DOE/EIS-0036-F

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Final Environmental Impact Statement

Coal Conversion Program

New England Power Co.

Brayton Point Generating Station
Plants 1, 2 and 3

Somerset, Bristol County, Massachusetts

U.S. Department of Energy
Washington, D.C. 20585

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Responsible Official

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Washington, D.C. 20585

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PREFACE TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT

This report constitutes the Final Environmental Impact Statement for the Department of Energy's proposed action of issuing a Notice of Effectiveness (NOE) to New England Power Company's Brayton Point Generating Station, Units 1, 2, and 3. The Draft EIS was published in October 1978, and public hearings were held in Somerset, Massachusetts, the location of the generating station, on November 21 and 22, 1978.

The Final EIS responds to the public comments received on the Draft EIS in several ways. First, the actual text of the Draft EIS has been revised in the places where information or analysis was found to be incorrect or deficient. Much of the text appears exactly the same as it did in the Draft EIS. Second, a new section has been added which summarizes the major issues raised in the public comment period and describes how they were dealt with in the Final EIS. Finally, a section has been added which reproduces the written comments received and provides specific responses to the comments.

The high sulfur coal used for the basis of the analysis of environmental impacts in this report differs slightly from the coal that was described in the Memorandum of Understanding (MOU) that was signed by New England Power Company (NEPCo) and the Massachusetts Department of Environmental Quality Engineering in August 1978. The coal used in the present analysis (DOE coal) was assumed to have a heat content of 13,825 BTU/pound, an ash content of 9%, and a sulfur content of 1.67% (monthly average)(which is the equivalent of 1.21 pounds of sulfur/million BTU). The coal described in the MOU (MOU coal) was assumed to have a sulfur content of 1.57% (monthly average) which is also the equivalent of 1.21 pounds of sulfur/million BTU.

The differences betwen the two types of coal are not great. There is no difference between the SO_2 emissions of the coals; both coals were selected specifically to meet the revised SIP regulation relating to the sulfur content of the fuel. Controlled particulate emissions will not vary between the two coals. The precipitators will be designed for an emission rate of 0.06 pounds/million BTU in order to meet the required emission rate of 0.08 pounds/million BTU with a margin of safety to allow for variability in ash content in coal. For example, MOU coal would require precipitators that were 98.5% efficient in order to meet the SIP requirement while DOE coal would require precipitators that were 98.6% efficient. However, in both cases the same emission requirement would be met.

Emissions for uncontrolled pollutants such as carbon monoxide, hydrocarbons, and nitrogen oxides would be about 6% higher with MOU coal than with DOE coal because 6% more coal would have to be burned with the MOU coal than with the DOE coal in order to maintain the same heat input. These slightly higher emissions using MOU coal would have an insignificant affect on ambient air quality levels for these pollutants in the vicinity of the Brayton Point Generating Station.

The DOE coal used in the impact statement would produce approximately 247,000 tons of ash per year, while the MOU coal would produce approximately 234,000 tons of ash per year.

The differences between the two types of coal arose from the fact that the original environmental analysis that went into preparing the Brayton Point EIS was performed independently from the analysis that was performed for the New England Energy Task Force which led to the Memorandum of Understanding. Because the differences in the environmental impacts between the two types of coals were so small, DOE decided not to modify the entire document to make it consistent with the Memorandum of Understanding. The conclusions drawn from the two different analyses are consistent, although some of the numbers vary slightly.

SUMMARY SHEET

1. ADMINISTRATIVE TYPE OF ACTION

A Notice of Effectiveness to prohibit burning of gas or oil as the primary source of fuel at New England Power Company's Brayton Point Generating Station, Somerset, Massachusetts, is proposed for Units 1, 2, and 3. The Notice of Effectiveness would make effective the June 30, 1977 Energy Supply and Environmental Coordination Act Prohibition Order issued by the Federal Energy Administration (now, in part, the Department of Energy). This report constitutes an environmental impact statement (EIS) on the proposed action.

2. BRIEF DESCRIPTION OF STATEMENT

The information presented in this report:

1) describes existing conditions,

2) examines the impact of conversion as it will affect air, water, land use and solid wastes, ecological resources, and aesthetic factors under a variety of pollution control strategies,

3) summarizes unavoidable adverse impacts and irreversible commitments of resources, and,

4) suggests measures to mitigate these effects.

This statement is a site-specific follow-up to Department of Energy's (DOE) earlier programmatic statement on the coal conversion program[1] which addressed broad economic and program implementation issues and energy supply alternatives. These issues are not re-addressed in the present statement.

3. ENVIRONMENTAL CONSEQUENCES OF CONVERTING BRAYTON POINT FROM OIL TO COAL

Conversion from oil to coal at Brayton Point will adversely affect the environment in the following ways:

1) Projected emissions will slightly increase, (see Table 3-11) assuming (i) SIP specified coal is burned and (ii) an electrostatic precipitator is operated, but will not violate the revised Massachusetts State Implementation Plan. More specifically, there will be slight, but insignificant increases in total suspended particulate (TSP) emissions and increases in nitrogen oxides (NO_x), carbon monoxide (CO), and hydrocarbon (HC) emissions, although there may be a reduction in annual average sulfur dioxide (SO_2) emissions.

2) Fugitive dust from coal storage and handling operations in the area will increase slightly.

3) A modeling analysis of SO_2 projected concentration levels in the region which will not exceed existing National Ambient Air Quality Standards. The modeling analysis of TSP, CO, and NO_x showed that conversion will not significantly affect the ambient levels of these substances. Although HC and NO_x will increase, it is difficult to relate emissions from the generating station to changes in ozone levels in the region.

1. Final Revised Environmental Impact Statement, Energy Supply and Environmental Coordination Act of 1974, as amended Section 2: Coal Conversion Program, FEA (FES 77-3), May, 1977.

4) Water runoff from the coal pile will contain heavy metals. These chemicals may threaten some aquatic life in Mt. Hope Bay. The magnitude of the threat depends upon the type of coal used and the amount of rain that causes the runoff. Collection and treatment of coal pile runoff may be required in order to protect water quality in Mt. Hope Bay.

5) Coal combustion will create approximately 247,000 tons of ash annually, which will have to be trucked to a landfill for disposal. A site for ash disposal has been identified. Impacts of the 38 round trips per day required for ash disposal will depend upon the types of trucks used. The ash, when disposed in the landfill, should have no significant impact on surface or groundwater due to leaching or runoff.

6) Construction necessitated by the conversion order will increase noise levels in the Brayton Point area temporarily. It is not practical to estimate the magnitude of these impacts without knowledge of the actual construction equipment and techniques to be employed.

The adverse impacts noted above must be weighted against significant <u>beneficial</u> consequences:

1) Substituting coal barges (or colliers) for oil tankers will reduce the likelihood of an oil spill. In general, oil spills are more injurious to the environment than coal spills from collier accidents. Unlike coal which sinks with little effect on marine life, oil floats, fouling beaches and adversely affecting birds and aquatic life. Coal is also more easily recovered following an accident.

2) Evaporative losses of hydrocarbons from fuel oil unloading operations will be reduced.

3) Sulfate levels in the vicinity of the station will be reduced. (See Page 3-35)

4) In the event of equipment failure, TSP emitted from coal combustion as a dust is easier to remove than TSP from oil combustion which adheres to surfaces.

5) Conversion of Brayton Point Generating Station Units 1, 2 and 3 from oil to coal will save approximately 12.3 million barrels of oil per year. (Although the Prohibition Order states that 10.7 million barrels of oil will be saved per year, this report uses the figure of 12.3 million based on additional information received from NEPCo raising the projected capacity factor of Units 1,2 and 3 from 72% (Prohibition Order) to 83%.

4. MITIGATING MEASURES

Should the Notice of Effectiveness be issued and Brayton Point convert from oil to coal, a number of steps could be taken to minimize the adverse environmental consequences just described. The consequences of coal pile runoff can be mitigated by collecting it and providing primary treatment. The use of washed coal would also reduce adverse consequences. Ash transport effects can be minimized through careful planning of the truck disposal route and proper selection of trucks. Fugitive dust can be controlled by selective water and coal tar emulsion spraying of the coal pile.

5. ALTERNATIVES

There are a number of ways to achieve the objectives of the Prohibition Order (i.e., reduction in the amount of oil burned at Brayton Point) without converting to coal, though none is feasible at Brayton Point. These include burning of refuse-derived fuels, combustion of wood, and early retirement. Wood and refuse-derived fuels are not presently feasible given current sources of supply. Early retirement of Brayton Point without parallel construction of new generating capacity would transfer generating load to smaller, less efficient, existing stations with a likely increase in the net system-wide combustion of either coal or oil. Given the relative efficiency of Brayton Point, such a transfer would probably increase the environmental consequences of electricity generation in New England albeit at different sites. "No action" is not a viable alternative if the objectives of ESECA are to be realized.

6. COMMENTS HAVE BEEN REQUESTED FROM THE FOLLOWING:

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
Department of the Army, Corps of Engineers
Department of Commerce
Department of Defense

Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Department of Labor
Department of State
Department of Transportation
Department of the Treasury
Environmental Protection Agency
Federal Energy Regulatory Commission
National Science Foundation
Nuclear Regulatory Commission
Office of Management and Budget
Tennessee Valley Authority

<u>State Clearinghouses</u>

Massachusetts State Clearinghouse
Rhode Island State Clearinghouse

<u>Utility Company</u>

New England Power Company
New England Power Exchange

<u>Other Parties</u>

Air Pollution Control Association
Clamshell Alliance
Edison Electric Institute
Electric Power Research Institute
Environmental Defense Fund, Incorporated
Friends of the Earth
Izaak Walton League of America
Massachusetts Department of Environmental Quality Engineering
National Association of Counties
National Coal Association
National Wildlife Federation
Natural Resources Defense Council, Incorporated
New England Congressional Caucus
Sierra Club
Southeastern Regional Planning and Economic Development District (Massachusetts)
United States Conference of Mayors

7. DATE MADE AVAILABLE TO EPA AND THE PUBLIC: September 24, 1979

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1. INTRODUCTION

1.1 PROGRAM BACKGROUND AND RELATIONSHIP WITH ENVIRONMENTAL LAWS

Under the Energy Supply and Environmental Coordination Act (ESECA) of 1974 (15 USC 791 et seq.) (Pub. L. 93-319) as amended by the Energy Policy and Conservation Act (EPCA) of 1975 (Pub L. 94-163),and as further amended on July 21, 1977 by the Federal Energy Administration Authorization Act of 1977 (Pub. L. 95-70), Congress mandated a national policy for meeting essential needs for energy independence. ESECA was enacted in response to the 1973 oil embargo, and was aimed at encouraging greater use of domestic reserves of coal in such a fashion as to be consistent, to the fullest extent practicable, with existing national commitments to improve the environment. To avoid potentially conflicting objectives between ESECA and other environmental legislation, ESECA requires close coordination and cooperation between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA).

ESECA provides DOE with authority to prohibit the use of oil and natural gas by existing and future electric utility powerplants and other major fuel burning installations. The aim is to significantly increase the use of coal, our most abundant domestic energy resource. Section 2 of ESECA requires DOE to prohibit a powerplant (unit) under certain conditions, from burning petroleum or natural gas. Before DOE can issue such a document, viz., a Prohibition Order, it must determine that the unit had the capability and necessary equipment to burn coal on June 22, 1974 or has acquired it thereafter; that the burning of coal is practical and consistent with the purpose of ESECA; that coal and coal transportation facilities will be available during the period the order is in effect; and that the Prohibition Order will not impair the reliability of electricity service.

The formal proceedings that result in the issuance of a Prohibition Order are initiated with the publication in the Federal Register of a

"Notice of Intent to Issue Prohibition Orders." Preceeding the Issuance of a Notice of Intent (NOI) was the lengthy review of data related to 725 generating stations which responded to a Federal Power Commission's Emergency Fuel Convertibility Questionnaire (FPC Form 36) and FEA identification of units which were, at the time, burning oil or natural gas but capable of burning coal as a primary energy source. On June 30, 1975, FEA issued Prohibition Orders affecting 74 units located at 32 generating stations. Subsequently, on 30 June 1977, FEA issued Prohibition Orders affecting an additional 18 powerplants located at 11 generating stations. Of these later Prohibition Orders, this report concerns powerplants 1, 2, and 3 at Brayton Point.

The Prohibition Order does not become effective until a "Notice of Effectiveness" (NOE) is issued. A NOE cannot be issued until the Administrator of the Environmental Protection Agency either notifies DOE that the facility is able to burn coal immediately in compliance with all applicable air pollution requirements, or certifies to DOE the earliest possible date that the facility will be able to burn coal in compliance with all applicable air pollution requirements. Under the 1977 Amendments to the Clean Air Act (PL 95-95), EPA may issue to a recipient of a Prohibition Order an order delaying compliance with certain air pollution requirements until as late as December 31, 1985. The issuance of a "delayed compliance order" means that the facility is authorized to burn coal during the term of the order provided that coal can be burned in compliance with Federal Ambient Air Quality Standards.

In May 1979 the EPA approved the proposed revision to the Massachusetts SIP which will allow the Brayton Point Generating Station to burn high sulfur coal. EPA also determined that the Brayton Point Generating Station can burn coal in compliance with all applicable air pollution control regulations. Official certification is contingent upon the concurrence of the governor of Massachusetts, which is expected shortly.

Also before an NOE can be issued, DOE must complete an environmental analysis as required by the National Environmental Policy Act of 1969 (NEPA)(Pub. L. 91-190) (42 U.S.C. 4321 et seq) and by DOE regulations for implementing ESECA,(10 CFR Parts 303, 305, 307). Section 102 (2)(C) of NEPA requires Federal agencies to prepare an Environmental Impact Statement (EIS) for "major Federal actions significantly affecting the quality of the human environment." Since a Prohibition Order is not effective until and unless an NOE is issued, DOE has determined that the major Federal action with respect to a Prohibition Order is the issuance of an NOE. In regulations published in the Federal Register on May 9, 1975 (40 FR 20462), (10 CFR, Parts 303, 305, 307), FEA stated the procedures it will follow to insure that the process of issuing and making effective Prohibition Orders complies with NEPA. Analysis of the environmental impacts associated with Prohibition Orders has been undertaken at two levels. The first level was completed with the publication of a final revised programmatic Environmental Impact Statement in May 1977 (FES-77-3); this document covered the environmental impacts associated with the scope of the entire coal conversion program.

The second level is associated with the development of site-specific environmental analyses on the impact of each NOE. Following from the guidelines issued by the Council on Environmental Quality (CEQ) (40 CFR 1500.1 et seq.)[1] and consultation with other Federal agencies, DOE adopted a methodology for implementing Section 102 (2)(C) of NEPA (41 FR 4722-4726). The product of these site-specific analyses will be either an Environmental Assessment (EA) leading to a negative determination or an Environmental Impact Statement (EIS). The former will be prepared for each Prohibition Order where it is unclear whether the effective NOE would

1. New CEQ regulations applicable to all Federal agencies were published as final regulations in 43 FR 55978 (November 27, 1978) and become effective July 30, 1979. These regulations were reviewed, and to the greatest extent possible, they have been incorporated into this EIS.

be likely to result in a significant impact on the quality of the human environment; the latter will be prepared for those Prohibition Orders where the effective NOE would be likely to result in a significant impact on the quality of the human environment.

1.2 SCOPE AND ORGANIZATION OF THIS ENVIRONMENTAL IMPACT STATEMENT

This Environmental Impact Statement focuses on the site-specific environmental effects associated with the Prohibition Order for Units 1, 2 and 3 at Brayton Point. Effects on air and water quality, animal and plant life, noise, land use, socio-economics, public utilities and services, transportation, historic and archaeological sites, and aesthetics in the immediate vicinity of the generating station are thoroughly addressed.

Data used in developing this report consisted of information currently and readily available, including relevant source material developed in conjunction with Federal and state programs and site visits to the existing facility. Air quality analyses were performed using information developed from a series of earlier site-specific evaluations conducted for each generating station under contract to DOE. The environmental consequences of the increased coal mining necessitated by the proposed action are discussed in the Programmatic EIS.

In developing this EIS, all mandated elements associated with CEQ guidelines and DOE regulations have been incorporated and addressed. To better fulfill the spirit as well as the letter of NEPA, however, the contents of this EIS have been organized in a significantly different way. The objective was to reduce the length of the EIS while not omitting consideration of any significant environmental factors to produce an accurate and complete EIS which is more logically arranged and more easily read.

Section 2 consists of two major sub-sections in which Section 2.1 presents a succinct description of the proposed action. Section 2.2

describes the regional environmental setting and serves to place the proposed action within an overall environmental setting thereby avoiding unnecessary descriptions in later sections.

Section 3 comprises an environmental analysis of site factors in the vicinity of the generating station and is subdivided into Section 3.1 dealing with the natural environment and Section 3.2 addressing the human environment. For each environmental factor, the setting, impacts and mitigation measures are presented within that subsection.

Section 4, discusses those factors which are substantially related with regard to magnitude and time, but which are usually found in separate sections in many other EIS's, viz., "The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity" and "Any Irreversible or Irretrievable Commitments of Resources that Would be Involved in the Proposed Action Should it be Implemented."

Section 5 lists those adverse impacts which could not be avoided if the proposed action were implemented.

Section 6 addresses feasible site-specific alternatives to the proposed action. These are considered with the proposed action in mind both from the positive and negative perspectives. Also considered is the alternative of no action, i.e, not implementing the Prohibition Order or continuing present activities and operations. Not considered are those alternatives previously addressed in DOE's Programmatic EIS.

Two new sections have been added to the Final EIS. Section 7 consists of a summary of the significant issues raised concerning the Draft EIS and how they were dealt with in the Final EIS. Section 8 provides a copy of all the written comments and specific responses to them.

Final sections consist of a list of references utilized in preparing this report (Section 9); a list of agencies consulted (Section 10); a glossary of technical terms including all underlined words or phrases appearing in the report (Section 11); and appendices, including a metric conversion table in Appendix B. Sections 9, 10, and 11 were included in the draft EIS as Sections 7, 8 and 9.

2. PROJECT DESCRIPTION AND REGIONAL ENVIRONMENTAL SETTING

2.1 DESCRIPTION OF THE PROPOSED ACTION

2.1.1 Project Name and Location

Brayton Point Generating Station, located in Somerset, Bristol County, Massachusetts, is owned and operated by the New England Power Company, a wholly owned subsidiary of New England Electric System (NEES). Brayton Point is located at the confluence of the Lee and Taunton Rivers in Mount Hope Bay (Figure 2-1), the northeast extension of Narragansett Bay. Nearby towns are Fall River, located across the Taunton River to the east, Swansea, situated across the Lee River to the west, and Dighton to the north. The closest major cities are Providence, RI, which is about 15 miles to the northwest of Somerset and Boston which is 55 miles to the north (Figure 2-2). The only land access to the station is via Brayton Point Avenue.

2.1.2 Project Overview and Objectives

The proposed action will prohibit burning oil or natural gas at Brayton Point Generating Station, Units 1, 2 and 3. This is part of a national program initiated in 1974 through the enactment of ESECA to reduce dependence on foreign energy supplies. All three units at Brayton Point were originally designed for coal firing and were subsequently converted to oil firing operations. While the original coal handling, storage and unloading facilities are still on site, they may be inadequate given the quantity of the coal to be used. Additional precipitator capacity and a waste treatment system may have to be installed. Conversion will produce fly ash which will be disposed in a landfill at Freetown, Massachusetts. Coal will be transported to the station by barge.

