Forge	2, 14, 38, 41
1.8-R-1-12	Grand Trunk's Presumpscot yard	9, 11, 14, 17, 19, 20, 21, 24, 25, 33, 41
1.8-SR-1-1	Merrill's shipyard	14, 19
1.8-SP-2-1	Kelly's shipyard	14, 19
1.8-SP-3-12	Russell's shipyard	14, 19
1.8-D-1-23	The Ocean Avenue Landfill	40
1.8-PS-2-2	Burnham and Morrill	19, 25
1.8-FP-2-23	Burnham and Morrill	6, 19
1.8-FP-1-12	The Portland Rendering Co.	6, 19
1.8-MW-1-1	Eastern Forge	2, 14, 19, 38, 41
1.8-PS-1-23	Sun Oil Co.	19, 25
1.8-S-1-23	Winslow Street	
1.8-S-2-23	Acadia Street	
1.8-PS-1-23	Webber	19, 23
1.9-C-1-123	Eastern Cemetery	5, 19
1.9-FP-2-1	Burnham and Morrill	6, 19
1.9-FP-1-1	Eagle Sugar Refinery	6
1.9-M-1-1	John A. Lidback's machine shop	11, 14, 19, 24, 25, 33, 38, 41
1.9-MW-1-123	The Portland Company	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 33, 38, 41
1.9-MW-3-123	Laughlin Co.	2, 7, 8, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
1.9-MW-2-1	The Milan Mining Company; Portland Smelting	14, 19, 36
1.9-R-1-12	Grand Trunk Railroad yards	9, 11, 12, 14, 17, 19, 20, 21, 24, 33, 38, 41
1.9-R-2-1	Grand Trunk car repair shops	9, 11, 12, 14, 17, 19, 21
1.9-SR-1-1	Dyer's shipyard	14, 19
1.9-V-1-1	Burgess-Forbes	9, 12, 17, 19
1.9-M-1-2	222/28 Fore Street	11, 14, 19, 20, 24, 25, 33, 38, 41
1.9-M-2-2	Corner of Franklin and Commercial	11, 14, 19, 20, 24, 25, 33, 38, 41
1.9-G-1-23	Laughlin Co.	2, 5, 9, 11, 14, 15, 41, 45
1.9-P-1-2	19/21 Commercial Street	5, 19, 21, 27, 33
1.9-S-1-2	Franklin Street	
1.9-S-2-2	India Street	
1.9-FP-3-3	Jordan Meats	6
1.9-SR-2-3	Bath Iron Works	47
1.10-EG-1-1	Consolidated Electric Light Co. of Maine	25

1.10-FP-1-1	Portland Packing Co. on Widgery's Wharf	6, 19
1.10-FP-2-1	Portland Packing Co. on Commercial	6, 19
1.10-M-4-12	C.M. and H.T. Plummer	11, 14, 19, 24, 25, 33, 38, 41
1.10-M-5-1	W.H. Scott	14, 19, 24, 25, 33, 38, 41
1.10-M-6-1	W.H. Pennell Co.	14, 19, 24, 25, 33, 38, 41
1.10-M-2-1	D. Winslow & Sons	14, 19, 24, 25, 33, 38, 41
1.10-M-3-1	Jones and Hitchins	14, 19, 24, 25, 33, 38, 41
1.10-M-3-1	462 - 70 Fore Street	14, 19, 24, 25, 33, 38, 41
1.10-M-7-1	L. Brodigan & Co. File Works	14, 19, 24, 25, 33, 38, 41
1.10-MT-1-1	Portland and Cape Elizabeth Ferry	14, 19, 21, 25
1.10-MT-2-12	Peoples Ferry	14, 19, 21, 25
1.10-MW-2-1	D. Kelley Foundry	2, 14, 19, 38, 41
1.10-MW-5-12	C.A. Donnell Brass Foundry	2, 16, 17, 19, 24, 25, 38, 41
1.10-MW-4-1	L. Crockett Foundry	14, 19, 38, 41
1.10-MW-7-1	Stevens, Smart & Dunham Britannia Works	19, 38, 41
1.10-MW-6-1	Stevens, Smart & Dunham	14, 19, 38, 41
1.10-MW-2-12	Regouier & Jones	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 38, 41