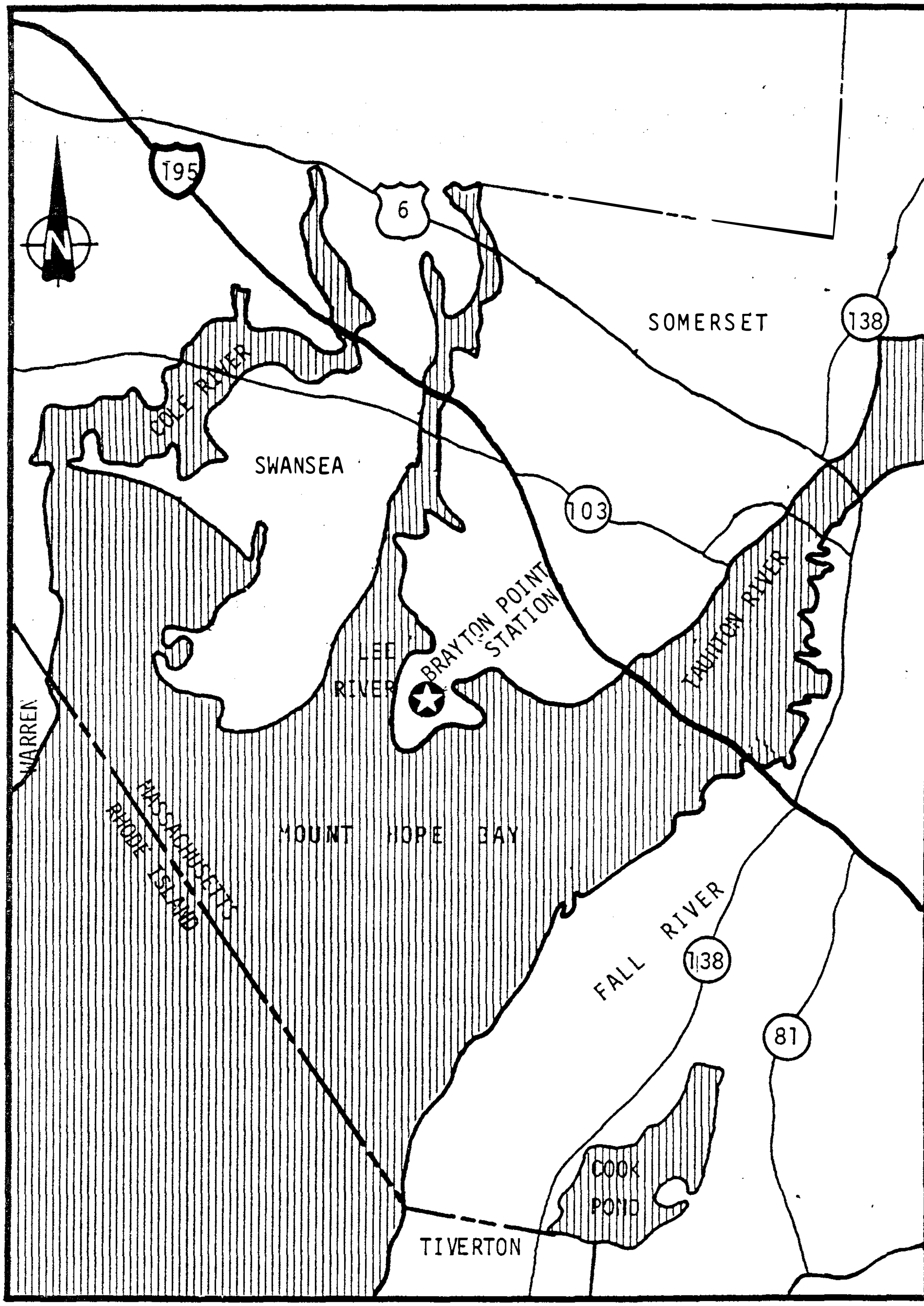

FIGURE 2-1

PROJECT VICINITY

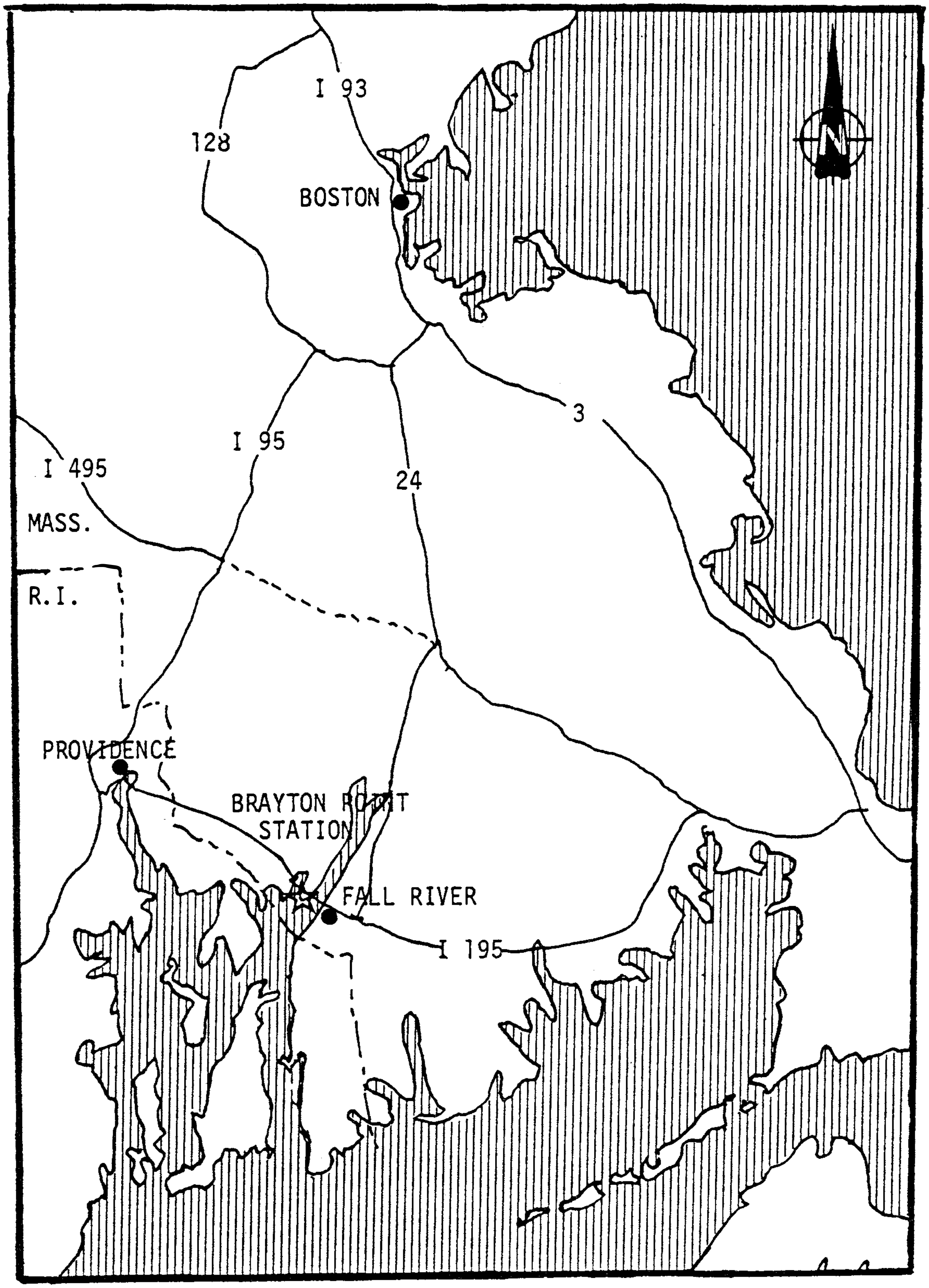

FIGURE 2-2
PROJECT LOCATION

2.1.3 Characteristics of Steam Electric Generating Stations

This section is for the benefit of readers unfamiliar with the technology of a steam electric generating station. It provides a context for the more technical sections that follow. Knowledgeable readers may wish to skip this section.

A generating station consists of a boiler and turbine driven generator that interact with four systems, two of which supply fuel and cooling and two pollution control systems for air and water (Figure 2-3). System inputs are fuel, water for the boiler and cooling, air for combustion and chemicals for waste treatment. The outputs are electricity, air emissions, treated or untreated liquid effluents, cooling water and solid waste in the form of dry ash or ash sludge.

The fuel support system includes fuel unloading by methods appropriate to fuel type. The fuel may be used immediately or placed in storage. Depending upon the size of the delivered coal and the type of firing equipment in the boilers, it may be necessary to reduce the size of the coal by crushing and pulverizing. Crushing typically reduces coal diameters to about 1 1/4 inches while pulverizing abrades the crushed coal to a powder. Fuel injection into the boiler for combustion is the last step in this system.

During fuel combustion, heat is transferred to water, passing through the turbine as steam to generate electricity (transmitted over a network to consumers). The used steam is condensed to water by transferring remaining heat to the cooling system water. Cooled boiler water is recycled to the boiler, adding makeup water only when necessary to reduce the concentration of corrosive material. A variety of methods are currently used to reduce cooling water temperatures -- cooling towers, spray ponds, single jet and multiport diffusers and cooling canals. All cooling methods consume water and require substantial volumes of make-up water daily.

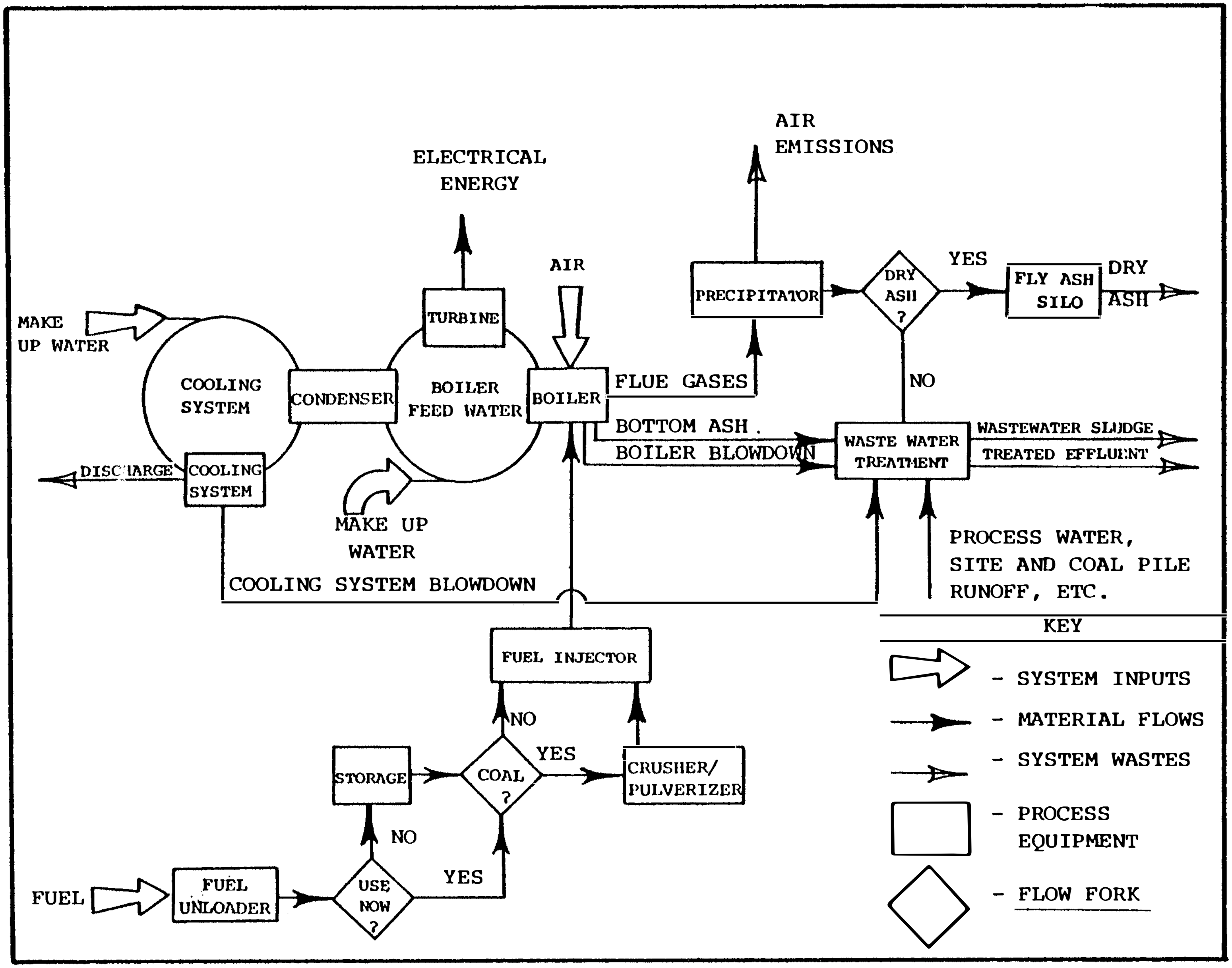

FIGURE 2-3

Fossil Fuel Power Generation Process

Fuel combustion produces ash which leaves the combustion zone in two forms: bottom ash which falls from the combustion zone and fly ash which is carried up in the flue gases. Boilers are characterized as "wet bottom" when the ash is molten at normal operating temperatures and as "dry bottom" when the ash is in solid form during combustion. Bottom ash typically comprises 20 to 30% of the total ash for wet bottom boilers and 10 to 15% of the total ash for dry bottom boilers.

The air pollution system is designed to meet the local, State and Federal ambient air quality standards. A typical system will include a precipitator which removes particulates (fly ash) from the flue gases vented from the boiler. Fly ash is collected from precipitator hoppers either by vacuuming or wet sluicing. If a dry collection method is used, the fly ash is stored in silos prior to disposal. If wet, the ash sluice is directed to the wastewater system.

The wastewater system treats a variety of wastes from different station operations. Waste inputs usually include bottom ash sluice, fly ash sluice, boiler blowdown, cooling system blowdown, plant process water, site runoff, and coal pile runoff. Generating station wastewater systems are all primary treatment processes. In such processes, a waste stream (influent) is pumped to a basin or pond called a sedimentation tank or clarifier. As the influent passes through the tank, the heavier suspended solids settle to the bottom. The clarified effluent may undergo another clarifying process in a second settling tank. The final effluent is usually treated by addition of chemicals to achieve neutral pH and reduce hardness prior to discharge to a receiving (natural) water body. The settling tanks accumulate solids on the bottom and require dredging or pumping to restore capacity. The removed sludge may be disposed of on-site in a pit (if there is a sufficient amount of space available); it may be disposed of in an off-site landfill; or it may be utilized for a number of different purposes. Major applications for ash utilization include its use as a fill material for roads and other construction sites and as a partial replacement for cement and concrete constituents. In addition, fly ash has been mixed with certain types of marginal soils to improve moisture retention properties and certain nutrient levels. (However, the addition of fly ash to soils may have adverse effects in some cases because of the presence of trace elements which may be toxic to plants when leaching occurs.) Bottom ash has also been used as an anti-skid material for icy roads.

2.1.4 Existing Facilities

The Brayton Point Generating Station occupies most of a 250 acre site which had once been used for small-scale truck farming. Figure 2-4 depicts the site layout. The station's net generating capacity of 1597 megawatts (MW) is made up of four steam power plants. Brayton Point Station, the largest fossil fueled generating station in New England, contributes power to the New England Power Pool (NEPOOL). The New England Power Exchange (NEPEX), a division of NEPOOL, is the dispatching center for NEPOOL customers in New England.

Construction of Unit 1, generating 250 MW (net), was completed in July 1963. One year later a second unit, identical to the first, went on line. Both of these units have a single turbine, controlled circulation and are divided furnaces, designed for tangential firing of pulverized coal. Provision existed for future fuel switching to firing of number 6 residual fuel oil. In 1969 a third generating unit was constructed with a 657 MW net capacity and the capability to burn either coal or oil. It burned coal for three months while Units 1 and 2 were converted to oil burning operation. At the end of 1969, all three Brayton Point units were burning oil. This fuel switch was the result of the relatively low price of oil at the time.

Unit 4, producing a net output of 440 MW, was completed in 1974 and is designed to burn oil only. With the construction of Unit 4, plant facilities were enclosed for noise reduction and overall unity of

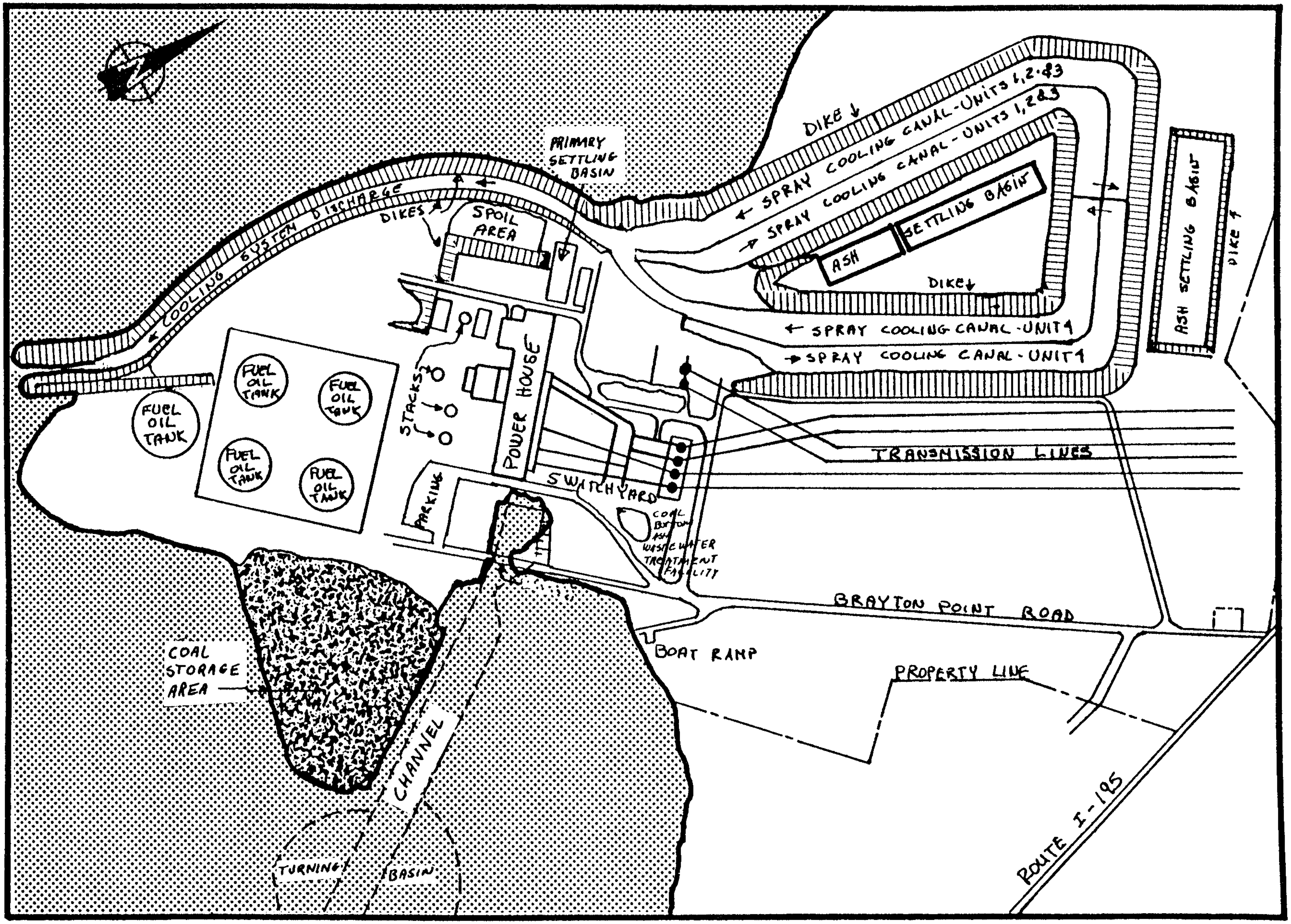

FIGURE 2-4
BRAYTON POINT GENERATING STATION SITE PLAN

appearance. Design and operating data for the generating station are given in Table 2-1.

In 1974, when the oil embargo resulted in fuel shortages, Unit 3 burned coal. The Region I Office of the EPA granted a variance allowing non-conformance with air quality emission standards for Unit 3 from May 15 to December 31, 1974 and then a temporary suspension for the period January 1 to June 9, 1975. Suspensions were also issued for Unit 1 (February 16 to May 17, 1975) and Unit 2 (April 10 to May 2, 1975) allowing the use of coal in the three units.

The Brayton Point fuel system can accommodate both oil and coal. Fuel carriers approach the NEPCo dock through a 36 foot deep channel in Mount Hope Bay. Fuel oil is currently transported by tankers, each typically holding 150,000 barrels (6.3 million gallons). Tankers are pumped dry and oil is stored in five tanks.

Coal shipments have always been made by sea. Twenty-three thousand ton colliers or 8,000 ton barges were unloaded at the station's dock with a twelve ton bucket operated from a tower. The bucket drops the coal onto the coal pile which, covering about nine acres, may hold up to 600,000 tons (88 days of storage). The crusher house is located between the coal pile and the station building. There is temporary coal storage (silos) inside the building which feeds the pulverizers. Onsite coal movement is accomplished by conveyor belts.

Condenser cooling for turbines 1, 2 and 3 is accomplished by a once-through system that withdraws salt water from the Taunton River. The intake is equipped with trash racks and a revolving screen. The condenser cooling discharge is released to the cooling canal as shown in Figure 2-4. Since 1976, the entire canal has been dedicated to Unit 4. Addition of freshwater makeup for over two years has reduced the salinity of the cooling water from 25,000 parts per million (PPM) to between 5,000 and 10,000 PPM.

TABLE 2-1

BRAYTON POINT GENERATING STATION
DESIGN AND OPERATING DATA AT FULL LOAD
(Modified from FPC Form 67; Prohibition Order; NEPCo 1978)

	UNIT 1	2	3	4
CANDIDATE FOR AN NOE/COAL CAPABLE	yes	yes	yes	no
YEAR COMPLETED	1963	1964	1969	1974
NET UNIT OUTPUT (MW)	250	250	657	440
1977 FUEL	oil	oil	oil	oil
DESIGN COAL INPUT (tons/hr)*	70.1	70.1	173.5	-
DESIGN HEAT RATE (million BTU/MW-hr)	9.3	9.3	8.8	10.9
WET OR DRY BOTTOM	dry	dry	dry	dry
STACK HEIGHT (feet)	352	352	352	500
STACK INSIDE DIAMETER (feet)	14.5	14.5	19.5	18.5
DESIGN EXIT VELOCITY AT 100% LOAD (ft/sec)(est.)	70.0	70.0	85.2	90.6
DESIGN EXIT TEMPERATURE AT 100% LOAD (°F)(est.)	275	275	250-270	366
DESIGN FLUE GAS RATE (1000 cu ft/min)	718	718	1526	1462

* Design coal input based on coal with 13,825 BTU/lb.

The total withdrawal of saltwater for cooling from the Taunton River is 922 million gallons per day (MGD).

The air pollution control system at Brayton Point Generating Station is limited to particulate (fly ash) removal. All four units are equipped with electrostatic precipitators. Ash from the precipitator hoppers, economizer hopper and furnace bottoms is collected by a wet sluicing system installed in 1969.

The seawater sluice system carries the fly ash, bottom ash and slag to the wastewater treatment system. The ash slurry is first centrifuged to recycle 98% of the transport water. The concentrated sludge is then trucked to a drying basin and subsequently disposed of. The transport water passes through three sequential settling basins which remove residual ash content by gravity sedimentation. The waste is neutralized with tri-sodium phosphate and limestone prior to discharge through the cooling water discharge canal. The sedimented sludge solids are left to accumulate in the basins and are then dredged and disposed of. Current annual accumulations of oil fly ash and slag in the basins are approximately 1000 cubic yards. The annual accumulation of oil fly ash and slag would drop to 300 cubic yards if Units 1, 2 and 3 converted to coal. However, a significant amount of coal ash, approximately 247,000 tons per year (assuming 13,825 BTU/lb and 9% ash), will be produced if Units 1, 2, and 3 are converted to coal. The ash will be disposed of in the Freetown ash landfill site.

Sanitary wastes generated at the plant are treated in the Somerset treatment plant. Lubricating oil systems are drained to a used oil storage tank and are disposed of by a local contractor. A porous gravel foundation, through which rainwater easily seeps, prevents oil tank area runoff from mixing with site runoff. Dry chemical sorbents are used to clean up oil spills.

2.1.5 Construction Required by Coal Conversion

Although NEPCo has not started coal conversion construction activities at this station, necessary improvements for full-time coal consumption have been planned by the utility and a private consultant. These plans include additional precipitator capacity to handle the increased ash volumes and modifications to the station electrical system and a four-acre sludge disposal area for wastewater treatment sludges. Other improvements such as the installation of a second coal unloading tower, the installation of new pulverizers, and the modification of the ash handling system from a wet sluicing system to a pneumatic system, may be made, but final decisions have not been made by the utility.

NEPCo has made an agreement with a local contractor to dispose of ash at a 35-acre former gravel pit in Freetown, Massachusetts, about ten road miles from Brayton Point. All necessary state and local permits have been obtained for the site and a limited environmental assessment report was prepared on the landfill under the Massachusetts Environmental Policy Act. The Freetown ash landfill is expected to have a life span of 5 to 10 years. After that time, an additional landfill site would need to be developed unless a commercial use for the ash is found. See page 3-26 for a discussion of the impact of ash disposal at the Freetown site.

The time necessary to complete these improvements is about 60 months after the issuance of an NOE. Estimated downtimes during this period are 2 months for Units 1 and 2, and 4 months for Unit 3.

2.1.6 Operations

Coal could be burned at Brayton Point Generating Station as early as 1984. This date is contingent upon the issuance of a Notice of Effectiveness by the DOE and any necessary on-site construction.

In 1976, the station generated 7,295,866 MW-hrs for sale to consumers. This level of output required 11.4 million barrels of oil (Table 2-2). In 1984, NEPCo must produce approximately 10,150,000 MW-hrs at Brayton

TABLE 2-2

POWER OUTPUT AND FUEL CONSUMPTION

		Unit 1	Unit 2	Unit 3	Unit 4	Total
Load	-1976	base	base	base	peaking	
	-1984*	base	base	base	peaking	
Capacity Factor (%)	-1976	73.9	76.6	49.5	29.7	
	-1984*	83	83	83	45	
Heat Rate (Million BTU/MW-Hr)	-1984*	9.3	9.3	8.8	10.9	
Annual Output (Million MW-Hr)	-1976	1.675	1.674	2.833	1.114	7.296
	-1984*	1.82	1.82	4.78	1.73	10.15
Oil Use (million bbl)**	-1976	2.54	2.63	4.26	1.96	11.39
(without NOE)	-1984	2.745	2.745	6.82	3.06	15.37
(with NOE)	-1984	0	0	0	3.06	3.06
Coal (Thousands of tons)**	-1976	0	0	0	0	0
(with NOE)	-1984	612	612	1521	0	2,745
(without NOE)	-1984	0	0	0	0	0

* Projected capacity factors, heat rates, and outputs were obtained from NEPCo in July, 1978. DOE has assumed that conversion could occur as early as 1984.

** Oil heat content of 146,800 BTU/gal. Coal heat content of 13,825 BTU/lb.

Point Station for transmission over the NEPOOL power lines. This level of output would require approximately 15.4 million barrels of low-sulfur oil (Tables 2-2 and 2-3). Converting Units 1, 2 and 3 to coal would substitute 2,745,000 tons of coal for approximately 12.3 million barrels of oil.

A typical oil tanker holds 150,000 barrels and takes four hours to pump the oil from the tanker; about 76 tankers docked at Brayton Point Generating Station in 1976. Coal typically arrives in 23,000-ton colliers (barges may be used in place of colliers) which require 3.2 days to unload. The existing coal tower is equipped with a twelve ton coal bucket. A second coal tower may be installed which would double unloading speed and halve dock time for colliers. Since 119 colliers and 21 tankers would have to dock to supply Units 1, 2 and 3 with coal and Unit 4 with oil to meet 1984 output requirements, the dock would be in use 52% of the time (exclusive of tie-up and departure time) (87 hours minimum per week). The coal bucket unloads directly onto the nine acre pile.

A concrete tunnel under the coal pile delivers coal via conveyor over magnetic separators to the crusher house. Two conveyors from the crusher house move coal into the station for temporary storage in silos. The silos can store six hours of fuel at full load. Silos feed coal at a constant rate into the pulverizers which in turn fuel the boilers. The coal handling system was designed to prevent packing and holdups by continuous coal movement and is entirely remote controlled.

A maximum of 247,000 tons of ash (fly ash and bottom ash together) would be produced annually, assuming utilization of coal with a maximum ash content of 9% and a heat content of 13,825 BTU/pound. With the installation of new and more effective precipitators, more than 99% of the fly ash would be collected. No losses of bottom ash are inherent in the system.

The number of trucks used to haul the ash to the Freetown fly ash landfill site will vary with the capacity of the truck. Dry fly ash,

TABLE 2-3

FUEL CHARACTERISTICS

	Low Sulfur Oil*	Low Sulfur Coal*	High Sulfur Oil**	High Sulfur Coal***+
Million BTU/ton	-	27.65	-	27.65
Sulfur Content (%)	0.97	0.72	2.2	1.67
Ash Content (%)	-	9	-	9
Million BTU/barrel	6.13	-	6.22	-

* Meets underlying SIP (May 1979) with no sulfur in fuel revisions.

** Meets current temporary SIP (effective until July 1979) and will meet "permanent" revision for oil burning (effective until November 1, 1988).

*** Meets permanent revision to SIP for coal burning (effective until November 1, 1988)

+ Coal characteristics shown in this table vary from the coal characteristics shown in the Memorandum of Understanding between the Utility and the Massachusetts Department of Environmental Quality Engineering. The MOU coal has a heat content of 26 million BTU/ton (13,000 BTU/pound), a sulfur content of 1.57% (based on a monthly average), and an ash content of 8%. The differences in the impacts between the two types of coal are not significant.

when compacted, has a density of approximately one ton per cubic yard. Ash production requires a 153 acre-foot volume (5.1 acres, 30 feet deep) for storage annually. If 25 ton trucks were used, 38 round trips would be required daily (5 day work week). These trucks would access the station from Brayton Point Avenue. Bottom ash slag would still be collected by wet sluicing from all four boilers. The ash would be obtained as deposited solids after treatment in the wastewater system for solids removal, pH and hardness control.

No change in the station's cooling water system would be necessary when burning coal, since the quantity of waste heat does not change with fuel type. There would be a reduction in oil handling (about 80% by volume), resulting in fewer oil spills and leakages into the bay and on the site.

2.2 REGIONAL ENVIRONMENTAL SETTING

2.2.1 Regional Geology and Physiography

Brayton Point lies in the Narragansett Basin, a syncline with a north-south axis. Due to a predominance of older, resistant rocks and repeated periods of glaciation, the slopes are gentle and relief is moderate. The elevation varies from sea level to 300 feet. Sandy beaches are found intermittently among the low cliffs on the coast. Much of this area (between 10 and 50%) is covered with standing water, the most significant water body being Narragansett Bay which includes lakes, marshes and smaller bays.

Basement strata are of the Rhode Island period of the Pennsylvanian Age and were deeply twisted by orogenic forces. The overlying strata to the north, west, and south of Brayton Point, mostly sedimentary in origin, are of the later Paleozoic Period. Some older Precambrian metamorphic and igneous rocks are included in the carbonate rocks of the Paleozoic Period east of Fall River to New Bedford. This area is characterized by granitic Paleozoic rocks.

Little seismic activity of significance has occurred in the region in recent times. Two epicenters were recorded in the second half of the 19th century. One was in North Kingston, RI, the other north of New Bedford, MA. Intensity of these shocks was estimated at V - VI on the Modified Mercalli Scale. This intensity is characterized by slight damage in buildings of average construction, e.g., dishes and windows broken and some furniture movement. The "felt" area was less than 50,000 square miles.

The southeastern Massachusetts - northern Rhode Island area contains limited mineral resources. There are active sand and gravel mining operations in Bristol County. Quarrying for granite and other crystalline rocks is common. Graphite deposits are present.

Recent geological investigations in the Narragansett Basin reveal that significant amounts of low-sulfur anthracite coal dating from the Pennsylvanian Period may underlie the basin. The seams occur in waves, their thickness varying from several inches to 20 feet. Folding and faulting have disrupted continuity and much more needs to be learned about the Basin. Preliminary geological assessments have been supported by the National Science Foundation; current studies are being supported by the U.S. Bureau of Mines.

2.2.2 Regional Water Resources

The principal water bodies of the region are of poor quality. Since no ground water aquifers exist near or are affected by the Brayton Point

Generating Station, only marine and fresh surface waters are discussed in this section.

Brayton Point Generating Station is situated at the southern end of the Brayton Point peninsula which is bounded on the east by the Taunton River and on the west by the Lee River. These two bodies of water, together with drainage from the Cole, Kickamuit, and Quequechan Rivers, and tidal influx from the Sakonnet River and Narragansett Bay, make up the Mount Hope Bay estuarial system (Figure 3-1).

Mt. Hope Bay has a total surface area of 16.7 square miles and a drainage area of 585 square miles. The bay has a mean low tidal volume of 8 billion cubic feet and a mean tidal range of 4.4 feet resulting in a tidal exchange volume of 1,900 million cubic feet. The freshwater inflow to the bay (800 cfs, mean; 400-1,500 cfs, range) causes estuary mixing throughout the year except the spring when high river flows can induce stratification and salt wedge formation.

Circulation patterns are determined by water temperature, freshwater runoff, wind, coriolis effect, tidal flux, and geometry. They are difficult to predict in the Mount Hope Bay because of the bay's irregular geometry (including two separate, 35-foot dredged channels) and low tidal range. However, the range of ebb tide velocities are reported to be 0.2-0.4 knots for the northeastern portion of Mount Hope Bay, 0.4-0.9 knots for the eastern and southern portions, and 0.1-0.5 knots for the dredged channel in the Taunton River.

The Mt. Hope Bay - Taunton River area has existing water quality problems due to sewage treatment plant outfalls, combined sewer overflows, direct industrial discharges, and urban runoff. The bay and many of its tributaries contain large amounts of nitrates and phosphates, high levels of heavy metals, and low levels of dissolved oxygen. Of the 108 freshwater stream miles of the Taunton River basin (classified variously as classes B and C, see Appendix A), 104 miles or 96% do not meet the applicable water quality criteria. Thus, the principal streams of this water basin are presently of poor water quality relative to the quality deemed possible through water pollution control.

Major freshwater streams are not utilized for municipal water supplies. In the lower Taunton River basin, municipal water supplies are obtained from reservoirs, lakes, and groundwater aquifers.

Mt. Hope Bay and the Taunton River are major recreational resources which have been relatively underdeveloped because of poor water quality. Swansea possesses one of the few large beaches in the region; other smaller ones are found along the banks of the Taunton River and in Assonet Bay. In addition, Mt. Hope Bay and the tidal portion of the Taunton River provide some of the most important spawning and nursery areas for alewives in Massachusetts. According to the proposed Massachusetts Coastal Zone Management Plan (Vol. II), despite the polluted condition of certain segments, the Taunton River estuary is an important nursery and feeding area for menhaden, winter flounder, bluefish, and Atlantic tomcod. Mt. Hope Bay and its tributaries contain productive shellfish habitat, but industrial and municipal wastes have closed all except a segment of the Cole River to direct harvesting.

2.2.3 Regional Climatology

The National Weather Station at Theodore Francis Green State Airport, in Warwick, Rhode Island, is located approximately 15 miles west-northwest of the site at an elevation of 62 feet above sea level. Because of the weather station's proximity to the site, the climatological data from this station approximates general climatological features of the site.

General Climate

The proximity of the plant site to Mount Hope Bay and the Atlantic Ocean plays a significant role in moderating the climate of this region. The temperature for the entire year averages about 50°F. January and February are the coldest months of the year with a mean temperature of about 29°F. July is the warmest month with a mean temperature of about 73°F. Freezing temperatures occur on the average about 125 days per year starting in the latter part of November and ending in late March. Highest relative humidity values are recorded during morning hours (0100-0700) and the lowest values are recorded during the afternoon (1300-1900).

Because of the site's proximity to large water bodies, most of the precipitation during the year comes as rain rather than snow. The annual average precipitation is about 40 inches, but this has varied from as little as 25.44 inches in 1965 to as much as 65.06 inches in 1972. During 30 to 40 days a year, dense sea fog is advected in over land by onshore winds, curtailing visibility. Fall coastal storms of tropical origin and summer thunderstorms occasionally bring gusty winds reaching 40 to 50 miles per hour, which occasionally cause damage to property in the coastal region.

The mean annual wind speed is 10.8 miles per hour and the average annual prevailing direction is southwest. Table 2-4 summarizes the climatological features of the region.

Diffusion Climatology

The annual wind rose for Providence, Rhode Island for the period of record 1 January 1964 to 31 December 1973 is shown in Figure 2-5. The predominant wind directions are west and west-northwest. Average monthly wind speeds and prevailing wind directions are summarized in Table 2-5.

TABLE 2-4

CLIMATOLOGICAL SUMMARY OF PROVIDENCE, RHODE ISLAND (1941-1970)
(After National Climatic Center, 1976)

PRECIPITATION (inches)	
Normal Annual Total	42.75
Maximum 24 Hours (October, 1962)	6.63
Mean number of days with thunderstorms	21
SNOWFALL (inches)	
Mean Annual Total	32.0
Monthly Maximum (March, 1956)	31.6
TEMPERATURE (°F)	
Mean Annual	50.0
Record High (July, 1964)	97
Record Low (January, 1971)	-5
AVERAGE RELATIVE HUMIDITY (percent)	
7:00 a.m.	75
7:00 p.m.	66
WIND	
Prevailing Direction	SW
Mean Speed (mph)	10.8

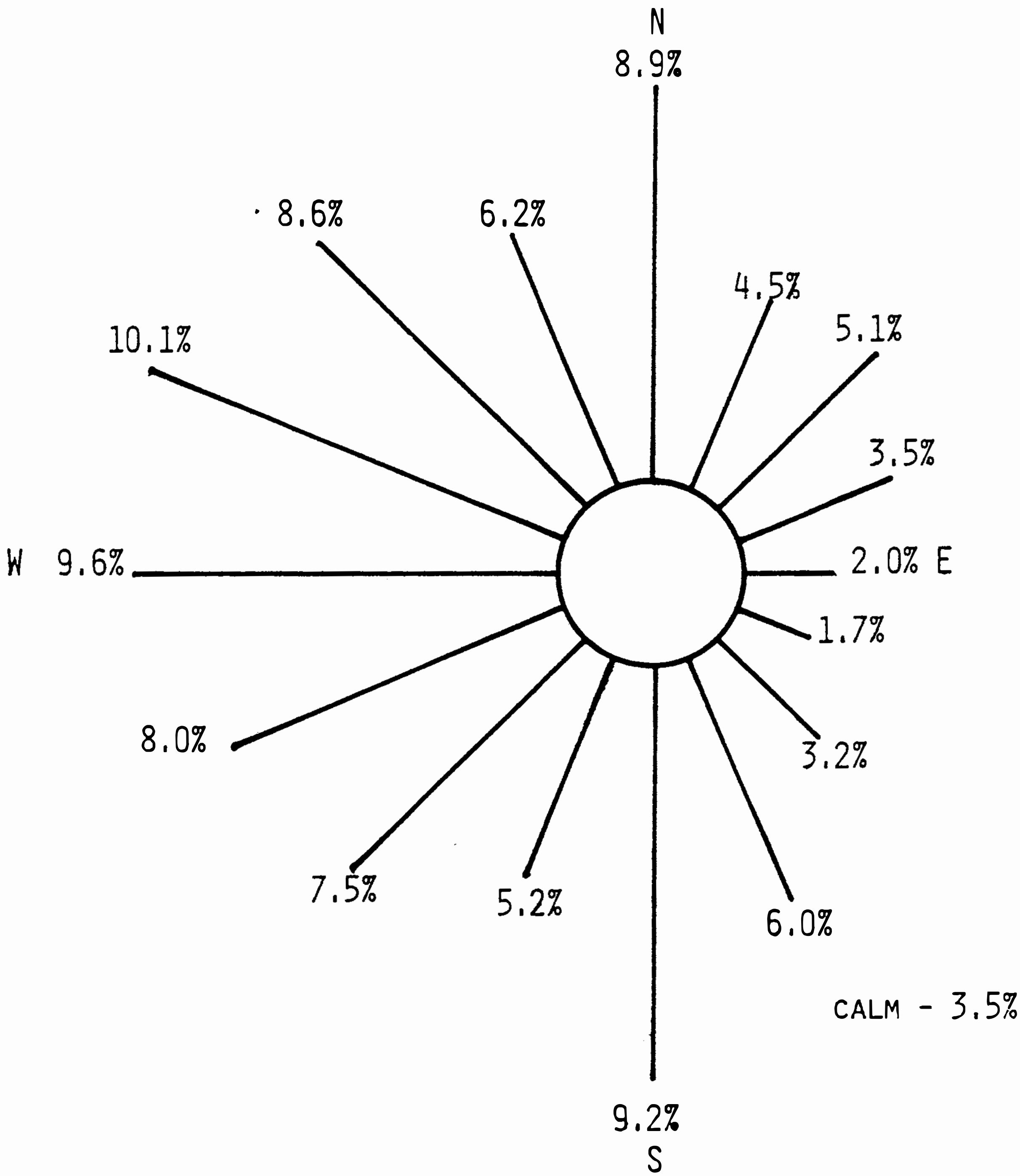

FIGURE 2-5

ANNUAL WIND ROSE FOR PROVIDENCE, RHODE ISLAND
(JANUARY 1964 TO 31 DECEMBER 1973)
(AFTER RADIAN CORPORATION, 1975)

TABLE 2-5

MONTHLY WIND DATA, THE THEODORE FRANCIS GREEN STATE AIRPORT
WARWICK, RHODE ISLAND
(After National Climatic Center, 1976)

Average Hourly	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Speed, mph	11.6	12.0	12.4	12.5	11.2	10.1	9.6	9.5	9.7	9.8	10.7	11.1
Prevailing direction	NW	NNW	WNW	SW	S	SW	SW	SSW	SW	NW	SW	WNW

Air pollutants emitted from a point source, such as a stack, are carried downwind and diluted due to rapid mixing in the atmosphere in a roughly cone-shaped plume. High wind speeds facilitate greater dilution effects thus allowing the atmosphere to accept higher pollutant loads without exceeding safe or legal concentration levels. If the air is stagnant or the pollutants can only mix in a shallow layer, ambient levels of pollution will increase. If mixing heights are below 500 meters and wind speeds are less than four meters per second, the potential exists for significant increases in ambient levels of pollution (Holzworth, 1972). These conditions were not observed at Brayton Point during the five year period from 1960 to 1964. Consequently, dispersion of pollutants around the Brayton Point Generating Station is relatively good.

Temperature inversion, a condition in which atmospheric temperature increases with altitude, also causes high ground level pollution concentrations. The warm layer overlaying a cooler one inhibits vertical mixing. While low-level nighttime inversions occur on 50% of winter and spring days and 70% of summer and fall days, these inversions are short-lived and do not indicate high air pollution potential (Hosler, 1961).

2.2.4 Regional Development

The first European settlers travelled from Plymouth, MA to Fall River, MA in 1659 and settled along the Quequechan River, called Falling Waters by the Wampanoag Tribe. One hundred years later the first cotton mill was built, establishing the focus of Fall River industry for the next two centuries. The nearby towns of New Bedford and Taunton also specialized in textile and garment manufacturing industries. By 1920 Fall River grew to a population of 130,000, the largest it has ever been. Fall River was incorporated as a town in 1803 and became a city in 1854. Somerset and Swansea were incorporated in 1790 and 1668, respectively.

The industry and population which originally centered around the Quequechan River moved south and east to Cook and South Watuppa Ponds with the advent of steam power. The waterfront was also a densely built area of factories and shipping facilities. Population centers grew up around the industrial sectors.

Today, Bristol County has a slightly denser population than the State average although its population is not increasing as noticeably as in other parts of the State. Population of Bristol and Plymouth Counties and the State increased significantly from 1960 to 1970. Plymouth County experienced the highest rate of increase. The Bristol County growth rate was on a par with the State's.

The largest cities in the region, New Bedford and Fall River, have declined in population over the past several decades while neighboring suburban communities have grown. Much of the cities' decline in population can be attributed to the cities' declines in textile and garment manufacturing industries which have not been offset by growth in other industries within the cities.

Highway construction has encouraged the development of Swansea and Tiverton as "bedroom communities" within the Providence and Fall River Metropolitan areas. These and other surrounding towns have had to cope with large influxes of new residents and the associated problems of providing increased services. Somerset is physically the smallest town in the county but has the third highest population density in the county after Fall River and New Bedford.

2.2.5 Regional Socio-Economics

Population has increased within the Southeastern Regional Planning and Economic Development District (SRPEDD) over the past 20 years, and this general trend is expected to continue. (Census data from 1950, 1960 and 1970 and a special Massachusetts State Census in 1975 were utilized to construct Table 2-6.)

Somerset is the only town in the county with a relatively high population density (1872 persons/square mile) that is still growing. Fall River and New Bedford have densities of 2535 and 5099 persons/square mile respectively,but have been experiencing population decreases for the last 50 years. Swansea is a "bedroom community" with a large portion of its wage earners commuting to Providence, RI; the remainder work mainly in Fall River and Somerset. One percent of the town is used for industrial purposes.

During the decade from 1960 to 1970, Somerset's population grew by nearly 50%; Swansea grew by nearly 28% and Fall River declined by 3%. Since 1970 the growth of both Somerset and Swansea has slowed. Fall River's population has grown to 100,400. The 1990 population projections for the three communities indicate that Fall River will continue its long-term decline; the Somerset growth rate will be one and a half times as great as the United States growth rate of 21%, and the Swansea growth rate will be nearly three times as great. Thus, the trend for higher relative growth in the immediate vicinity of Brayton Point is expected to continue.

The Fall River population includes significant proportions of elderly (14%) and minorities (16%). Low income people make up almost a tenth of the city compared to 1% each of the Somerset and Swansea populations.

From the middle of the eighteenth century, the cities of Fall River, New Bedford and Taunton specialized in textile and garment manufacturing. The port of Fall River gained local prominence as is evidenced by the construction of the United States Customshouse in 1834 to handle the volume of shipping generated by these successful manufacturing industries. The

TABLE 2-6

BRAYTON POINT VICINITY POPULATION ANALYSIS

Population Characteristic	Somerset	Swansea	Fall River
Population - 1960	12,196	9,916	99,442
Population - 1970	18,088	12,640	96,868
1960-1970 Growth Rate (%)	48.3	27.5	-2.6
1975 Population	19,205	15,152	100,399
1970-1975 Growth Rate (%)	6.2	19.9	3.6
Projected Population - 1990	23,550	19,900	88,700
1970-1990 Growth Rate	30.2	57.4	-8.5
Minority Population - 1970	186	128	15,559
Minority Population (%)	1	1	16
Low Income Population - 1970	764	654	9,464
Low Income Population (%)	4.2	5.2	9.8
Elderly Population (Over 65) - 1970	N/A	N/A	13,355
Elderly Population (%)	N/A	N/A	13.8

area attracted many groups of immigrants skilled in the textile industry. The smaller surrounding towns remained predominantly agricultural until this century.

Today the region is economically depressed with a high level of unemployment compared to state and national levels. The 1976 Fall River unemployment rate of 9.9% was slightly greater than its state rate of 9.5% and significantly greater than the national rate of 7.7%. (The 1974 and 1975 unemployment rates for Fall River were even higher than the 1976 rate.) This situation is the result of cumulative adverse conditions occurring in the 1920's. The mills of this region were nationally renowned and financially successful. The advent of new, sophisticated (more automated) machinery in 1927 threatened the existing facilities in New England with obsolescence. A combination of labor problems and the Depression forced many mill owners to curtail operations. This stimulated the fabric industry to locate elsewhere in the country.

Construction of Interstate 195 has allowed residents of the Fall River area to commute to Providence and New Bedford although these communities face many of the same socio-economic problems as Fall River. Labor Market Area (LMA) statistics derived from the 1970 U.S. Census and the 1975 Massachusetts Census are presented in Table 2-7. Of the total Fall River employment in 1970, manufacturing accounted for 52%, compared to 64% in 1960. Forty-one textile and garment manufacturers left Fall River during that period. The major industry still is textiles, with over 60 such companies representing 14% of the $186.66 million city payroll. The port of Fall River, which includes the east coast of Somerset along the Taunton River, has 15 shipping terminals and docking facilities. Warehousing and rail shipping are a significant activity. Fall River is one of the largest New England oil repositories with both commercial and government operated facilities on the waterfront. In 1973 Fall River handled 30 million barrels of oil. Storage in Fall River is three million barrels.

TABLE 2-7

LABOR MARKET AREA STATISTICS (Annual averages)
(After SRPEDD, 1976)

Fall River	1970	1975	1976
Employment	63,400	62,600	59,316
Unemployment	3,500	8,600	6,506
Labor force	66,900	71,200	65,826
Unemployment rate	5.2	12.1	9.9
Population	96,898	100,399	N/A

There has been a regional shift away from agriculture, as evidenced by the large losses of agricultural lands to urban uses or reforestation (Table 3-12). Fishing is still a significant industry along the coast, but severe competition from foreign fleets has had a negative effect on New England fisheries in recent years. It is anticipated that the enforcement of the 200 mile coastal fishing limit will allow depleted fish stocks to recover and cause a significant improvement in local fishing catches and the local economy. The proposed Massachusetts Coastal Zone Management Plan predicts an increase in the New England fishing fleet of 15 to 50% by 1985.