1.10-M-1-12	Regoier & Jones	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-MW-3-1	T. Laughlin & Sons	14, 19, 38, 41
1.10-MW-8-1	Stanwood & Shanning	14, 19, 38, 41
1.10-MW-9-1	Quinn & Co., 45/49 Commercial	14, 19, 38, 41
1.10-V-1-12	Burgess-Forbes Paint Co.	9, 12, 17, 19, 21, 32, 41
1.10-FP-3-2	Long Wharf Cannery	6, 19
1.10-FP-4-2	Portland Cold Storage	6, 19
1.10-FP-5-2	Monmouth Canning	6, 19
1.10-FP-6-2	R.J. Peacock	6, 19
1.10-FP-7-2	Brown Co.	6, 19
1.10-J-1-2	Widgery's Wharf	17, 25
1.10-J-2-2	494 Fore Street	17, 25
1.10-J-3-2	Portland Pier	17, 25
1.10-J-4-2	Central Wharf	17, 25
1.10-M-10-23	Custom House Wharf	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-11-2	Mianus Motor Works	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-12-2	Pike and Horn Machine Shop	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-13-2	Commercial Wharf	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-14-2	Smith and Langmaid Machine Shop	11, 14, 19, 20, 24, 25, 33, 38, 41

1.10-M-15-2	Fred F. Boyce Machine Co.	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-8-2	302 - 304 Fore Street	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-9-2	296 - 298 Fore Street	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-M-4-12	60 - 65 Union Street	11, 14, 19, 20, 24, 25, 33, 38, 41
1.10-MT-3-2	People's Ferry	14, 19, 25
1.10-MT-4-23	Casco Bay Lines	14, 19, 25, 47
1.10-MW-5-12	440 - 442 Fore Street	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
1.10-MW-10-2	49 - 51 Union Street	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
1.10-MW-11-2	98 - 100 Union Street	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
1.10-MF-1-2	U. S. Navy Supply Station	25
1.10-MF-2-2	Naval Patrol Base	25
1.10-PS-1-2	Merchants Wharf	19, 25
1.10-PS-2-2	Sturdivant Wharf	19, 25
1.10-P-1-2	54 Union Street	5, 19, 21, 27, 33
1.10-P-2-2	67 - 69 Union Street	5, 19, 21, 27, 33
1.10-P-3-2	Linotype Composition Company	5, 19, 21, 27, 33
1.10-P-4-2	5 Exchange Street	5, 19, 21, 27, 33
1.10-P-5-2	43 - 49 Exchange Street	5, 19, 21, 27, 33
1.10-P-6-2	142 - 144 Middle Street	5, 19, 21, 27, 33
1.10-S-1-2	State Street	5, 19, 21, 27, 33
1.10-S-2-2	High Street	
1.10-S-3-2	Maple Street	
1.10-S-4-2	Browns/Merchant Wharves	
1.10-S-5-2	Exchange Street	
1.10-S-6-2	Market Street	
1.11-BR-1-12	Vaughn Bridge	
1.11-BR-3-12	Old Portland Bridge	
1.11-RBR-1-12	Turners Island Railroad Bridge	
1.11-FP-1-12	Soap Making - Leathe and Gore; Lunt	6, 48
1.11-FP-2-1	Forest City Sugar Refinery	6
1.11-H-1-12	Ayer - Houghton Company	17, 21
1.11-O-2-1	Land Plaster - Cummings Co.; Carlton Co.	
1.11-O-3-12	Portland Star Match Co.	
1.11-PS-1-12	Pine State Oil Works (Standard Oil)	19, 25
1.11-R-1-1	Maine Central yards	12, 14, 17, 19, 21, 24, 25, 33, 38, 41
1.11-R-2-12	Maine Central yards	9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 33, 38, 41

1.11-R-3-1	Freight Stations and Yards	9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 25, 31, 33, 38, 41
1.11-BR-3-23	Million Dollar Bridge	
1.11-CG-1-12	Portland Gas Company	12, 18, 25, 44
1.11-FS-1-2	570 West Commercial	19, 25
1.11-H-1-12	Ayer Houghton Co.	17, 21
1.11-O-3-12	Diamond Match Company	
1.11-PS-1-12	Pine State Oil Works; Koppers Products	12, 19, 25
1.11-S-1-2	Danforth sewer and outfall	
1.11-S-2-2	Vaughn Street	
1.11-S-3-2	Emery Street	
1.11-S-4-2	Clark Street	
1.11-MT-1-1	Merrill's Terminal	14, 19, 25, 47
1.11-MT- 2-123	The International Terminal	14, 19, 25, 47
2.1-MF-1-12	Fort Preble	25
2.1-D-1-23	Dumps and landfilling	40
2.1-FP -1-2	Quality House Specialty Corp. Sardine Factory	6, 19
2.1-FP-2-2	Deep Sea Product Inc.	6, 19
2.1-MW-1-23	Ptd. Copper & Tank, Machine Tool Rebuilders, S. Ptd. Shipyard, Gen. Electric	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
2.1-MW-3-2	Former West Yard: Walsh Construction	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
2.1-MW-2-2	Former West yard: Portland Machine Co.	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
2.1-MF-2-2	Military facilities	25
2.1-PS-1-23	Portland Pipeline Company	19, 25
2.1-PS-2-23	Pocahontas Terminal, Chevron, Northern Petroleum	19, 25
2.1-SR-1-2	Cumberland Shipbuilding	9, 11, 13, 14, 17, 19, 20, 22, 24, 25, 33, 41
2.1-SR-2-23	East Yard	2, 9, 11, 13, 14, 17, 19, 20, 21, 22, 24, 25, 27, 33, 41
2.1-SR-3-2	West Yard	2, 9, 11, 13, 14, 17, 19, 20, 21, 22, 24, 25, 27, 33, 41
2.1-SR-1-2	South Portland Engineering	2, 9, 11, 13, 14, 17, 19, 20, 22, 24, 25, 27, 33, 41
2.1-M-1-23	Tyler Machine Tool	11, 14, 19, 20, 24, 25, 33, 38, 41
2.1-MW-2-23	Portland Machine Tool	2, 9, 11, 13, 14, 17, 19, 20, 22, 24, 25, 27, 33, 38, 41
2.1-MW-3-2	Portland Machine Tool	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 33, 38, 41
2.1-MT-1-3	Spring Point Marina	14, 19, 25, 47
2.2-SR-1-123	South Portland Shipyard	11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 33, 38, 41, 47
2.2-SR-2-1	Pickett's Shipyard	14, 19, 25, 38, 41
2.2-SR-3-1	Shipyard, toot of Dyer	14, 19, 25, 38, 41
2.2-MT- 1-12	People's Ferry	14, 19, 25
2.2-MT-2-1	Portland and Cape Elizabeth Ferry	14, 19, 25

2.2-MW-1-123	Metal working	2, 9, 11, 13, 14, 17, 19, 20, 22, 24, 25, 33, 38, 41	
2.2-D-1-2	Dumps and landfilling	40	
2.2-FP-1-2	Brown's Sardine Factory, Seaboard Packing Plant	6, 19	
2.2-MT-3-2	Bennett Wharf Construction	25	
2.2-MW-1-123	Portland Copper and Tank Works, Bliss-Portland	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41	