2.2.6 Regional Transportation

The two major highways in the region are Interstate 195, which provides east-west connections to Cape Cod (Route 6) and Rhode Island, and I-95 joining Providence and Boston. State roads 138, 24, 140 and U.S. Route 44 complete the network of major roads. Figure 2-6 is a schematic of the road network in the Somerset area; average daily travel (ADT) figures are shown from surveys conducted in 1975 by the Massachusetts Department of Public Works.

Freight lines comprise the bulk of rail operations in Bristol County. Trains operated by CONRAIL (the former Penn Central) provide service to Providence, New Bedford and Fall River with connections to Boston, Connecticut and New York. One freight train originates in Boston daily and terminates on alternate days in New Bedford or Fall River. One passenger route is run by Amtrak through Providence as part of the Northeast Corridor Service.

The port of Fall River mainly handles freight; 4.8 million short tons were trans-shipped in 1975. A federally maintained channel improves port access; it is 400 feet wide and 35 feet deep at mean low water (M.L.W.). Fall River passenger volume in 1975 was 746. There are 15 marine terminals at the Fall River port.

Other major ports in the area include New Bedford, Massachusetts and Providence, Rhode Island. In 1970, New Bedford Harbor handled 0.6 million tons of freight and Providence River and Harbor handled 9.9 million tons of freight.

Small private sailing facilities are found in Mattapoissett, Taunton, Wareham and Westport. These ports support some commercial activity and mainly service private sailing and cruising enthusiasts.

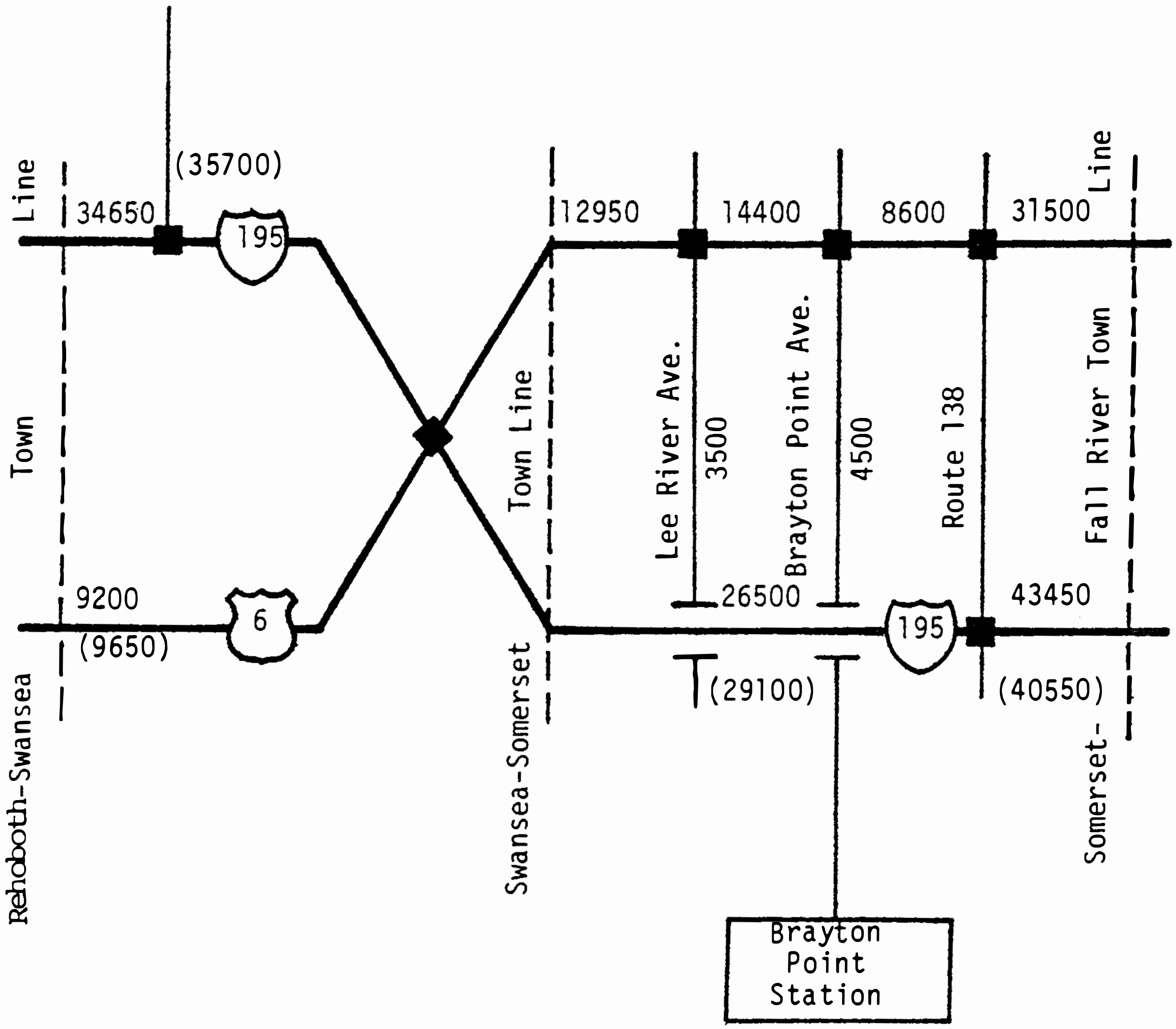

FIGURE 2-6

LOCAL ROAD NETWORK SCHEMATIC AND AVERAGE DAILY AUTOMOBILE TRAFFIC VOLUME IN 1975

(Expressed in vehicles per day; Figures in parentheses are 1976 data)

Airports are located in Fall River, New Bedford, Taunton and Mansfield, MA, and Warwick, RI. The latter is the only airport with regularly scheduled commercial passenger flights. The other airports are used for general aviation. New Bedford is the most active of these. The T.F. Green Airport in Warwick handles an unusually large amount of military flights.

The Southeastern Regional Transit Authority (SRTA) was formed in 1974. It provides bus service to the municipalities of Fall River, New Bedford, Acushnet, Dartmouth, Fairhaven, Somerset, Westport, Freetown, and Swansea. This system operates 25 routes Monday through Saturday with some limited service on Sunday. Special progams for senior citizens, the handicapped, and students are in effect. One route operates between Brayton Point and Fall River.

2.2.7 Relation to Other Federal Actions

There are no existing or planned Federal actions within a 20 mile radius that, if considered in conjunction with the proposed action, would have a cumulative impact greater than the impacts described herein. Similarly, the proposed action would not affect any major Federal action within a 20 mile radius of Brayton Point.

3. SITE AND VICINITY ENVIRONMENTAL ANALYSES

3.1 PHYSICAL ENVIRONMENT

3.1.1 Landforms

Setting

The profile of the terrain in the immediate vicinity of the plant is fairly low and rolling. The highest feature is a ridge of hills with a north-south axis just east of the Fall River shoreline, with a high point of 256 feet. On Brayton Point itself, the highest point is 100 feet. Although the station site elevation varies from sea level to 50 feet, most of the site is 10 feet above sea level. There is a marshy area at the northwest corner of the site. The terrain of Swansea to the west, is also low lying with hills ranging up to 70 feet high. The rainfall in the area is sufficient to maintain good vegetative cover; erosion is not a local problem.

Brayton Point Generating Station is situated on bedrock. Local rocks, either exposed shoreline rocks, or those found in exploratory drill holes for foundation tests are shale, schist and brecciated graphite. Due to the violent nature of their formation, the subsurface strata have many small faults (cracks) and folds. According to the results of tests conducted by Charles T. Main, Inc. a small shear may pass through the plant site.

The three main soil types in the vicinity of Narragansett Basin are Cryorthods, Fragiorthods and Haplorthods, which all belong to the class of Spodosols. These soils are characterized by subsurface horizons of amorphous materials, including organics, aluminum compounds and iron compounds. Spodosols are formed in acid conditions from coarse textured materials in humid and cool climates. The cryorthods contain thistosols which are undecomposed plant residues. The fragiorthods, from a root word meaning modified or brittle, compose the moderate slopes of the region. The haplorthods, meaning simple and common soils, are the sandy soils which also contribute to the gently sloping topography.

Coal of low sulfur content has been found at Brayton Point in one of three test holes, each 1500 feet deep. Testing was conducted by Weston Observatory of Boston College. The test holes were unable to demonstrate the continuity of the seam. The coal was found to have a heat content of 13,846 BTUs/lb, thickness of 8.78 feet, a volatile content of 5.2% and an average dip of 50 degrees. The depth to the bed is 732 feet. Boreholes recorded by Charles T. Main, Inc., for foundation tests on-site found beds of anthracite in the top 30 feet varying in thickness from 2 to 5 feet. Evaluation of coal extraction feasibility has not been performed.

Impact

The proposed action would not have a significant impact on local geology, soils or topography. Coal conversion would not hinder any possible future attempts to extract on-site coal.

3.1.2 Water Quality

Summary: Notice of Effectiveness

The Brayton Point Generating station presently burns oil. Conversion to coal combustion will require certain on-site construction. Construction will have minimal water quality impacts because of the site's low relief. If unwashed coal is used, coal pile runoff will have higher concentrations of iron, copper, mercury, zinc, nickel, arsenic, manganese, and lead than the appropriate marine water criteria. Moreover, iron, manganese, and zinc precipitates would form when runoff mixed with the estuarine waters.

Even with primary treatment, coal pile runoff concentrations of iron, copper, mercury, zinc and lead will still exceed criteria and minimal amounts of iron, manganese, and zinc will precipitate. Mixing after discharge will dilute concentrations relatively rapidly to an acceptable level but will not eliminate the problem of precipitation without primary treatment. Use of washed coal may satisfactorily substitute for primary treatment, but there is not sufficient data to analyze sufficiently impacts from its use.

Summary: Generalized Description of Water Quality Factors

Sources of water quality degradation associated with a coal-fired generating station can be broadly categorized either as 1) runoff or percolation resulting from precipitation, or (2) discharges (into surface or groundwater) produced by some generating process. The principal sources of water pollution include coal piles, ash transport systems, and ash disposal areas.

Generating stations customarily store coal in large piles with foundations that may or may not be lined. Rainwater and melted snow can either evaporate, seep through the piles and percolate into the groundwater, or run off from the piles. Runoff may either drain into surface streams or percolate into the groundwater.

Metallic sulfides associated with the coal are oxidized and, through leaching, produce water with low pH and high metal ion content. The level of acidity, which controls the metal leaching potential is a function of the concentration of sulfide-bearing minerals in the coal, the size of the coal pile, the method of coal preparation and cleaning, local meteorology (i.e., precipitation), alkalinity of the coal, trace metal concentration in the coal, and residence time in the coal pile. At typical low pH levels, water characteristics include high iron, manganese, total dissolved solids, and trace metals concentrations.

Coal pile leachate resulting from a single large storm is not of constant quality. The initial leachate generally contains much higher concentrations of metals than the leachate appearing at the end of the storm. This is because the available metals are flushed out by the first waters to percolate through the pile. Although detailed analyses of this "first flush" phenomenon are not available, it appears that after flushing with two inches or less of rainfall the quality of the coal pile leachate greatly improves, with metal concentrations becoming less than one fifth of the concentration in the initial two inches of precipitation (Anderson and Youngstrom, 1976).

A great many variables determine the impact which leachate pollutants will have on groundwater quality. Soil permeability, determined by the amount of clay and gravel, affects how much of the leachate will percolate through to the groundwater -- the more clay, the less will seep through. The size of the emission source, the size of the soil particles, the groundwater flow rate, and the gradient determine the rate at which the leachate pollutants will disperse and mix with the rest of the groundwater. Groundwater can travel rapidly in buried sand and gravel channels, resulting in little mixing of pollutants with surrounding ground water and a concentrated pollutant plume far away from the pollutant source. Alternatively, the ground may be homogeneous producing more rapid dilution of pollutants. Thus, the homogeneity of the soil, distance between the source of pollution and the points of extraction, as well as their relative locations (downstream or upstream) determine the eventual impact on water quality. Under usual groundwater conditions, at a distance between one-half and one mile downstream of a pollution point, the groundwater pollutant concentrations will fall to between 5% and 100% of the initial concentrations. Because groundwater often moves at a rate of 1 foot to 3 feet daily, leachates entering the groundwater may not be noticed for several years if a groundwater well is one-quarter of a mile or more distant from the pollution source.

The effect on surface receiving water from either runoff or a direct discharge will vary depending on 1) the volume and pollutant concentration of the runoff or discharge and 2) the type of receiving water, its magnitude and flow characteristics. A simple breakdown of receiving water types includes small streams and rivers, large rivers, small lakes and ponds, large lakes, estuaries, bays and harbors, and open ocean. As a general rule, the smaller the receiving water, the greater will be the impact on it of any discharge, with larger bodies of water generally less impacted by a discharge of constant volume and strength. Nonetheless, a swiftly flowing river of small volume may mix, dilute, and aerate the pollutants in the discharge more rapidly than would a larger river that is sluggish. Small ponds and lakes are usually more severely impacted by a given discharge than any other type of receiving water.

Estuaries represent an area of mixed fresh and salt water. The impact of any discharge will depend on how rapidly the discharge is mixed within the estuary and how quickly it then moves out to open ocean. The effect of tidal action and the volume of fresh water entering the estuary are very important in determining the movement and dilution or escape of polluted discharges. Currents within the estuary may act to keep portions of the total water within the estuary. If the discharge is into such an area, concentrations may build up over time. Similar considerations apply in bays and harbors. Discharges to the ocean are usually rapidly mixed and diluted. Where there are no currents parallel to the shore, however, this process takes a longer time, allowing concentrations to build up. Currents play a similar role in large lakes.

Coal pile runoff and leachate present a serious potential problem because of metals leached from the stored coal and high acidity of the resultant leachate. Runoff impact can be mitigated by sealing the bottom of the storage area so that percolation to the groundwater does not occur. Runoff and leachate must then be treated, either separately, or as a part of the overall treatment process for all wastewaters.

Coal ash is sometimes stored temporarily in piles where rainfall and floods can erode them and produce runoff with high concentrations of suspended ash sediments that endanger aquatic habitat. Leachates from coal ash deposited in landfills is a more serious concern. The depth of the underlying water table, the permeability of the underlying soil, wetness of the deposited ash, and the leaching characteristics of the coal ash determine the impact on both groundwater and surface water.

Other sources of potential water quality degradation are the wastewaters generated by periodic washing operations such as the fireside wash or chemical cleaning. These wastewaters contain large concentrations of metals for both oil and coal burning, although the relative concentrations of the metals are different for the different fuels (e.g. washes during oil burning contain very high levels of vanadium, which is essentially absent from washes during coal burning).

Summary: Water Quality Standards

A combination of EPA and State regulatory activities are used to manage and reduce to acceptable levels the impact on surface water quality of pollutants caused by the operations of steam electric generating stations. The 1972 Amendments to the Federal Water Pollution Control Act (P.L. 92-500) and the 1977 Amendments (P.L. 95-217), now known collectively as the Clean Water Act, set forth the basic framework for operation of this management system. Under provisions of the Act, States are required to classify all "navigable" surface waters as to the desired end use of the particular water, to monitor water quality, and to establish a management program to achieve the desired level of water quality. States are required to establish classifications of waters that will achieve the overall goal of the Act of fishable/swimmable water quality by 1983. Even higher levels of water quality are encouraged by the Act.

In order to ensure attainment of these goals, States are required to establish water quality standards for each level of classification. Specific minimum levels of ambient water quality are to be set for a wide variety of water quality characteristics and pollutants (e.g., dissolved oxygen content, coliform bacteria, turbidity) reflecting appropriate water quality for each use classification. State standards are usually based on criteria developed by EPA and presented in two major documents, Water Quality Criteria (1972) and Quality Criteria for Water (1976). EPA uses material contained in the criteria documents to evaluate proposed state standards prior to approving them. As a result of litigation, EPA has recently issued a series of 27 (out of a total 69 to be ultimately issued) new draft criteria for review and subsequent adoption (44 FR 15931, March 15, 1979).

As part of its management system, a state is required to periodically assess the water quality of its navigable waters in relation to its classification scheme. Large or complex bodies of water are broken down into segments for classification and analysis. Each segment is rated in relation to its status of compliance with standards. An effluent limited (EL) rating means the particular segment can meet standards after either "secondary treatment" or "best suitable treatment" is applied to the point sources of pollution in that segment. A segment rated water quality limited (WQL) indicates that a higher level of waste treatment is required to meet standards.

Through a permit program, known as NPDES (National Pollutant Discharge Elimination System), all point source dischargers are required to obtain a discharge permit that sets maximum limits on the type and quantity of pollutants that may be discharged. The permit program is designed to reduce the amount of pollutants discharged to streams so that desired water quality goals can be achieved. Permits are generally written for five-year periods and require periodic monitoring of discharges. The program is administered jointly by the US EPA and the Massachusetts Division of Water Pollution Control.

The Commonwealth of Massachusetts has divided the surface waters of the State into segments and classified them according to current quality and future desired use. Salt waters in the Commonwealth are classified SA if suitable for any use (including shellfish harvesting), SB if suitable for primary contact (including bathing) and, SC if suitable for secondary contact and boating. The designated uses for the Massachusetts water classes are detailed more clearly in Appendix A.

Surface Water

Setting

No permanent fresh water streams, lakes, or marshes exist on Brayton Point or in the vicinity of the station. The nearest fresh water stream is approximately one-half mile northeast of the station and drains into the Taunton River above the Bragga Bridge. Because of the site topography, this stream does not receive drainage from the station site.

The salt water areas near Brayton Point are all affected by tidal exchange of water from Mt. Hope Bay in complex water circulation patterns. Velocities are generally less than one knot and, depending on both wind and tide, effluent from the cooling water discharge canal may be carried out into the bay, up the Lee River, or toward the Taunton River and the station cooling water intake. Thus, discharges and runoff from Brayton Point could affect water quality of nearby estuaries and Mt. Hope Bay (Figure 3-1).

In the past there have been substantial water pollution problems in Mt. Hope Bay and the Taunton River, including numerous violations of the state class SB ratings for temperature, phosphate, nutrients, coliforms, and dissolved oxygen. (See Appendix A for an explanation of water quality ratings.) These violations are not necessarily attributable to Brayton Point Station. Pollutant concentrations in the vicinity (i.e., within 2,000 feet) of the Brayton Point Generating Station are available from the

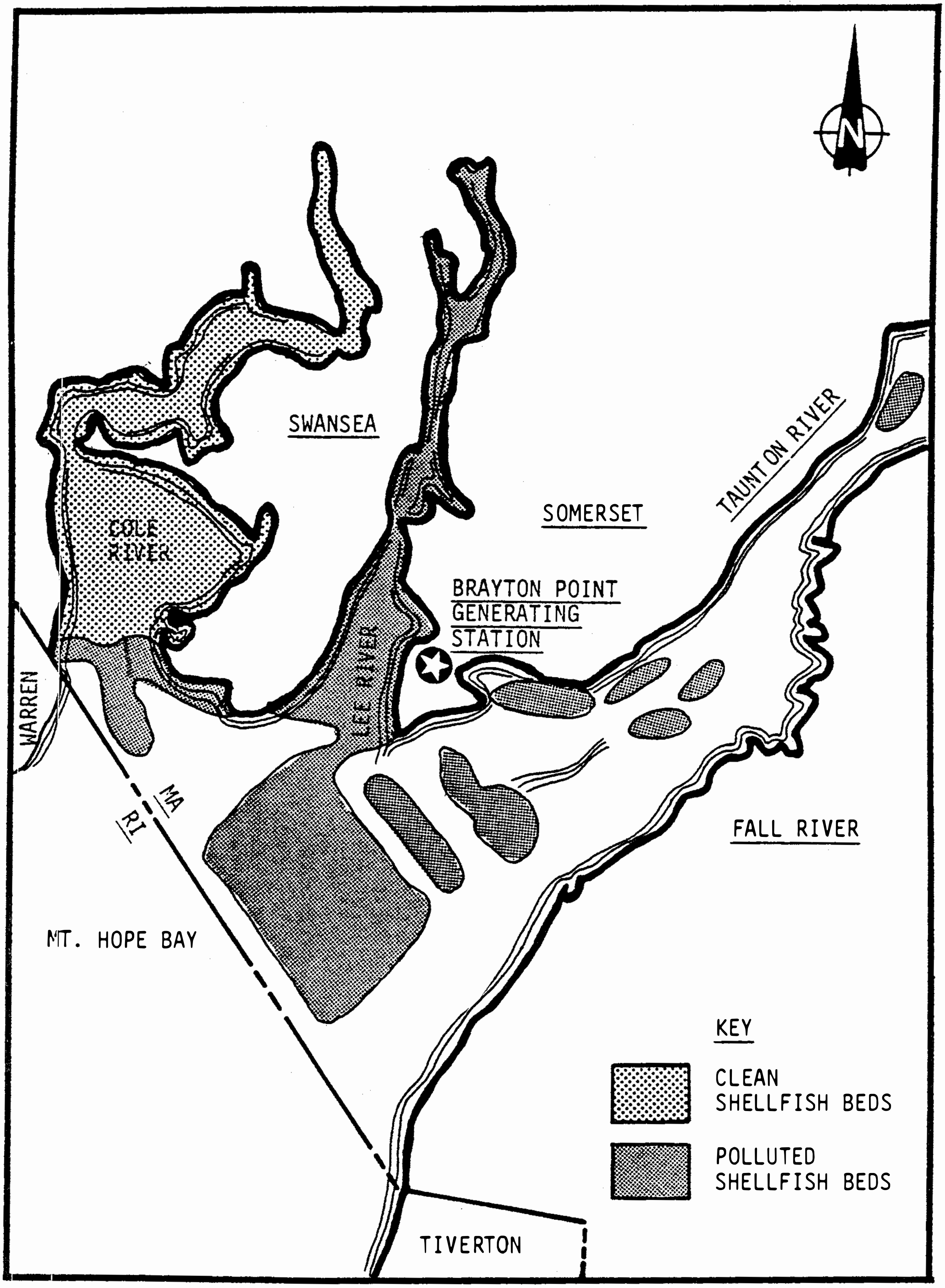

FIGURE 3-1

MOUNT HOPE BAY ESTUARY

EPA Region I STORET data file. In general, violations were within an order of magnitude of the criteria. It should be noted, however, that since 1972, clean-up efforts have significantly reduced these concentrations. Also, thermal plumes, floating solids, chemical dyes, and oil have tended to limit water-contact recreation in the bay and lower Taunton River.

Presently, the Cole River estuary (Figure 3-1) is suitable for any high water quality use (i.e., it meets the class SA water quality standards). The Taunton River estuary and the section of Mt. Hope Bay southeast and east of Brayton Point have been designated class SB, indicating that the goal is to have the waters suitable for bathing and recreational purposes. These areas presently do not satisfy the class SB criteria. There is no single source responsible for the violations. The criteria are scheduled to be met, through water pollution control, by 1979.

The Brayton Point Generating Station currently discharges five types of wastestreams to Mt. Hope Bay. These discharges are: 1) the cooling water and associated waste streams (discharges 001, 002, and 003); 2) fly ash recirculation blowdown and bottom ash sluice water (discharge 004); 3) circulating water system backwash (discharge 005); 4) yard surface drainage (discharges 009, 010, 013, and 015), and 5) intake screen washwater (discharge 017). The location of each discharge is shown in Figure 3-2. Each of the discharges is subject to NPDES limitations on quality and volume as detailed in NPDES Permit No. MA0003654.

Conversion to coal will result in a coal pile runoff discharge stream with more concentrated pollutants (due to constant replenishing of the coal supply) and will change the content and volume of discharge 004 - the discharge associated with ash handling (while burning oil) and boiler cleaning wastes - due to conversion of Units 1, 2, and 3 to coal. Figure 3-3 shows the sources and treatment of the waste streams that make up the current discharge 004. Table 3-1 shows the NPDES limitations for discharge 004 and some monitored values for concentrations

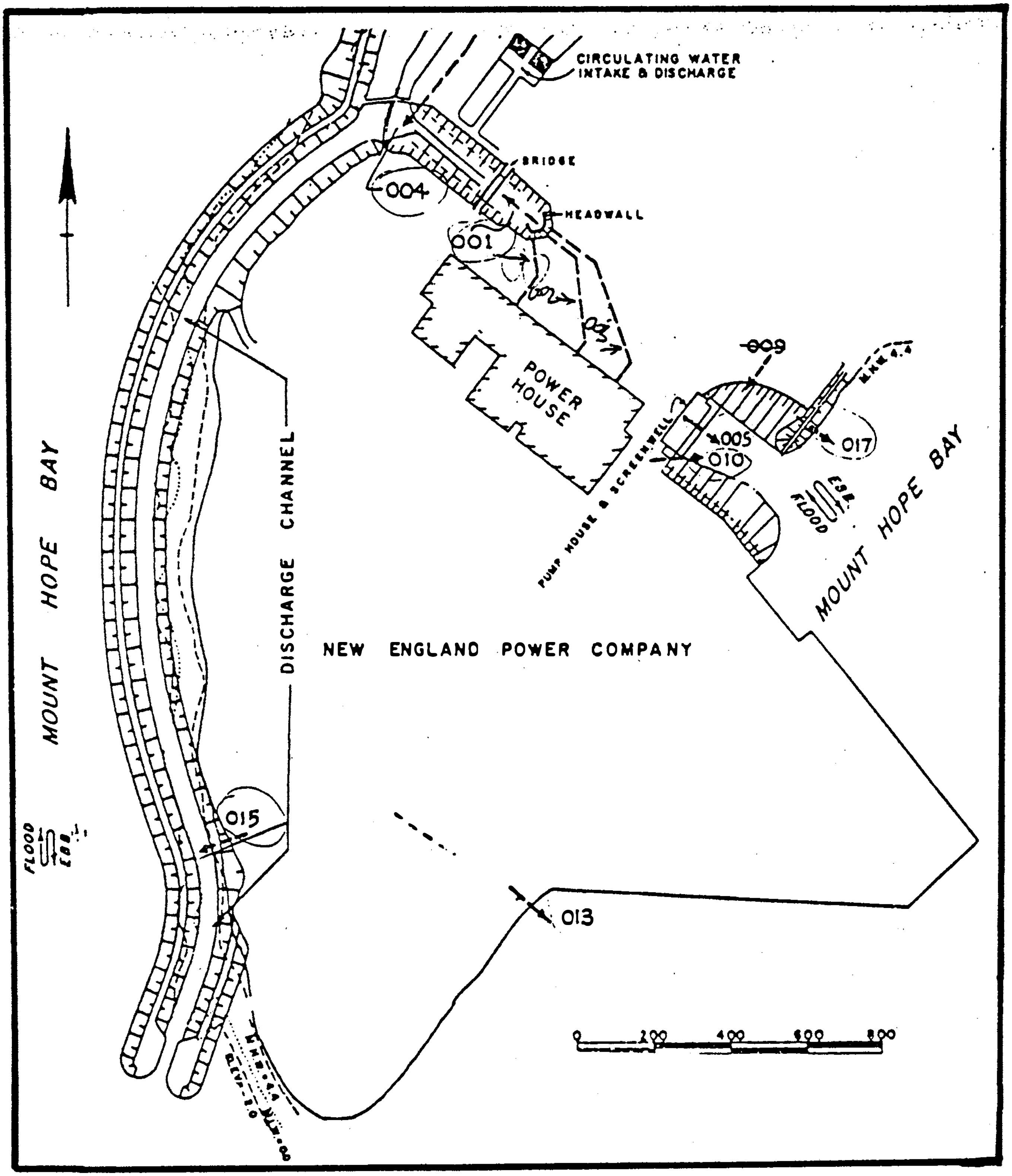

FIGURE 3-2
EXISTING WASTEWATER DISCHARGES AT THE BRAYTON
POINT GENERATING STATION

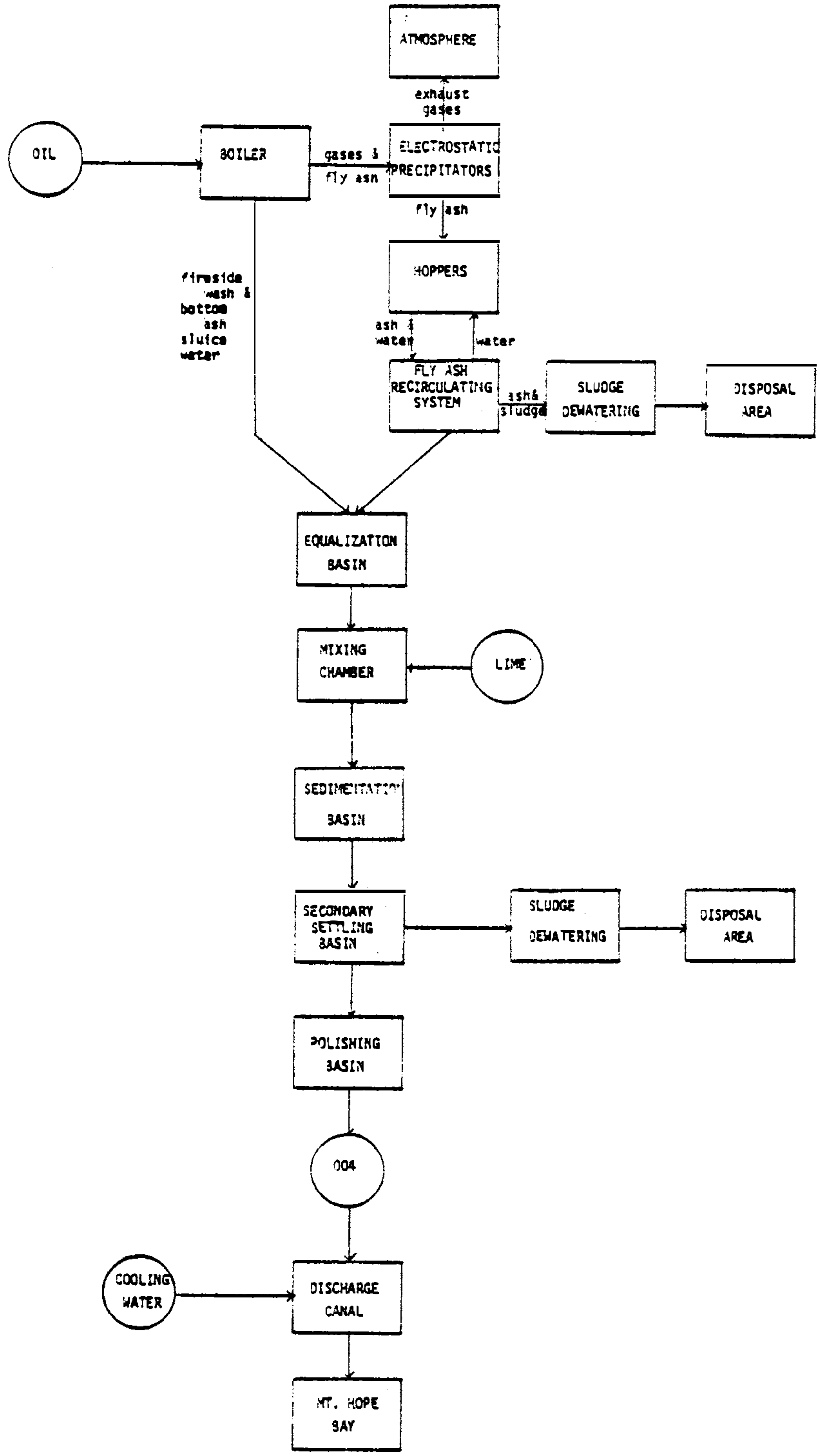

FIGURE 3-3
SOURCES AND TREATMENT OF WASTEWATER STREAMS
CONSTITUTING DISCHARGE 004

TABLE 3-1

NPDES LIMITATIONS AND MONITORED DISCHARGE
VALUES FOR DISCHARGE 004

Parameter	NPDES Limit Average	NPDES Limit Instantaneous	Monitored Value* Avg.	Monitored Value* Max.
Volume (MGD)	2.5 (30 days)	6.0	0.87	4.9
pH		6-9.5	9.02	7.7 - 9.8 (range)
Suspended solids (mg/l)	30	100	0	0
Turbidity (JTU)	25	50	0.77	12.4
Oil & Grease (mg/l)	15	15	19.07	186.7
Zinc (mg/l)	1.0	2.0	0.010	0.051
Copper (mg/l)	1.0	2.0	0.0	0.18
Iron (mg/l)	1.0	2.0	0.10	1.32
Nickel (mg/l)	1.0	2.0	0.02	0.37
Manganese (mg/l)			0.0	0.04
Vanadium (mg/l)			8.44	11.6
Aluminum (mg/l)			0.0	0.0
Chromium (mg/l)			0.0	0.0

*From July, August and September 1977.

of pollutants that are restricted by the NPDES permit. Data for other discharges is not given as discharges should not vary under conversion, except for 010 and 013 which drain the coal pile, as well as other areas of the yard surface. Limits are set only for oil and grease and pH. New limits will need to be set after conversion.

Impact

Conversion of Brayton Point Units 1, 2 and 3 to coal firing will require removal of approximately half of the 800 acre-feet of ash presently stored on site. In addition a second coal tower and a pneumatic ash handling system may be installed. NEPCo personnel indicate that none of these activities is expected to result in the creation of more than an acre of new barren soil surface. Due to the low relief of the site, suspended solids in runoff from these sites will have an insignificant effect on the quality of surrounding waters.

One hundred percent coal burning at Units 1, 2, and 3 of the Brayton Point Generating Station would create new sources of water pollutants. The impact of these added water pollution sources would depend on the operating procedures adopted. Estimates of water quality impacts were calculated for a typical coal and various assumed operating procedures. Incomplete data on the coal to be utilized, extent of treatment of leachate and runoff, and details of emergency ash handling procedures and limited data concerning Mt. Hope Bay prohibited the use of sophisticated modeling procedures.

Water pollutant sources normally associated with coal firing but not with oil firing include: 1) coal pile runoff, 2) ash pile runoff, ash handling water and ash pond overflow, and 3) fugitive dust. For Brayton Point, water quality impacts were calculated for an active nine acre coal pile with and without primary treatment of coal pile runoff. Surface water quality impacts resulting from ash handling were calculated assuming a level of treatment comparable to that level used during oil burning.

Conversion to coal at Brayton Point Generating Station will create new ash handling problems because of the increased volume of fly and bottom ash that will be created. Fly ash will be transported away from the precipitators by either a dry pneumatic system or a recirculating wet sluice system, and eventually removed from the site by truck to a landfill. If a dry transport system is used there will be no onsite water quality problems associated with fly ash. If a recirculating wet sluice system is used, the blowdown from that system will be eventually discharged to Mt. Hope Bay via discharge 004. Bottom ash will also be removed from the hoppers by a wet sluice system that may or may not be recirculating and treated at the old coal ash waste treatment system; this sytem will need to be reactivated.

Ash sluice water generally contains high levels of dissolved metals as shown in Table 3-2. Blowdown from a sluice system may contain metals in concentrations 10 to 12 times that of a once-through sluice system because of reconcentration.

The fly ash recirculating sluice blowdown will be combined with the fireside wash and chemical cleaning and treated in the waste water treatment system as shown in Figure 3-4. It is believed that adequate retention time is available allowing for the removal of dangerous metals to within acceptable discharge limits (Table 3-2), with the possible exception of mercury and arsenic. (Note that vanadium, a problem during oil burning, will not be present in significant concentrations in waste waters during coal burning). If adequate retention volume is not available, adaptation of the wastewater treatment system would be required to provide either i) greater volume to allow for longer treatment time, ii) different chemical treatment levels and types, or iii) mechanical mixing, agitation or aeration of the blowdown to allow for more effective contact and chemical reaction. Bottom ash sluice water may or may not be recycled.

Because the discharge point of the fly ash sluice water-blowdown-wash stream is into the thermal discharge canal, the discharge will be mixed with a large volume of water before it actually enters Mt. Hope Bay. This

TABLE 3-2

CONCENTRATIONS OF POLLUTANTS IN COAL ASH SLUICE WATER AND SLUICE SYSTEM BLOWDOWN

Pollutant	Sluice water* concentration (mg/l)	Blowdown concentration (mg/l)	Concentration* after lime addition and sedimentation (mg/l)	Current NPDES limitations (mg/l)	Marine+ water quality criteria (mg/l)
Total Suspended Solids	94	-	0	30	-
Iron	1.113	13.4	1.0	1.0	0.3
Copper	0.047	0.56	0.5	1.0	0.05
Mercury	0.0002	0.0024	0.0024	-	0.0001
Zinc	0.093	1.12	0.5	1.0	0.1
Nickel	0.014	0.17	0.05	1.0	0.1
Arsenic	0.8	9.6	5.0	-	0.067
Chromium	0.014	0.17	0.1	-	0.1
Manganese	0.10	1.20	0.5	-	0.1
Aluminum	3.12	37.4	1.0	-	1.5

* Derived from USEPA, Development Document for Effluent Guidelines for Steam Electric Generating Stations (1974).

\+ Arsenic criterion from 44FR15931, March 15, 1979.
Mercury criterion from U.S. EPA, Quality Criteria for Water (1976).
Other criteria are recommendations from National Academy of Science, Water Quality Criteria (1972).

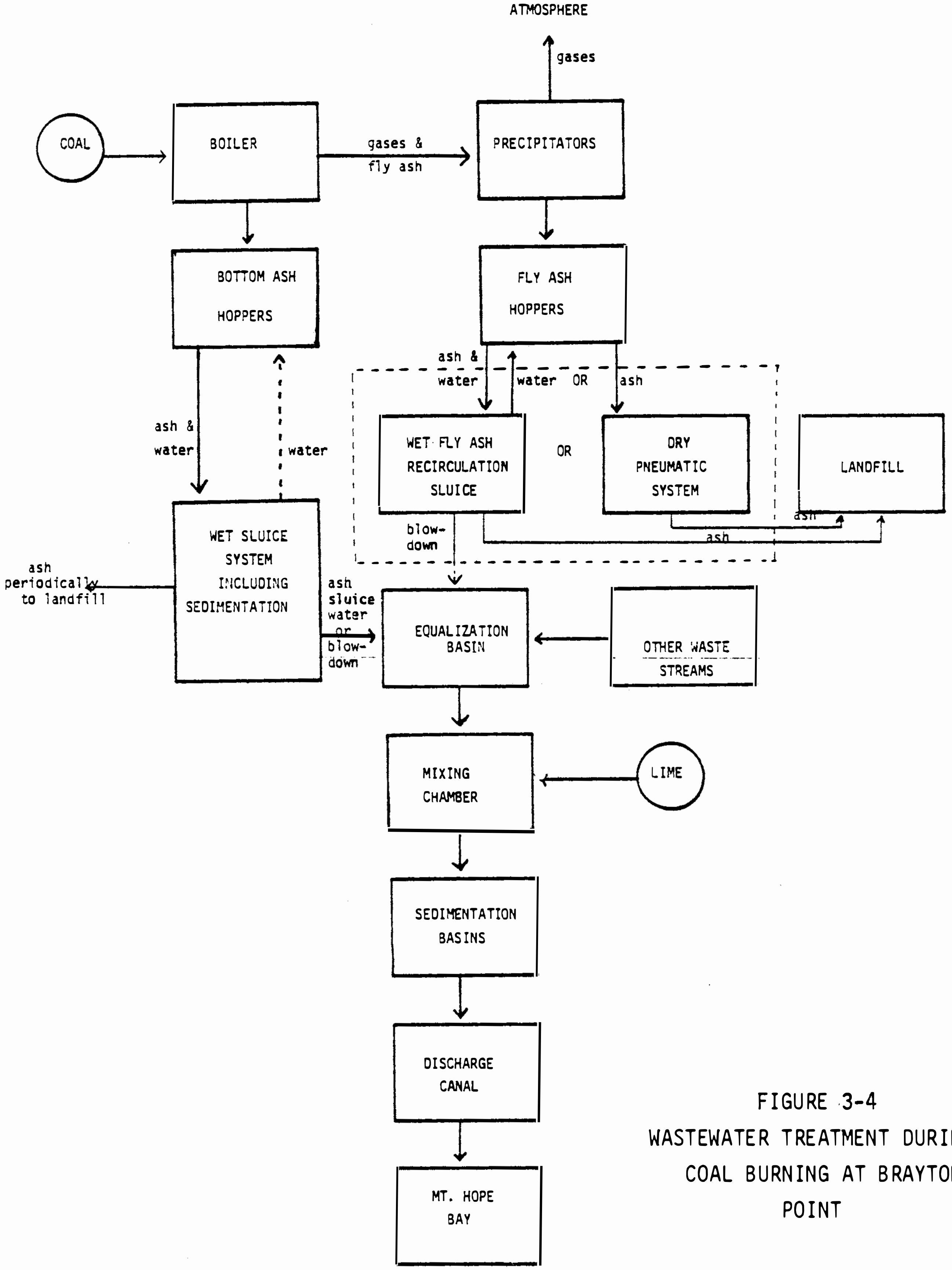

FIGURE 3-4
WASTEWATER TREATMENT DURING COAL BURNING AT BRAYTON POINT

will further reduce the possibility of violations of water quality criteria in the bay. Discharge volume from 004 is 1 MGD or less. The rough range of cooling water discharge is from 600-750 MGD, providing very effective dilution. Any discharge from the coal bottom ash treatment system must meet reasonable effluent limitations such as those in effect for current discharge 004. If the discharge is added to the discharge canal, it would have less impact than if direct discharge to Mt. Hope Bay.

Actual concentrations of arsenic and mercury in the waste stream cannot be estimated without more information on the ash transport and wastewater treatment system. It is therefore recommended that the utility monitor its waste streams for these substances and that mitigation measures be taken if concentrations are high enough to threaten the environmental quality of Mt. Hope Bay waters.

To provide control for runoff from an active coal pile, the NPDES permit for Brayton Point will require modification specifying treatment sufficient to ensure that EPA water quality criteria will be met in Mt. Hope Bay, and sufficient to protect the class SB uses of the bay. A suitable monitoring schedule will have to be specified to assure compliance. Literature data cited in the present report indicates that a monitoring schedule which combines monthly grab samples and a series of storm-related composite samples, may provide the most cost-effective and scientifically valid monitoring data.

The level of treatment required by the NPDES permit could include the following wastewater treatment measures common at coal-fired stations: collection of all coal pile runoff, neutralization of acidic runoff with base, and removal of precipitated neutralization products by sedimentation or filtration. This primary treatment is recommended by the EPA in its 1974 "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category." Alternative treatment might include collecting the runoff and passing it through lime beds and/or channeling the runoff to the cooling water discharge canal, or use of washed coal with a sufficiently low level of sulfur to prevent metal leaching.

Impacts on Mt. Hope Bay from coal pile runoff have been calculated for a worst-case precipitation event for both primary and no treatment alternatives. The results of these calculations and applicable water quality criteria are presented in Table 3-3. A worst case precipitation event creates the largest amount of coal pile runoff and therefore creates the largest possible temporary water quality impact on Mount Hope Bay.

Table 3-3 has been constructed with the following considerations and assumptions.

a) A coal pile of nine acres area is subjected to a 6.6 inch rainfall event over 24 hours (storm of record), assuming constant and equal rainfall. On the basis of results of Brookman et al. (1977), 16% of this precipitation is assumed to appear as runoff during the storm.

b) As reported in Anderson and Youngstrom (1976), runoff from the first two inches of precipitation will be more concentrated in dissolved and suspended solids than runoff from the later part of the storm. Values for concentrations of pollutants in the "first flush" are taken from Cox et al. (1977) and appear in column 1 of Table 3-3.

c) Concentrations after the first flush effect appearance in column 2 and are from Anderson and Youngstrom. Treatment, if it occurs, will consist of addition of sufficient base with sufficient retention time to ensure removal of most metals to levels between 0.5 and 1.0 mg/l. Arsenic and lead are not effectively treated in this manner. The values for these two metals are dealt with as standard discharge values in the SEGS Development Document. All values appear in column 3.

d) Dispersion of the pollutant plume is described by the one-dimensional equation (after Gallagher and Hobbs, 1978):

$$\frac{\partial}{\partial t}(AC) = -\frac{\partial}{\partial x}(A\bar{u}c) + \frac{\partial}{\partial x}\left(AK\frac{\partial c}{\partial x}\right) + S$$

TABLE 3-3

CALCULATED COAL PILE RUNOFF TEMPORARY IMPACTS IN MOUNT HOPE BAY FOR SINGLE STORM

Parameter	Coal pile runoff* first flush (mg/l)	Coal pile runoff+ after first flush (mg/l)	Coal pile runoff++ after primary treatment (mg/l)	W.Q.** Criteria	Distance from discharge point that criteria may be exceeded in absence of treatment (ft.)	Distance from discharge point that criteria may be exceeded with primary treatment (ft.)
TSS	470	94	-	-	-	
Iron	940	188	<1.0	0.3	9,000	<1,500
Copper	0.86	0.172	<0.5	0.05	2,500	<2,500
Mercury	0.0004	0.00008	0.0002	0.0001	750	750
Zinc	6.68	1.336	<0.5	0.1	4,200	2,000
Nickel	2.59	0.518	<0.1	0.1	3,400	0
Arsenic	0.17	0.034	0.075	0.067	0	0
Chromium	0.007	0.0014	0.003	0.1	0	0
Manganese	28.7	5.74	<0.5	0.1	6,000	2,000
Lead	0.33	0.066	0.15	0.05	1,300	1,300
Volume (gal)	78,000	180,000	258,000			

* Cox et al., (1977)

\+ Anderson and Younstrom (1976)

** USEPA (1979 and 1976), and National Academy of Sciences (1972)

\+\+ Estimated from USEPA Development Document for Steam Electric Generating Station where A is the cross sectional area of the plume or estuary,

$\bar{u}$ is the average tidal velocity,

c is the pollutant concentration,

K_x is the longitudinal dispersion coefficient for turbulent flow,

S is the input of pollutant, and

x is the distance from the discharge point.