2.2-MF-1-12	Coast Guard	25	
2.2-PS-1-2	Portland Pipeline	19, 25	
2.2-PS-1-2	Texaco	19, 25	
2.2-S-1-2	Pickett/Proble Streets		
2.2-S-2-2	Dyer Street		
2.2-S-3-2	Oak/Harriet Streets		
2.2-S-4-2	Clemen Street		
2.2-FP-2-3	Pine State By-Products	6	
2.2-M-2-3	D. & G. Machine Products	11, 14, 19, 20, 24, 25, 33, 38, 41	
2.3-BY-1-1	J. Bradley's Brickyard		
2.3-FP-1-1	Forest City Brewery	6	
2.3-O-1-1	Two tidal mills	6	
2.3-SR-1-12	Portland Drydock	14, 17, 19, 25, 38, 41	
2.3-UT-1-12	Portland and Cape Elizabeth Railroad	19, 25	
2.3-DC-1-23	Dry cleaner	31	
2.3-D-1-2	Harbor Dump	40	
2.3-D-2-2	Mill Creek Dump	40	
2.3-D-4-2	Corner Broadway and Ocean Dump	40	
2.3-EG-1-12	Portland Street Railway, Central Maine Power	25	
2.3-EG-2-23	Maine Central's Power Plant	25, 26	
2.3-O-2-2	Old Sparhawk Mills Rug Factory	17	
2.3-S-1-2	E Street		
2.3-SR-2-2	Shipyard	14, 17, 19, 25	
2.3-S-2-3	South Portland Sewage Plant	40	
2.4-C-1-123	Forest City Cemetery	5, 19	
2.4-PS-1-23	Texaco and ?	19, 25	
2.4-PS-2-23	Anthoine Creek tank farms	19, 25	
2.4-R-1-12	Portland Terminal RR, Portsmouth RR, Boston & Maine RR	9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 33, 38, 41	
2.4-S-1-2	Bagley Street		
2.4-S-2-2	Unnamed street (Mildred?)		
2.4-S-3-2	Chapel Street		

2.4-S-4-2	Pearl Street	
2.4-S-5-2	Atlantic Street	
2.4-MW-2-3	Megouier & Jones	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 33, 38, 41
2.4-S-6-2	Mechanic Street	
2.4-PS-2-23	Anthoine Creek tank farms	19, 25
2.5-C-1-123	Forest City Cemetery	5, 19
2.5-C-2-123	Calvary Cemetery	5, 19
2.5-CM-1-12	Atwood Lead Co.	1, 19, 36, 43,
2.5-MW-1-12	Portland Rolling Mills	2, 9, 11, 13, 14, 16, 17, 19, 20, 22, 24, 25, 27, 30, 33, 38, 41
2.5-PS-1-123	Portland Kerosene	23, 25, 29, 37, 42, 43
2.5-PS-2-1	Portland Kerosene Railroad Pumping Station	23, 25, 29, 37, 42, 43
2.5-V-1-12	A.P. Fuller	9, 12, 17, 19, 21, 32, 41
2.5-D-1-2	Dump	40
2.5-PS-1-123	Standard Oil of New Jersey, Socony Vacuum, Mobil	19, 25
2.5-PS-2-23	Valvoline, Richfield, BP	19, 25
2.5-PS-3-23	Other: Cities Service, Shell, Gulf, Richfield, Tidewater, Esso	19, 25
2.6-C-1-23	Highland Memorial Garden Cemetery	5, 19
2.6-D-1-2	Alfred Street Dump	40
2.6-MW-1-23	Bancroft and Martin	2, 9, 11, 13, 14, 17, 19, 20, 22, 24, 25, 33, 38, 41
2.6-R-1-23	Rigby Yard	9, 11, 12, 14, 17, 19, 20, 21, 24, 25, 33, 38, 41
2.6-D-1-3	Highland Avenue Landfill	40
2.6-M-1-3	Rigby Manufacturing	11, 14, 19, 20, 24, 25, 33, 38, 41
2.7-E-1-23	Fairchild Camera and Instrument, Fairchild-Digital	34
2.7-E-2-2	Sanders Associates	34
2.7-E-3-2	Klik Industries	34
2.7-M-1-2	Diamond Automation	11, 14, 19, 20, 24, 25, 33, 34, 38, 41
2.7-E-1-23	Fairchild-Digital, National Semiconductor	34