To further simplify this model, it is assumed that longitudinal dispersion of the plume reaches a steady state and that transverse dispersion is negligible relative to longitudinal dispersion. The equation can then be solved to yield:

$$C(x) = Co \exp\left(\frac{-\bar{u}x}{K}\right)$$

where Co = the initial pollutant concentration and

$C(x)$ = the criterion concentration for each pollutant being modeled.

In Mt. Hope Bay the average tidal velocity is about 1600 ft/hr. The longitudinal dispersion coefficient for wide estuaries is typically 2×10^6 ft^2/hr.

For each pollutant, C(x) is solved for untreated and treated conditions.

The physical picture that the last two columns in Table 3-3 represent is therefore a long thin plume reaching in the direction of tidal flow. Plume is defined as the ribbon of water in which pollutant concentrations are above the criterion concentration. Substantial transverse dispersion (assumed to be 0 in the model) would shorten these plumes. Because the assumption of steady-state is not completely valid for a storm related discharge, the plume lengths should be regarded as maxima rather than as actual descriptions of expected length. The temporary nature of the discharge, the relatively small discharge volume and the high turbulent diffusion coefficients associated with tidal estuaries indicate that build up of pollutants in the bay will not occur as a result of a single storm event and that once the rainfall and runoff cease, dilution to below criteria concentrations will be rapid.

In the absence of a primary treatment program pollutant plumes containing amounts of iron and manganese exceeding water quality criteria may respectively extend 9000 and 6000 feet from the discharge point for a short time during a record storm event. Examination of the direction taken by the plant's thermal plume indicates that the plume may reach up the Tauton river or directly out into Mt. Hope Bay. In neither case would water quality criteria exceedances occur in areas of currently clean shellfish beds.

Primary treatment of coal pile runoff would substantially reduce the length of the pollutant plumes as is seen by comparing columns 5 and 6 of Table 3-3. Nonetheless, there are a number of criteria that would be exceeded on a short-term basis in the worst case analysis. Column 5 represents the maximum (linear) point of criteria violation based on a weighted discharge concentration for first flush and subsequent rainfall. Exceedances occur for the following pollutants in descending order as to distance of exceedance: iron, manganese, zinc, nickel, copper, lead, and mercury. Under primary treatment conditions, temporary exceedances would still occur for iron, manganese, zinc, copper, and lead, but for shorter distances than under untreated conditions.

The use of washed coal could significantly reduce concentrations of pollutants. Coal washing can decrease sulfur levels by as much as 80% depending on the type of coal and degree to which it is crushed. Decreased sulfur content limits the extent to which oxidation occurs, acids are produced and metals leached. Data on coal pile runoff from piles of washed coal of the types that might be used by NEPCo are not available.

More important than the temporary impacts associated with a single storm event are the long term impacts from the accumulated coal pile runoff over the course of a year or several years due to the fact that iron, and to some extent manganese and zinc, are relatively insoluble at the pH of sea water and may precipitate out of solution as hydroxides in the vicinity of the discharge. Large amounts of precipitated iron could suffocate fish eggs, fish fry, and benthic organisms, and the red precipitates could cause a negative aesthetic impact. Lesser amounts of zinc and manganese could be precipitated.

To estimate the long-term impacts of coal pile runoff on Mt. Hope Bay, the total annual amounts of metals that may be discharged into the bay have been calculated and appear in Table 3-4. Table 3-4 has been constructed assuming that 16% of the annual precipitation over the coal pile is discharged as runoff into Mt. Hope Bay.

Table 3-4 clearly indicates that long term impacts from iron precipitates and possibly from manganese and zinc precipitates will occur if coal pile runoff is discharged without treatment into Mt. Hope Bay. Column 1 is based on the assumption of no rainfall greater than 2 inches; concentration values for column 1 of Table 3-3 are used. The table also indicates that primary treatment of coal pile runoff will effectively remove all long term impacts caused by precipitating metal hydroxides.

Long term impacts from use of washed coal can not be assessed. It might be close to that resulting from primary treatment. If washed coal is used, careful monitoring should be carried out.

TABLE 3-4

LONG-TERM IMPACTS RESULTING FROM COAL PILE RUNOFF

Parameter	Annual input if no treatment (kg)	Annual input with primary treatment (kg)
TSS	2900	-
Iron	5900	<6.3
Copper	5.4	<3.1
Mercury	0.0025	0.0025
Zinc	42	<3.1
Nickel	16	<0.63
Arsenic	1.1	1.1
Chromium	0.044	0.0044
Manganese	179.57	<3.1
Lead	2.1	2.1

Source: Cox _et al_., (1977). Annual rainfall 42.6 inches, 16% precipitation appears as runoff.

In summary, storage of unwashed coal in an active storage pile on Brayton Point without primary treatment of runoff would lead to temporary criteria exceedances and adversely affect bottom dwelling organisms due to the presence of iron in untreated coal pile runoff and its precipitation in the Bay. Cumulative effects could also result from the presence of manganese and zinc in untreated runoff. Impacts on the Mt. Hope Bay fauna are discussed further in the Biology Section of this report.

With a primary treatment program, there would be no long term adverse effects and more moderate temporary adverse effects.

Mitigation

Mitigation measures are available to minimize the consequences of coal pile runoff. Collection of runoff and conventional primary treatment would render impacts of all substances minimal. The use of well-washed coal is a alternative to primary treatment of runoff which may be sufficient without additional treatment. Specific treatment requirements cannot be determined until the exact nature of the coal to be burned is determined. Coal pile runoff will be subject to a NPDES permit, the terms of which will be determined by EPA and the State within 180 days of coal conversion.

Two further alternatives could be employed. Coal pile runoff can be collected and channeled through lime beds before discharge, giving an approximation of primary treatment when designed properly to provide adequate contact. In addition, runoff could be conveyed to the cooling water discharge canal and mixed with that discharge to provide pollutant concentration reduction. The lower end of the range of daily cooling water flow (600 million gallons per day) would provide a dilution of over 2,000 times to the the design storm runoff. This would not, however, eliminate the problem of iron, manganese, and zinc precipitation. If used in conjunction with either lime bed or conventional primary treatment, both precipitation and temporary exceedance problems would be effectively resolved.

Ground Water

Ground water quality impacts of coal conversion of the Brayton Point Generating Station have been considered for the Brayton Point site and for the proposed coal ash disposal site at Freetown, Massachusetts. The ground water impact at both sites is insignificant.

The ground water present beneath the Brayton Point Station is in direct hydraulic connection with the waters of Mt. Hope Bay. Present pollutant loadings to the ground water are believed minimal and would not be increased by coal conversion.

Conversion of the Brayton Point Station from oil to coal will result in the generation of approximately 247,000 tons of coal ash annually. It is proposed that this ash will be disposed of at the Freetown, Massachusetts fly ash landfill site. The use of coal ash as landfill material represents a potential adverse impact on water quality, because under certain circumstances, coal ash leachates can contain high concentrations of toxic substances. However, hydrological factors, combined with the low permeability of compacted fly ash, will minimize the leaching of toxic substances from ash at the Freetown site. If adequate operational care is taken to prevent wind and water erosion of the ash surface, no significant water quality impacts are anticipated from the disposal of coal ash at the Freetown landfill. The Massachusetts Department of Environmental Quality Engineering has determined that the proposed landfill presents no danger of ground or surface water degradation by percolation of leachates, and has approved the site on the basis of the environmental impact report prepared by the Thompson and Lichtner Company of Brookline, Massachusetts.

Setting

A primary prerequisite for long-term physical stability of a coal ash disposal site is the prevention of ground water entry into the landfilled material and minimization of entry and infiltration of surface water and rain. This can be accomplished by the provision of an adequate surface and subsurface drainage system and by the separation of fill material from the natural water table. Adequate cover material and planting will minimize infiltration as well as erosion.

The excellent drainage also means that the subsurface water bearing and transmission characteristics are excellent. In fact, for the immediate area around the site (a radius of approximately 2 miles), the eastern portion of the site lies on that portion of the area that is the best potential aquifer. The Southwestern Regional Planning and Development District in its areawide <u>(208) water quality management plan</u> has judged it to be of high yield. The western part of the site is judged to be of moderate yield. Most of the land in the area is judged to be of moderate to low yield. The area can be considered as both a recharge and discharge area. Because of drainage and transmission characteristics, the site is also highly susceptible to ground water pollution.

The nearest houses are located approximately 1,500 feet to the east (across Route 24) and to the south (past the Route 24 interchange number 36). Housing to the east is at a higher elevation than the proposed base of the fill area. Houses to the south are at a lower elevation than those to the east. The distance of separation is sufficiently great, however, that no migration of groundwater from the site to that area should occur; rather it will move northwesterly toward the river. There are no public water supply wells in the vicinity; the closest is across the river at the Assonet Bay Shores development. Groundwater at the site is not presently used.

The base material at the Freetown ash disposal site (formerly excavated as a gravel pit) is sand and gravel with excellent natural drainage, obviating the need for installation of any subsurface drains.

Groundwater at the Freetown site was found in the sand and gravel ranging from 54 to 84 inches below the surface at 7 of 8 test pits dug at the site. In the eighth pit, groundwater was 12 inches below the surface (the test pit was 2 to 4 feet lower than the others). Below the sand and gravel is a layer believed to be moderately dense and low permeability till. This material lies at 0 feet to -4 feet elevation in the southerly portion of the site and at about -20 feet in the northeastern portion of the site. Bedrock is believed to be one of three possible types of material: Dedham granodiorite, sedimentary rock of the Rhode Island formation (or metamorphosed representatives of the Rhode Island formation), or extremely dense and compact till. Bedrock lies at a typical depth of -50 to -60 feet but is deeper in the southern part of the site (deeper than -70 feet elevation.)

In the central portion of the site, a deep trench is believed to have been cut and filled with unconsolidated material (based on interpretation of seismic refraction survey results). At the site, sand and gravel are intermingled with cobbles and boulders and occasional silt and clay in the southeastern portion.

Data on groundwater fluctuation is not known, but it would presumably vary directly with rainfall and the level of the river and the bay. Responses to changes would be relatively rapid. Only one sample of groundwater has been made. It is relatively soft water with only 30 parts per million of mineral solids. The pH of 5.3 is definitely acidic, but it is believed by the analysts that the 6-day delay in testing may have led to a lower pH value than would otherwise have been obtained due to decreased CO_2 and predominating organic acids.

Almost all coal ashes contain toxic pollutants. Since the heavy metals in coal are relatively non-volatile, they tend to be concentrated in the coal ash by the combustion process. This tendency is demonstrated by the figures for hazardous trace elements in coal and coal ash found in

Table 3-5. In addition, it is reported (Dreesen et al, 1977) that the surfaces of fly ash particles are enriched in certain trace elements relative to the average concentrations of those elements in fly ash. This surface enrichment makes these elements (Mo, F, Se, B, As, Ca) more available to be leached out of the ash.

Under equilibrium conditions, some of the toxic constituents of coal ash may be leached out by water. Several factors affect the amount of toxic substances that may be leached from a coal ash landfill including: i) fill permeability, ii) acidity of ash, and iii) pH of groundwater.

The permeability of a fill determines the amount of leachate that the fill can produce. The permeability of compacted fly ash is low, typically 10^{-4} - 10^{-6} feet per minute. Thus, a homogeneous fill of compacted ash has minimal leachate potential. Mixture of fly ash with more permeable material may increase the fill's permeability and its leachate potential.

The composition of coal ash leachate is greatly affected by the acidity of the leaching liquors. Acidic solutions are able to extract many trace metals from coal ash in much higher concentrations than are alkaline or neutral solutions. Table 3-6 shows the percentage of various trace elements extracted from a naturally alkaline coal ash by acidic and neutral solutions. The acidic extract contains much higher concentrations of trace metals. In actual discharges from coal ash disposal sites, acidic leachates tend to contain much higher concentrations of trace metals than neutral or alkaline leachates.

Thus, leachates from acidic coal ash are potentially much more highly concentrated in toxic substances than are leachates from alkaline coal ash. In addition, even alkaline ashes may discharge contaminated leachate in the presence of acidic ground water. Very acidic ground water, such as that resulting from disposal of pyritic mining refuse with the coal ash, could cause leachates of toxic concentrations of trace metals.

TABLE 3-5

DISTRIBUTION OF ENVIRONMENTALLY HAZARDOUS TRACE ELEMENTS IN EASTERN COAL AND COAL ASH

	Coal[1] (ppm)	Ash[2] (ppm)
Antimony	1.2	--
Arsenic	18	8 - 120
Beryllium	2.0	6 - 20
Cadmium	0.2	0.01 - 8
Mercury	0.16	0.15 - 0.7
Lead	12	40 - 78
Selenium	5.1	25 - 75
Zinc	13	201 - 291

Sources: 1. Oak Ridge National Laboratory, Environmental, Health, and Control Aspects of Coal Conversion: An Information Overview. Table 2.21, page 2-3, Vol 1 Distribution of Environmentally Hazardous Trace Elements in Appalachian coal. (Original source Zubovic 1975, Table 3 p. 12A.)

2. Ash figures for beryllium, lead and zinc from Joseph Bern, "Residues from Power Generation: Processing, recycling, and disposal", Land Application of Waste Materials, Soil Conservation Society of America 1976, for Eastern Coal Ashes.

Ash figures for arsenic, cadmium, mercury and selenium from Weeter et al, "Water Quality Management of Leachates from Power Station Coal Ashes" Purdue University Engineering Bulletin 1974 for fly ash. (Original source Stephens et al, 1974.)

TABLE 3-6

PERCENTAGE OF TRACE ELEMENT CONTENT OF ALKALINE ASH EXTRACTED BY SOLUTION OF DIFFERENT ACIDITY

Solution	0.1M citric acid	H_2O
initial pH	2.2	7.4
final pH	3.6	11.9
	% extracted	% extracted
As	59	0.10
B	94	1.5
Be	6.1	<0.09
Cd	33	<0.14
Cr	13	0.33
Cu	4.6	<0.01
F	86	7.2
Mo	110	5.9
Se	46	5.1
V	16	<0.01
Zn	1.8	<0.03

Ash to extractant ratio of 1:4. Agitated for 3 hours and filtered.

Linton _et al_, _Science_, 191, 852 (1976), reproduced in Dreesen _et al_., _Environmental Science and Technology_ 11, 10, 1017 (1977).

The impact of the use of coal ash as landfill material on water quality varies considerably depending on the nature of the parent coal and the chemical and hydrological characteristics of the fill site. In the worst possible case (a fill containing acid coal ash in extensive contact with acid ground water or surface water), leachates containing heavy metals and other toxic substances could pose a serious threat to water quality. This condition could occur if the ash were mixed with material of high hydraulic permeability, stored in a very shallow, large site, or stored below the natural water table. Since many of the toxic substances found in coal ash are bioconcentrated by certain plants and animals, such a condition could threaten animal life beyond the immediate consumers of the contaminated water.

In the case where alkaline coal ash is stored, the leaching of most toxic substances would be minimal. Drainage systems, erosion prevention measures, and full compaction of ash can prevent leaching of toxic substances into ground and surface waters regardless of the acidity of the ash.

Impacts

The exact chemical nature of the coal ash to be stored at the Freetown site is not known. However, the excellent natural drainage at the Freetown site, the adequate separation between the ash fill and the ground water table, and the extremely low permeability of the compacted ash relative to the host material, guarantee a minimal impact on water quality if precautions are taken to prevent wind and water erosion. The average pH of the groundwater is uncertain. If it approximates the (delayed) measured value of 5.3, there is a potential to form leachate that is high in certain toxic materials if it came in contact with the ash. (Manganese and zinc were shown to have leachate concentrations of 0.33 and 2.0 mg/l respectively under conditions of 5.35 pH water (Bern, 1976, p. 234).

Mitigation

Based on the Environmental Impact Report of the Thompson & Lichtner Company for the Freetown fly ash landfill, the Massachusetts Department of Environmental Quality Engineering gave approval to the landfill site.

Approval requires a minimum of four feet of separation between the bottom of the fill and the water table. The Freetown Conservation Commission will require a 100-foot buffer zone between the bay and the active and finished parts of the landfill. This buffer will have an average slope of 6%. The final embankments around the fill area will have a 25% slope and the finished landfill area will have a slope of 2% running from the southeast to the northwest part of the fill.

The proposal management plan for the landfill operation calls for daily cover of a minimum of 6 inches of permeable soil and a minimum of 6 inches of this soil between cells. Final cover will be a minimum of 6 inches of low permeable soil topped by 18 inches of final cover.

If NEPCO decides to continue to utilize a wet process for ash handling, the ash to be filled will be moist (although drained), so there is no need for wetting the material on site. If a dry pneumatic system is installed in the future, a source of water would need to be provided at the Freetown site in order to prevent wind erosion and to enable the ash to stabilize and harden.

The Freetown Conservation Commission has also indicated that a berm 2 to 3 feet higner than the area being actively worked should be maintained at all times. This is essential to prevent eroded material from entering the bay or leaving the site on the landward sides. Embankments will not be totally constructed until time of final closure. Given their steep slopes (25%), the erosion potential is high. Embankments should be covered with permeable soil and regularly stabilized and vegetated. If embankments are built in stages and are always higher than the area being worked, they will satisfy the requirements of the conservation commission. The 100-foot buffer zone should also have adequate vegetation placed on it, particularly at the end next to the embankment, to trap and hold sediment and prevent it from entering the bay.

As a precautionary measure, because of the general uncertainty of the exact nature and effect of ash leachate, the owner of the landfill site has agreed in the forward of the Final Limited Environmental Impact Report to periodically monitor the site groundwater. The exact location of the monitors and the sampling frequency has not been specified. At a minimum, sampling should take place quarterly in the buffer strip just beyond the embankment, a few feet below the surface (approximately 6 feet) and at two additional depths. Additional monitoring should be carried out beyond the southern embankment. This will probably require permission from the adjoining property owner to be effectively carried out.

3.1.3 Air Quality

Summary: Notice of Effectiveness

The following major findings are drawn from the air quality impact analysis relating to the Notice of Effectiveness:

- Particulate emissions from the generating station stacks could increase as much as 66% when the station converts to coal when comparing high sulfur coal to high sulfur oil. However, use of electrostatic precipitators with an efficiency of 98.6% which will meet the revised Massachusetts SIP, will limit the increase in ambient 24-hour concentrations to 2 ug/m^3 for a predicted maximum concentration of 187 ug/m^3. This exceedance of the secondary standard is due to non-plant related background levels which currently exceed the standard. Annual average concentrations are predicted to increase less than 1 ug/m^3 to a predicted maximum of 56 ug/m^3.

- Maximum sulfur dioxide emissions will increase 61% when the station converts to coal under the revised SIP as compared to high sulfur oil emissions. The projected increase in 24-hour ambient concentrations is 62 ug/m^3 under these conditions to a maximum value of 240 ug/m^3. The projected increase in 3-hour ambient concentrations is 402 ug/m^3 to a maximum value of 1155 ug/m^3, but the projected annual ambient concentration will decrease 2 ug/m^3 to a maximum value of 47 ug/m^3.

- Conversion to coal reduces initial SO_2 oxidation from that associated with oil firing, thereby lowering sulfate concentrations within 5 miles of the station. This condition reverses for plume travel distances over 100 miles downwind.

- Short-term carbon monoxide, hydrocarbons, and nitrogen oxides emissions would increase by 6%, 43%, and 23% respectively, as a result of the conversion. The projected incremental impact of these carbon monoxide and nitrogen oxide emissions on air quality levels is small. Estimated maximum annual nitrogen dioxide concentrations will not exceed ambient air quality standards. Maximum ambient concentrations of carbon monoxide cannot be estimated due to the unavailability of data on background levels.

- Particulate concentrations from fugitive dust due to coal unloading operations and wind erosion of the proposed coal pile will be small beyond the generating station property line. Evaporative hydrocarbon emissions from fuel oil unloading operations will decrease.

- Conversion of this station to coal will not directly or indirectly cause violations of National Ambient Air Quality Standards (NAAQS) of any pollutants in Southeastern Massachusetts. The impact on air quality in neighboring Rhode Island is small; sulfur dioxide concentrations will increase by about 15%. Conversion will not cause any violations of any NAAQS of any pollutants in Rhode Island.

Summary: Generalized Description of Air Quality Factors

Fossil fueled electric generating stations produce air pollution principally as products of combustion that are discharged with the flue gases from the stacks. The major stack pollutants include sulfur dioxide (SO_2), various oxides of nitrogen (NO_x), unburned hydrocarbons and a miscellany of substances in particle form. Fugitive dust caused by traffic, wind erosion, and transfer operations is a minor air pollutant from generating stations.

Once released into the atmosphere, these emissions are mixed and diluted by the wind and undergo atmospheric chemical reactions. Their presence affects people, nature, and property as an increment to the pollution generated by all other sources (background conditions). The impact of a highly concentrated pollutant plume at ground level (ambient conditions) is dependent on the rate at which the plume is mixed and diluted before it reaches the ground. If a generating station is located in a region already affected by other sources of pollution, the marginal change in air quality attributable to the generating station plant may be small.

Air pollution cannot be controlled once it is in the atmosphere; there are no techniques of air treatment except drastic measures such as respirators and filters for affected persons. Control of air pollution consequently is limited to four techniques:

- Remove the pollutant before it is burned (for example, burn low sulfur or desulfurized fuel)

- Burn the fuel under conditions that minimize formation of pollutant (for example, complete combustion with excess air will oxidize CO to CO_2)

- Remove the pollutant just prior to entry into the stack (for example, electrostatic precipitators remove particulates from the output stream)

- Release the pollutant high enough above the ground that it will be sufficiently diluted before it reaches the ground. This is not an EPA approved control technique.

Air pollutant emissions from the Brayton Point Generating Station (Table 3-7) are regulated by the Massachusetts Department of Environmental Quality Engineering (DEQE). The underlying State Implementation Plan (SIP) limits sulfur emissions (0.55 lbs S per million BTU) and particulate emissions (0.12 lbs TSP per million BTU). These limits were relaxed under a short-term revision to allow the station to burn "fossil fuel with a sulfur content not in excess of 1.21 pounds per million BTU." The revision was originally granted only after it was determined that Brayton Point did not cause any National Ambient Air Quality Standards (NAAQS) exceedances and will be revoked if the higher sulfur content fuel causes exceedances of regulatory particulate emission limits. This revision was extended to include the period May 1, 1978 to July 1, 1979.

Massachusetts DEQE has analyzed the proposed coal-conversion program. DEQE found that changes in the Regulations to Control Air Pollution would facilitate engineering plans and commitments for equipment and fuel supply. DEQE proposed that the sulfur limit, for solid fuels only, be relaxed to 1.21 lbs of sulfur per million BTU averaged monthly, 2.31 lbs of sulfur per million BTU averaged over 24 hours, and that the particulate limits be restricted to 0.08 lbs of total suspended particulate per million BTU. According to the DEQE analysis, this action would not cause violations of the sulfur dioxide ambient air quality standards and could improve the particulate air quality.

TABLE 3-7

UNDERLYING (1979) AND REVISED (1984) MASSACHUSETTS
EMISSION STANDARDS FOR BRAYTON POINT GENERATING STATION

Fuel/SIP	Sulfur+		Particulates++
	($lbs/10^6$ BTU)	(Percent)+++	($lbs/10^6$ BTU)
Coal			
Current Underlying SIP (no revision)	0.55	0.76	0.12
Revised SIP*	1.21	1.67	0.08
Revised SIP**	2.31	3.19	0.08
Oil			
Current Underlying SIP (no revision)	0.55	1.0	0.12
Revised SIP	1.21	2.2	0.12

* Thirty-day average.

** Twenty-four hour average.

\+ Sulfur dioxide emissions are controlled by regulating the sulfur content of the fuel to be burned. Measurement units are pounds of sulfur in the fuel per million BTU heat release potential or the equivalent percent sulfur in fuel.

++ Total suspended particulate emissions are controlled by regulating the pounds of particulate (measured in the stack) per million BTU heat release potential of the fuel.

+++Based on heat content of 13,825 BTU/lb for coal.

Public meetings were held before the proposal was submitted to EPA for approval. On May 25, 1978 a public information meeting was held in Somerset, Massachusetts. Another public hearing was held on June 15, 1978 to solicit public testimony concerning the proposal. A Memorandum of Understanding based on this revision between the Commonwealth and the Utility was signed on August 21, 1978, and the proposal was submitted to EPA for review. In early March 1979, EPA published the proposed revision to the SIP and asked for comments. In May 1979, the SIP revision was approved thereby allowing the utility to burn higher sulfur content coal until November 1, 1988. A regulation for continued burning of high sulfur oil was reviewed and approved soon after the coal regulation was approved. It is also effective until November 1, 1988.

Air quality impacts have been calculated for two scenarios: oil combustion with the high-sulfur oil revision (which represents 1979 conditions) and coal combustion with the high sulfur content coal revision (which represents conditions after conversion). Only Units 1, 2, and 3 will convert to coal. Unit 4 burns high sulfur content oil in both scenarios.

The EPA also has promulgated performance standards that regulate the pollutant emission rates from stacks of new stationary sources. However, a power plant that burns coal as a direct result of a Prohibition Order under section 2(a) of ESECA is not considered to be a new source or modification for the purposes of application of Federal New Source Performance Standards (Section 111(a)(8) of the Clean Air Act, as amended, 42 USC 7401, et seq.). (Because Units 1, 2, and 3 were constructed with coal burning capability prior to the issuance of New Source Performance Standards (NSPS), they would not be subject to the NSPS regardless of the ESECA order if they were converted to coal.) A generating station issued a Prohibition Order under ESECA is also exempt from the Prevention of Significant Deterioration of Air Quality Standards (Section 160 of the Clean Air Act, as amended) and the offset provisions of that Act (Section 171 of the Clean Air Act, as amended). However, the generating station must be in compliance with the applicable State Implementation Plan emission regulations for existing generating stations.

National primary and secondary Ambient Air Quality Standards for sulfur oxides, total suspended particulates, carbon monoxide, nitrogen dioxide, and photochemical oxidants, along with a guideline value for hydrocarbons, were promulgated by EPA on April 13, 1971. A National Ambient Air Quality Standard (NAAQS) for lead was promulgated on October 4, 1978 and the photo-chemical oxidant standard was revised to an ozone standard on February 8, 1979. These are minimum standards which all states were required to adopt. Primary standards are intended to protect public health, while secondary standards are defined levels of air quality, with an adequate margin of safety, intended to protect the public welfare from any known or anticipated adverse effects. The applicable Massachusetts and National Standards are summarized in Table 3-8.

Summary: Background Conditions

Air Quality Control Regions (AQCR) are monitored for pollutants known or suspected to be present in violation of standards. Based on these data, the Regions are classified by the EPA in two ways, depending on the pollutant. For total suspended particulates (TSP) and sulfur dioxide (SO_2), the categories are:

"better than national standards"
"does not meet primary standards"
"does not meet secondary standards"
"cannot be classified"

For oxides of nitrogen (NO_x), ozone (O_3), and carbon monoxide (CO), the categories are:

"does not meet primary standards"
"cannot be classified or better than National Standards"

TABLE 3-8

FEDERAL AND MASSACHUSETTS AMBIENT AIR QUALITY STANDARDS (ug/m^3) May 1979

Pollutant	Averaging Time	Federal* Primary	Federal* Secondary	Massachusetts* Primary	Massachusetts* Secondary
Sulfur dioxide (SO_2)	3 hrs	--	1,300	--	1,300
	24 hrs	365	--	365	--
	Annual	80	--	80	--
Total Suspended Particulates (TSP)	24 hrs	260	150	260	150
	Annual	75	60$^+$	75	--
Carbon monoxide (CO)	1 hr	40,000	40,000	40,000	40,000
	8 hrs	10,000	10,000	10,000	10,000
Hydrocarbons (HC)**	3 hrs	160	160	160	160
Nitrogen dioxide (NO_2)	Annual	100	--	100	100
Ozone (O_3)++	1 hr	235	235	235	235
Lead	Quarter	1.5	--	1.5	--

* National and Massachusetts standards other than those based on annual arithmetic means or annual geometric means are not to be exceeded more than once per year.

\+ Guideline value.

** Three hour maximum concentration from 6:00 a.m. to 9:00 a.m. to be used as guidelines for assessing implementation plans.

++ Standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 235 ug/m^3 is equal to or less than one.

The Brayton Point Generating Station is located in the Air Quality Control Region (AQCR #120) composed of Southeastern Massachusetts and the State of Rhode Island. The status on attainment of standards for the Southeastern Masssachusetts portion of the region is listed in the Federal Register (43 FR 8962, March 3, 1978) as follows:

TSP:	Does not meet National secondary standards in Fall River
SO_2:	Better than National Standards
O_3:	Does not meet National primary standards
CO:	Cannot be classified or better than National Standards
NO_2:	Cannot be classified or better than National Standards

The attainment status of the Rhode Island portion of the Region is listed as:

TSP:	Providence does not meet National primary standards.
	East Providence, Cranston, Warwick, North Providence, Pawtucket, and Central Falls cannot be classified.
	Remainder of AQCR 120 is better than National Standards.
SO_2:	Better than National Standards.
CO:	Providence does not meet National primary standards.
	Remainder of AQCR cannot be classified or better than National Standards.
O_3:	Does not meet National Primary standard.
NO_2:	Cannot be classified or better than National Standards.

In both areas the photochemical oxidant standard revision to a less stringent ozone standard did not change the attainment status. Lead attainment status listings have not been published.

Specific data on ambient conditions are available from local monitoring stations. The Commonwealth of Massachusetts operates two such monitors in Fall River at the sites shown in Figure 3-5. The monitoring station at the Globe Street Trailer samples TSP, SO_2, and NO_2, while the Central Fire Station site samples TSP and SO_2. In addition, NEPCo operates four monitors within three miles of the station. The highest and second highest ambient concentrations recorded at these stations are presented in Table 3-9. More detailed discussions of the local air quality conditions are presented in later sections.

The maximum background concentrations due to sources other than Brayton Point Generating Station were estimated from the recorded data on ambient conditions. These estimated background levels are reported in Table 3-10. It is noteworthy that the background levels for TSP show values which exceed the secondary air quality standards. The projections for future background assumed no increase in concentration levels.

Summary: Emission of Pollutants

Table 3-11 compares the annual average emission rates from Brayton Point Generating Station under the NOE in 1984 to the emission rates without the NOE under the revised Massachusetts SIP. These emissions were calculated using the emission factors in Table 3-13 and fuel characteristics corresponding to the emission standards in Table 3-7. A similar comparison for maximum emission rates is given in Table 3-12. These projected emissions are computed using the design power output and plant operating conditions.

The particulate emission rates are not calculated in the same manner. The without NOE rates are based on the following measured values:

High Sulfur (2.2%) Oil (1979) - Particulate Emissions

Unit 1	0.050 lb/10^6 BTU	weighted average
Unit 2	0.083 lb/10^6 BTU	weighted average
Unit 3	0.028 lb/10^6 BTU	weighted average
Unit 4	0.025 lb/10^6 BTU	weighted average

These measurements (Donovan, 1978) were converted to lbs/hr using fuel characteristics data from Table 2-3. The coal burning scenario uses the control efficiencies necessary to meet appropriate SIP emission limitations.

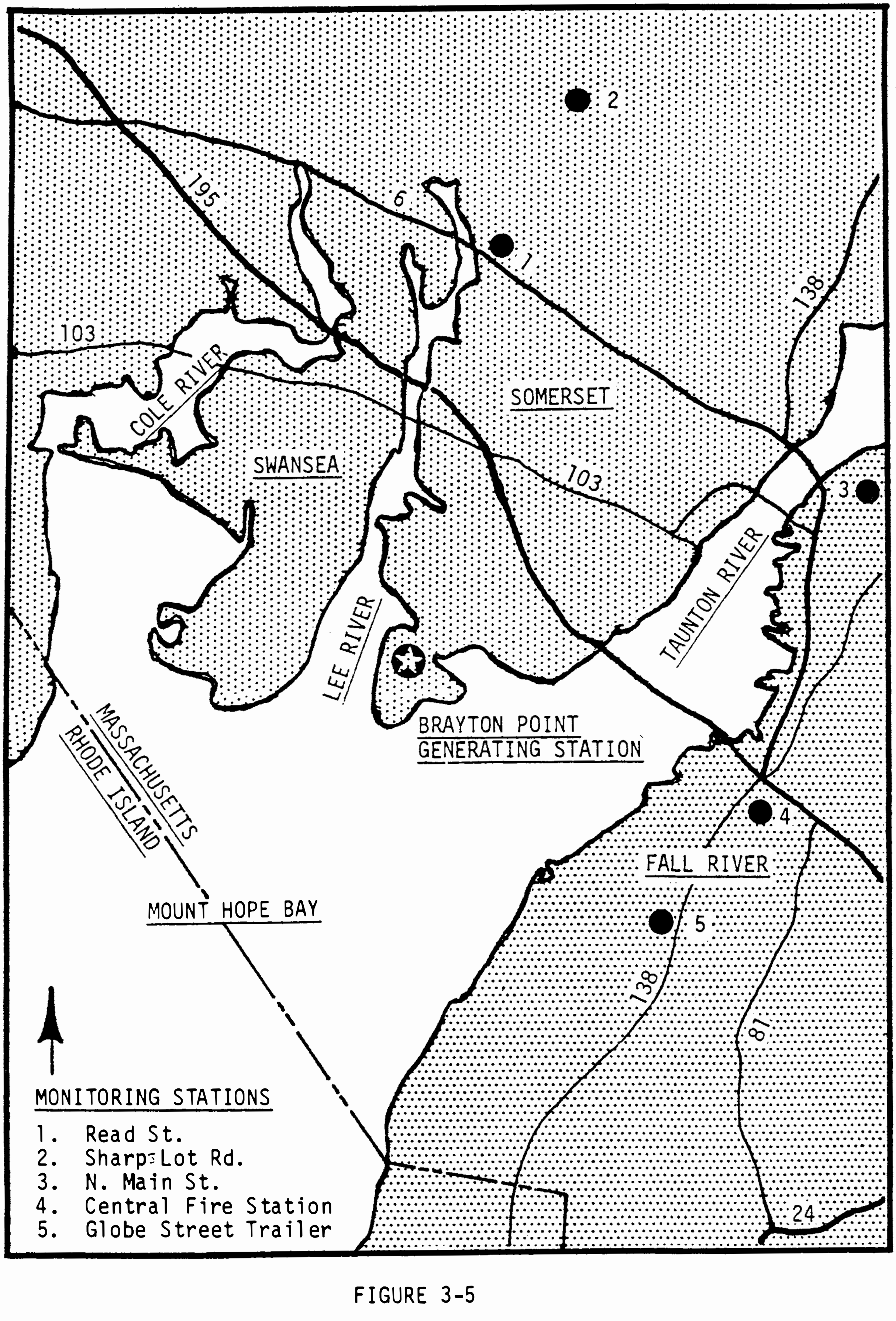

FIGURE 3-5

BRAYTON POINT GENERATING STATION SO_2 AND PARTICULATE MONITORING STATIONS 1976-1977

TABLE 3-9

SUMMARY OF AMBIENT AIR QUALITY (ug/m^3) IN THE VICINITY OF
BRAYTON POINT GENERATING STATION
(Violations of Standards are underlined)

City/Town	Fall River	Fall River	Somerset	Somerset	Fall River	Fall River
Monitoring Station	Globe Street Trailer	Central Fire Station	Sharps Lot Road	Read Street	North Main Street	Plymouth Avenue
Location from Generating Station	2 miles SW	2 miles E	3 miles N	2 miles N	3 miles ENE	2 miles SE
Agency*	MDEQE	MDEQE	NEPCo	NEPCo	NEPCo	NEPCo
Year of Record	1977	1977	1977	1977	1977	1977
SULFUR DIOXIDE						
Highest 3-Hour Average	272	N/A	115	183	207	178
Second Highest 3-Hour Average	160	N/A	115	128	157	133
Highest 24-Hour Average	110	107	75.9	81.1	102	107
Second Highest 24-Hour Average	73.3	68.1	70.7	75.9	91.6	102
Annual Arithmetic Mean	18.3	26.2	20.9+	23.6+	18.3+	24*
PARTICULATES						
Highest 24-Hour Average	112	147	122	130	183	164
Second Highest 24-Hour Average	68	126	101	119	154	135
Annual Geometric Mean	N/A	55	35+	44+	55+	64++
NITROGEN DIOXIDE						
Annual Arithmetic Mean	30.1					
OZONE						
Highest 1-Hour Average	294					
Second Highest 1-Hour Average	294					

+1/1/77-9/30/77
*1/1/77-9/13/77

TABLE 3-10

ESTIMATED MAXIMUM BACKGROUND LEVELS OF POLLUTANT CONCENTRATION IN THE VICINITY OF THE BRAYTON POINT GENERATING STATION+

Pollutant	Averaging Period	Concentration (ug/m^3)	% of Primary* NAAQS
Sulfur dioxide	3 hours	115	9**
	24 hours	92	25
	Annual	26	33
Particulates	24 hours	183	70
	Annual	55	85
Nitrogen dioxide	Annual	30	30
Ozone	1 hour	294	125

+ Estimated for 1979; assumed background levels for 1984 (i.e., no change due to growth).

* $\frac{\text{Background concentration}}{\text{Standard concentration}} \times 100$

** % of Secondary NAAQS is reported.

TABLE 3-11

PROJECTED 1984 ANNUAL AVERAGE POLLUTANT
EMISSION RATES (lbs/hr) FROM BRAYTON POINT GENERATING STATION

	Unit	Without NOE: SIP With High Sulfur Oil Revision		With NOE: SIP With High Sulfur Coal Revision	
Fuel					
	1	oil		coal	
	2	oil		coal	
	3	oil		coal	
	4	oil		oil	
Pollutant					
SO_2*	1	4480	(2.2)	4440	(1.67)
	2	4480	(2.2)	4440	(1.67)
	3	11100	(2.2)	11000	(1.67)
	4	5040	(2.2)	5040	(2.2)
	Total	25100		24920	
TSP+	1	94.5	(70.5)	150	(98.6)
	2	158.0	(50.9)	150	(98.6)
	3	132.0	(83.4)	372	(98.6)
	4	53.2	(85.2)	53	(85.2)
	Total	438		725	
CO	1	64.1		69.8	
	2	64.1		69.8	
	3	160.0		174	
	4	71.9		71.9	
	Total	360		386	
HC	1	12.8		20.9	
	2	12.8		20.9	
	3	31.9		52.2	
	4	14.4		14.4	
	Total	71.9		108	
NO_x**	1	1370		1260	
	2	1370		1260	
	3	1340		3130	
	4	605		605	
	Total	4685		6255	

* Number in parentheses is the percentage of sulfur in fuel.
\+ Number in parentheses is the assumed control efficiency.
** Assumes no NO_x controls.

TABLE 3-12

PROJECTED 1984 MAXIMUM POLLUTANT
EMISSION RATES (lbs/hr) FROM BRAYTON POINT GENERATING STATION

	Unit	Without NOE: SIP With High Sulfur Oil Revision		With NOE: SIP With High Sulfur Coal Revision	
Fuel					
	1	oil		coal	
	2	oil		coal	
	3	oil		coal	
	4	oil		oil	
Pollutant					
SO_2*	1	5410	(2.2)	10200	(3.2)
	2	5410	(2.2)	10200	(3.2)
	3	13400	(2.2)	25400	(3.2)
	4	11100	(2.2)	11100	(2.2)
	Total	35320		56900	
TSP+	1	114	(70.5)	181	(97.9)
	2	190	(50.9)	181	(97.9)
	3	160	(83.4)	448	(97.9)
	4	118	(85.2)	118	(85.2)
	Total	582		928	
CO	1	77.4		84.3	
	2	77.4		84.3	
	3	192		209	
	4	160		160	
	Total	507		538	
HC	1	15.5		25.3	
	2	15.5		25.3	
	3	38.4		62.7	
	4	31.9		31.9	
	Total	101.3		145.2	
NO_x**	1	1650		1520	
	2	1650		1520	
	3	1950		3760	
	4	1620		1620	
	Total	6870		8420	

* Number in parentheses is the percentage of sulfur in fuel.
\+ Number in parentheses is the assumed control efficiency.
** Assumes no NO_x controls.

TABLE 3-13

AIR POLLUTANT EMISSION FACTORS
(EPA, 1975)

Pollutant	Emission Factor*
SO_2	38S lbs SO_2 per ton of coal burned 159S lbs SO_2 per 1000 gallons of oil burned
Particulates	17A lbs TSP per ton of coal burned (dry bottom boiler) (10S+3) lbs TSP per 1000 gallons of oil burned
CO	1 lb CO per ton of coal burned 5 lbs CO per 1000 gallons of oil burned
HC	0.3 lbs HC per ton of coal burned 1 lb HC per 1000 gallons of oil burned
NO_x	18 lbs NO_x per ton of coal burned (dry bottom boiler) 50 lbs NO_x per 1000 gallons of oil burned (tangentially fired boilers) 105 lbs NO_x per 1000 gallons of oil burned (for all others)

* The letters A and S indicate that the weight percentage of ash and sulfur in the fuel should be multiplied by the value given.

Summary: Ambient Conditions

Pollutants emitted from the generating station are dispersed in the atmosphere and contribute to ambient conditions. The maximum concentrations due to the station were calculated using the EPA's UNAMAP dispersion models (Khanna, 1976). The calculations of short-term concentrations (24-hour or less) were performed under worst case meteorological conditions as determined in an earlier analysis (Radian Corp., 1975). This analysis procedure predicts pollutant concentrations caused by the station which, when added to background levels, predict exceedances of air quality standards.

The results, reported in Table 3-14, do not include the effect of potential "aero-dynamic downwash". This phenomenon occurs when the effluent emitted from stacks has a low exit velocity and high wind conditions prevail. The effluent is entrained in the flow over and around the adjacent powerhouse building and carried to the ground much closer to the station than during periods of light or moderate winds. This effect may be expected to occur when the Brayton Point Generating Station operates below a load factor of 50 percent and wind speeds exceed 20 mph. However, ground level concentrations under downwash conditions are still below the concentrations presented in Table 3-13 which are based on 80-85% load factors. Also note that aerodynamic downwash depends only on stack and physical emission characteristics and is not affected by the type of fuel burned.

The predicted air quality impact is summarized in Table 3-15. The predicted impact equals the sum of the generating station's pollution and the pollution already in the air (background). The modeling analysis predicts that maximum ground level pollutant concentrations will occur about 0.6 miles downwind of the station when the atmosphere is unstable and the winds are light. The maximum annual average impact is predicted to occur seven miles southeast of the station near Beulah Corners.

The proposed action will not significantly affect the air quality in Rhode Island. Bristol and Tiverton are both about 5 miles from the generating station. Maximum sulfur dioxide concentrations with conversion to

TABLE 3-14

PROJECTED 1984 MAXIMUM GROUND LEVEL POLLUTANT CONCENTRATIONS DUE TO BRAYTON POINT GENERATING STATION (ug/m^3)*

Pollutant	Averaging Time	Without NOE SIP With High Sulfur Oil Revision	With NOE SIP With High Sulfur Coal Revision
Sulfur dioxide	3 hrs	638	1040
	24 hrs	86.1	148
	Annual	23.2	20.5
Particulates	24 hrs	1.7	3.8
	Annual	0.5	0.7
Carbon monoxide	1 hr	22.2	23.7
	8 hrs	3.4	3.6
Nitrogen dioxide**	Annual	6.0	7.1

* Concentrations are those attributable to emissions from Brayton Point Generating Station after atmospheric dispersion and transport. These concentration values, when added to background concentrations, give ambient concentrations (See Table 3-15).

** Calculated assuming that the pollutant concentration does not change due to photochemical reactions.

TABLE 3-15

PROJECTED 1984 MAXIMUM AMBIENT GROUND LEVEL CONCENTRATIONS (ug/m^3)
(exceedances of Standards are underlined)

Pollutant	Averaging Time	Existing Background Levels	Without NOE	With NOE	Location of
			SIP With High Sulfur Oil Revision	SIP With High Sulfur Coal Revision	Maximum Impact Downwind of the Station
SO_2	3 hour	115	753	1155	0.6 miles
	24 hour	92	178	240	2.0 miles
	Annual	26	49	47	7.5 miles SE
TSP	24 hour	183	185	187	2.0 miles
	Annual	55	56	56	7.5 miles SE
CO	1 hour	No data	*	*	0.6 miles
	8 hour	No data	*	*	1.9 miles
NO_2	Annual	30	36	37	7.5 miles SE

* Due to a lack of background data, ambient CO concentrations cannot be computed.

See Table 3-14 for CO concentration increases attributable to Brayton Point Generating Station.

coal will increase in both areas by about 15%; 24-hour average concentrations will increase from 156 ug/m^3 to 184 ug/m^3; and 3-hour average concentrations will increase from 218 ug/m^3 to 253 ug/m^3.

Total Suspended Particulates (TSP)

Setting

Particulate emissions are mainly determined by the ash content and chemical content of the coal, and the boiler characteristics and control equipment used. Although coal with a maximum ash content of 9% can produce significant amounts of particulates, the use of electrostatic precipitators as control devices with efficiencies of 98.6% for Units 1, 2, and 3 will allow the station to satisfy the stringent particulate emission limitation in the revised SIP. Coal with a heat content of 13,000 BTU/lb and ash content of 8% would require precipitators with an efficienty of 98.5%.

During 1977, the Southeastern Massachusetts Air Quality Control Region satisfied the primary air quality standard for particulates but violated the National secondary standard at the North Main Street station in Fall River. EPA has classified Fall River as "does not meet secondary standards."

The highest concentrations near Brayton Point were recorded at the North Main Street site during 1977. Over fifteen exceedances of the secondary 24-hour particulate standard were measured between January 1975 and December 1978. In 1978, Massachusetts Technology Development Corporation studied the particulate problem in Fall River, attempting to refine an earlier evaluation by EPA Region I. The EPA study (Oi *et al.*, 1977) concluded that local road construction and street sanding significantly influenced Fall River particulate concentrations and probably caused the exceedances. Neither the Brayton Point Station nor the Somerset Station appeared to contribute significantly to the exceedances. The later study has attempted to refine these conclusions. Although the final results are not available at this time (May, 1979) the preliminary results do not refute the previous study. Therefore, it should be emphasized that particulate emissions from Brayton Point Generating Station with or without coal conversion will not contribute significantly to exceedances that occur in the Fall River area.

High volume samplers used to monitor suspended particulates are normally operated for 24-hour periods. They collect a broad range of particulates from 0.1 to 30 microns in diameter (Cowherd, 1974) whereas the size range of particles affecting human health is 0.1 to 10 microns. About 75% of the particulates produced from coal combustion are of the size collected by high volume samplers and are deposited on the sampler filters.

Impact

Uncontrolled particulate emissions from this generating station could cause a deterioration of the ambient air quality in the Southeastern Massachusetts Air Quality Control Region. However, particulate removal by electrostatic precipitators on all four units will result in only a small fraction being emitted from the stacks.

Table 3-14 indicates that the projected differential impact of NOE issuance versus no action on 24-hour concentrations is 2.1 ug/m^3. This constitutes a relatively small change compared to the maximum predicted value of 187 ug/m^3 calculated for the NOE under current SIP regulations Although this predicted value exceeds the National and Massachusetts secondary ambient air quality standard, the basic cause of the violation is the high estimated background level. Table 3-15 shows that the annual average concentrations would be affected very little.

Particulates can cause serious respiratory problems. Although sulfur particulates (sulfates) produced by the combustion of fossil fuel are especially dangerous, any fine particulates inhaled and deposited in the lungs can irritate enough to cause chronic diseases such as bronchitis, emphysema, and lung cancer (Williamson, 1972). Carbon-residue from coal combustion particles could cause anthracosis, commonly known as black lung disease.

Fine suspended particulates in the size range 0.2 - 2.0u can decrease visibility and reduce solar radiation. Visibility can be reduced to five miles for a particulate concentration of 150 ug/m^3 and a relative humidity less than 70%. Direct solar radiation is reduced by one third during summer and two thirds during winter in middle and high latitudes for particulate concentrations between 100 and 150 ug/m^3.

Public opinion survey data in several cities indicate a positive relationship between public awareness of air pollution and the levels of particulate pollution. Whether or not they consider air pollution an annoyance relates to the frequency of acute pollution and their socio-economic status (EPA, 1969).

Mitigation

Particulate removal by electrostatic precipitators, the most appropriate mitigation measure, must be implemented to comply with SIP regulations. The efficiency of the precipitators on all four units should be checked periodically to assure the required rate of particulate removal.

Fugitive Dust

Fugitive dust is emitted from open or unducted sources. These sources can be generally classified as: 1) transfer operations, 2) processing operations, 3) vehicular traffic, 4) construction activities, and 5) wind erosion. Transfer operations include coal barge or collier unloading, conveyor transport, and any other operation where material is moved on-site. The crusher and pulverizer are processing operations. Automobile, truck, and construction equipment traffic can be considered together in the vehicular traffic class. Wind erosion of bare areas and particularly the coal storage piles can also be a source of fugitive dust.

Sources of fugitive dust at the Brayton Point Generating Station include the coal unloading tower, hoppers that distribute the coal in storage to conveyors, the crusher house, pulverizers, and the coal pile. In addition, construction activity at the station will have a temporary impact on local air quality.

Impact

About 8,000 tons of coal per day are expected to be unloaded from coal barges or colliers. About 600,000 tons of coal will be in storage at all times in a 9 acre area on-site. For short time periods, the maximum unloading rate was used to calculate the coal unloading emissions; the maximum pile storage capacity was used to calculate wind erosion emissions.

Estimates for the storage pile transfer operations used Cowherd's (1974) emission factors (0.003 lb/ton). The wind erosion estimate used Blackwood's (1977) emission factors (0.01 lb/ton). At the present time there are no EPA accepted methods for sampling fugitive dust, but these factors represent the best available emission estimates.

From the projected coal pile, fugitive dust emissions of about 3 tons/year (0.09 gm/sec) would occur due to erosion by wind. Dispersion calculations indicate that maximum 24-hour particulate concentrations of 4 ug/m^3 would result at a distance of approximately 460 feet from the coal pile.

Fugitive dust emissions for coal unloading operations are also computed using Cowherd's emission factors (Cowherd, 1974).Fugitive dust emissions due to the unloading of 8,000 tons of coal per day, are estimated to be approximately 127 lbs/day (0.67 gm/sec) for 156 days per year. Dispersion calculations indicate that maximum 24-hour particulate concentrations of 68 ug/m^3 would occur at a distance of approximately 360 feet from the coal unloading facility. However, only 30% of the fugitive dust will remain suspended (Cowherd, 1974) reducing the effective impact to 20 ug/m^3.

The location of maximum impact for fugitive coal dust will be within the generating station boundary; larger particules will continue to settle out up to 0.6 miles from the station. Thus the fugitive dust concentrations from the projected coal pile and coal unloading operations due to the NOE will be small compared to currently existing background levels of particulates.

At the plant boundary, an average dust accumulation rate of 1 mm per year is expected if no fugitive dust controls are used.

During the construction phase of the conversion process, fugitive dust emissions can also occur. An approximate emission factor for this effect is 1.2 tons per acre of construction per month of activity (EPA, 1975). Assuming that a maximum of about 80 acres could be under construction at any time during the 36 month period, the fugitive dust emissions would amount to 96 tons per month.

Mitigation

Fugitive dust emissions can be reduced in several ways. Spraying with water or chemical solutions (that form a surface crust) can reduce dust emissions from coal storage piles by 50%. Brayton Point personnel indicate that these dust suppression measures are being considered and are likely to be used at Brayton Point. Traffic emissions can be reduced by cleaning paved roads, and oiling or paving unpaved roads. Enclosing the unloading operations and conveyors can further reduce emissions.

Sulfur Dioxide

Setting

Sulfur dioxide emissions from the station's stacks are associated with combustion of fuel that contains sulfur compounds. The maximum ground level concentrations recorded in the vicinity of the station are well below the primary and secondary standards for SO_2. For this reason, EPA has classified Fall River air quality as "better than National Standards" with respect to SO_2.

Impact

Table 3-14 indicates that the projected differential impact of the NOE is 62 ug/m^3 on 24-hour concentrations, 402 ug/m^3 on 3-hour concentrations, and -2 ug/m^3 on annual average concentrations. The maximum 3-hour, 24-hour, and annual average concentrations calculated for the NOE under proposed SIP regulations are 1155 ug/m^3, 240 ug/m^3, and 47 ug/m^3, respectively. All of these predicted values are less than primary and secondary air quality standards.

The sulfur dioxide emission rates are directly related to the sulfur content of the fuel. Thus sulfur variability in fuel directly affects sulfur emissions. The problem of sulfur variability of the coal in the proposed SIP has been evaluated and will not cause any particular problems after conversion. This effect has been incorporated into the revised SIP predictions by using the maximum daily average sulfur content (3.19% S) for the 24-hour and 3-hour emission estimates and the monthly limit (1.67% S) for the annual average. No sulfur variability in fuel predictions was made for the other scenario.

Sulfur dioxide is an irritant. When inhaled, SO_2 can increase respiration rate and decrease tidal volume, the volume of air per inhalation. When combined with fine particles, the SO_2 oxidizes and forms sulfuric acid within the lungs which can cause chronic respiratory diseases (Williamson, 1972). SO_2 causes irritation at concentrations above 65,000 ug/m^3 and can be detected by the sense of smell at 7800 ug/m^3.

Sulfur dioxide causes plant and material damage above threshold levels which are different for different receptors. The damage effects plant leaves, and, in extreme cases, reduces crop yields and prevents germination (EPA, 1976). Prolonged exposure to sulfurous smogs damages carbonaceous building material, corrodes metal, and discolors paint.

Mitigation

Use of coal with a sulfur content of 1.67% or less averaged monthly maximum or 3.19% or less average daily maximum will ensure compliance with standards.

Sulfates

Setting

SO_2 in the ambient air oxidizes and hydrolyzes to form sulfuric acid and often is partially neutralized to form sulfates. Precipitation scavenging of sulfates and sulfur oxides causes increased acidity in the associated rainfall. The amount of sulfates and sulfuric acid formed and suspended in air depends on the SO_2 emission rate, atmospheric humidity, the presence of catalysts in fly ash, and to a lesser extent solar radiation. Typically, sulfate formation in coal-fired generating station plumes is negligible within the first hour or two but increases to 3% per hour thereafter (EPA, 1975). Since sulfate formation in oil-fired plumes is 10% per hour initially but falls to 3% after 1 hour (EPA, 1975), sulfate levels in the immediate vicinity of the plant will be lower with the use of coal. There are no monitoring data to indicate significant sulfate background levels in the study area.

Impact

At distances less than 20 miles downwind of the generating station, the predicted ground level sulfate concentrations contributed by the station using oil are less than 11 ug/m^3 under current SIP regulations and less than 0.1 ug/m^3 under proposed SIP regulations burning coal. For downwind distances of 100-200 miles,the concentrations become 0.3 and 0.5 ug/m^3, respectively.

Atmospheric sulfates increase rainfall acidity and injure vegetation. Long-range transport of sulfates will affect the ambient air quality in other downwind Air Quality Control Regions.

Prolonged exposure to sulfurous smog is known to cause serious damage to carbonate rocks used in buildings. Sulfates replace the carbonates in limestone, marble and mortar to form soluble compounds which are removed by rain over time. Consequently, discoloration and surface erosion (disfiguring) result.

Sulfate exposure can reduce human health by damaging the lower respiratory system which can lead to chronic bronchitis (Williamson, 1972). Populations with pre-existing lung damage may be more sensitive to sulfurous irritants.

Mitigation

There are no ambient air quality standards for sulfates, so no mitigation measures are required. However, sulfates can be reduced by reducing the amount of SO_2 emissions. If the Brayton Point Generating Station burns coal not exceeding the specified sulfur content, it will comply with State SO_2 standards and thus limit sulfate impacts; further reduction in sulfates would require combustion of coal with even lower sulfur content than now mandated.

Nitrogen Oxides

Setting

Nitrogen oxides (NO_x) are formed mainly from high temperature combustion followed by rapid cooling. Nitrogen oxides resulting from coal combustion appear primarily as nitric oxide (NO) which is subsequently oxidized in the atmosphere to the more toxic nitrogen dioxide (NO_2). In addition to determining ambient NO_2, emissions of nitrogen oxide also affect the formation of photochemical oxidants. Both NO and NO_2 participate in complex atmospheric reactions with ozone (O_3) and organic radicals derived from hydrocarbon emissions. The principal ozone formation mechanisms consists of NO_2 reacting with oxygen in the presence of sunlight, while the principal ozone destruction reaction is with NO to produce NO_2. The EPA has designated this area's air quality as "unclassifiable or better than National Standards" with respect to NO_2.

Impact

NO_x emissions are expected to increase by 23% due to the proposed action because NO_x emissions are greater for coal combustion than for oil. There will also be indirect contributions of NO_x emissions along the highways north of the Generating Station from diesel trucks carrying ash. However, these contributions are less than 0.5% compared to NO_x emissions from normal automobile traffic in that area.

Because the chemical reactions involving nitrogen oxides occur over a wide geographic area the impact of the NOE should be considered on a comparable scale. For example, when compared to total emissions for the AQCR, the change in generating station NO_x emissions amounts to about 9%.

The complex chemistry does not allow for a precise quantitative determination of the relation between the station's emissions and ambient levels of NO_2 in the region. If, for the purposes of discussion, we assume all the NO_x is emitted as an equivalent mass of NO_2 and does not participate in reactions, the projected differential annual ground level concentration is about 1 ug/m^3. The maximum annual NO_2 concentration calculated with these assumptions under the NOE is 37 ug/m^3 which is well below the primary air quality standard.

Mitigation

A number of operating modifications have been employed for NO_x control for some boilers. Staged combustion for example, including off-stoichiometric firing and/or two stage combustion, can reduce NO_x emissions by 30 to 70%. In off-stoichiometric firing, also called "biased firing", some burners are operated fuel-rich and some fuel-lean, while others may supply air only. In two-staged combustion, the burners are operated fuel-rich (by introducing only 80 to 95% stoichiometric air) with combustion being completed by air injected above the flame zone through second-stage "NO-ports." In staged combustion, NO_x emissions are reduced because the bulk of combustion occurs under fuel-rich, reducing conditions.

Other NO_x-reducing modifications include low-excess-air firing and flue gas recirculation. In low-excess-air firing, excess air levels are kept as low as possible without producing unacceptable levels of unburned combustibles (carbon monoxide, hydrocarbons, and smoke) and/or other operational problems. This technique can reduce NO_x emissions by 10 to 30 percent primarily because of the lack of availability of oxygen during combustion. Because the flue gas is relatively cool and oxygen deficient, flue gas recirculation into the primary combustion zone, can also lower NO_x emissions by 20 to 60% depending on the amount of gas recirculated. At present, only a few systems have this capability.

Hydrocarbons

Setting

Hydrocarbons are organic compounds consisting solely of hydrogen and carbon, which arise from incomplete combustion of carbonaceous fuels, industrial process evaporative losses and other fuel use activities.

The major source of anthropogenic hydrocarbons (HC) is automobiles. The Brayton Point Generating Station would contribute only a small fraction of the hydrocarbons compared to that produced by automobiles. Emissions produced by approximately 2600 vehicle-miles per hour (equivalent to 100 vehicles traveling 26 miles each hour) would emit more HC than a power plant similar to Brayton Point Generating Station. There are no monitoring stations measuring ambient hydrocarbon levels in the study area.

Impact

The NOE will result in a 43% increase in stack emissions of HC due to the oil to coal conversion. There will also be additional indirect contributions of hydrocarbons along the highways north of the generating station over which diesel trucks will transport ash. These increases will be offset significantly by reduced evaporative losses arising from transfer of fuel oil from tankers to on-site storage tanks. This reduction is estimated to be approximately 63 tons of hydrocarbons per year which results in a net HC emissions increase of 39% due to the oil to coal conversion. Furthermore, when this increase in station emissions is compared to total emissions for the AQCR, the change due to the NOE amounts to about 0.06%.

Hydrocarbons are not a direct health hazard. However, they combine with nitrogen oxides in a complex series of chemical reactions to form hazardous photochemical oxidants as discussed above.

Mitigation

Unburned and partially burned hydrocarbons are affected by burner design and operation. Without burner redesign, reduction in hydrocarbon emissions is dependent on additional combustion operating efficiencies achievable.

Ozone

Setting

In the presence of intense sunlight, complex chemical reactions between nitrogen oxides and hydrocarbons produces ozone and peroxyacetyl nitrates (PAN); large numbers of deleterious by-products (nitrate aerosols) are also formed. Monitored data on ozone in the region indicate violation of primary ambient air quality standards. For this reason, EPA has classified this area's air quality as "not meeting primary standards" with respect to ozone.

Impact

Since oxidants are the product of a set of complex atmospheric chemical reactions which are difficult to simulate, the impact of the NOE cannot be quantitatively evaluated. We can presume that ozone concentrations will increase somewhat because both HC and NO_x are predicted to increase. However,the HC and NO_x produced by the Brayton Point Generating station probably do not contribute to ozone levels in the immediate area, but might in a more distant region.

The observed effects of ozone include eye and respiratory irritation. A publication by the EPA (Health Effects of Air Pollutants, June 1976) reported on correlations between the frequency of traffic accidents and oxidant levels which showed that high oxidant levels lead to dulled senses, impaired vision and increased driver irritability. Ozone is also known to damage textiles, dyes and paint.

Williamson (1972) states that irritation of the respiratory system during smoggy days is most noticeable to those who undergo vigorous exercise. There is no evidence that the temporary distress of a healthy person exposed to an oxidant level of 600 ug/m^3 or so produces long-term effects. Similarly, there is no firm evidence that aggravation of the symptoms of patients with chronic lung disease leads to an ultimate deterioration of their conditions. There is, as yet, no supporting data to link mortality with ambient levels of total oxidant, even for patients with chronic respiratory diseases.

Mitigation

There are no direct emissions of ozone, but their reduction can be achieved through limitations on NO_x and hydrocarbon emissions. Plans for controlling ozone in non-attainment areas were to be developed by States by January 1, 1979 and approved by EPA by July 1, 1979. Any controls of either NO_x or HC for purposes of reducing photochemical oxidant impacts will be contained in these plans. Since the states are expected to attain ambient photochemical oxidant standards by December 1982 (1987 at the latest), the generating station might be subject to future mitigation requirements not yet promulgated (Environmental Law Reporter, 7 ELR 10184).

Carbon Monoxide

Setting

Carbon monoxide in the urban environment arises primarily from incomplete combustion of carbonaceous fuels. The largest source of CO is the combustion of gasoline by motor vehicles. Since CO is relatively inert once emitted, the concentrations tend to be largest close to the source. The generating station's contribution of CO is minimal compared with that of automobiles; a coal-fired generating station similar in size to Brayton Point produces less CO than the equivalent of 1700 vehicle-miles per hour. There are no monitoring stations measuring ambient CO levels in the study area. The EPA has classified the Southeastern Massachusetts Air Quality Control Region as "unclassifiable or better than National Standards" with respect to CO.

Impact

If an NOE is issued, CO emissions from the station will increase by 6%. There will also be an indirect contribution of CO emissions from diesel trucks carrying ash along the highways north of the generating station. However, these are less than 0.5% compared to the emissions from normal automobile traffic in the area.

Table 3-14 indicates that the projected differential impact of the NOE on 1-hour concentrations is about 1 ug/m^3 and for 8-hour concentrations is even less. This constitutes an insignificant change relative to the primary standards. No projections of total ambient levels were possible because background data are unavailable.

Carbon monoxide's major impact is on the public health. CO is a toxic chemical compound that damages the cardiovascular-respiratory functions. It can also impair time interval discrimination, visual acuity and other psychomotor functions when humans are exposed briefly to high levels of this gas (EPA, 1976).

Mitigation

CO emissions from generating stations are reduced as combustion efficiency increases. Careful control of excess air rates, the use of high combustion temperature and provision for intimate fuel-air contact will minimize CO emissions (EPA, 1975).

3.1.4 Biology

Summary: Notice of Effectiveness

The Brayton Point Station currently burns number 6 residual oil. Converting Units 1, 2, and 3 to coal will require construction and implementation of new operations. Construction will destroy some vegetation, but careful construction practice, planting, and reseeding can reduce the adverse impacts. High iron concentrations in coal pile leachates (from coal pile runoff) could seriously endanger both flounder and shellfish if not treated. SO_2 emissions can have subtle long-term effects on vegetation and soils through deposition of acid precipitation on the leaves and secondarily through root interactions in the soil. Thus without proper precautions and coal pile runoff treatment, the NOE could have a serious adverse impact on both shellfish and flounder in the Brayton Point area.

Flora

Setting

A great variety of trees, shrubs, and other plants are found near the generating station. Surrounding residential neighborhoods contain a variety of non-native trees and shrubs. A 1971 aerial survey associated with the Massachusetts Map Down Project indicates that approximately 25% of the land for 2 1/2 miles north of the plant is wooded, 34% residential, 9% agricultural, 7% abandoned fields, 1% shallow marsh, with the remainder scattered among uses such as highways, powerlines, sanitary landfills,etc. The wooded area consists almost entirely of mixed hardwoods. Agricultural areas a little farther away include some orchards. The station site itself is highly developed and contains little natural vegetation except for a small salt marsh on the northwest corner of the property. Salt marshes are important producers and exporters of organic material to the bay. This production is carried out by two dominant species, salt marsh cordgrass, (Spartina alterniflora), which occupies the zone flooded by daily high tides, and salt meadow cordgrass, (Spartina patens), which occupies slightly higher ground flooded only by seasonal high tides. As John R. Curley et al (1974) indicate, six other salt marsh species were also present in a Taunton River salt marsh.

The other major producers of organic matter in the bay are the phytoplankton, free-floating microscopic algal organisms. These have been sampled by Marine Research, Incorporated. From May 1975 to April 1976 twelve different species, mostly diatoms, were among the most abundant organisms. The diatom Skeletonema costatum was the dominant species, as it has been in previous years, being dominant or very abundant during most of the year. High levels of nitrogenous nutrients in the bay support abundant phytoplankton growth. Excessively high levels of nutrients resulting from pollution of the bay occasionally produce blooms of some non-diatom species, as occurred in July 1975 when an unusally large bloom of Nannochloris-like organisms was associated with unusually high ammonia concentrations.

Impact and Mitigation

Increasing the number of ships visiting the docks for coal delivery will disturb the bottom. Since ship passage is confined to the same narrow channel, the impact would be insignificant.

No changes in air quality impact on vegetation are expected. Sulfur dioxide emissions and ground level concentrations will be the same with or without a Notice of Effectiveness (Tables 3-11, 3-12 and 3-15). However, emissions of sulfur dioxide resulting from use of high sulfur rather than low sulfur fuels (whether oil or coal) might cause intermittent effects on specific plants. Prediction of impacts on different species is difficult because sensitivity varies widely within as well as between species. Sensitive plants can be damaged by eight hour exposures to sulfur dioxide in the range from 0.5 ppm down to 0.05 ppm, while resistant plants require exposures of 2 ppm. Plants not injured by the low sulfur dioxide levels themselves are often more sensitive to injury from other common pollutants such as ozone and nitrogen oxide. Exposures of a few hours to 0.1 ppm sulfur dioxide or ozone singly or in combination can injure the leaves of a wide range of plant species (Mudd et al, 1975). Maximum 24-hour ground level concentrations of sulfur dioxide (station plus background) with high sulfur coal combustion will be 240 ug/m^3 (0.09 ppm) 2.0 miles downwind from the station. The maximum three-hour concentrations (0.6 miles downwind) will be 1155 ug/m^3 (Table 3-15). Consequently, temporary damage to specific plants can be expected to occur intermittently and would be somewhat more widespread at the higher concentration of sulfur dioxide, but the long-term damage to the plant community will probably be minimal.

Because the Brayton Point Station is the largest fossil fuel generating station in New England, increases in its stack emissions of sulfur dioxide could affect the regional acid rain problem. At full load, Units 1, 2, and 3 would produce over 45,800 pounds of sulfur dioxide per hour for combustion of high sulfur coal, compared to 24,220 pounds per hour for high sulfur oil (Table 3-12). However, the nature of the impact is conjectural at the present time. As Gene Likens and F. Herbert Bormann (1974) have reported, rainfall in northeastern United States is now acidic, ranging between pH 2.1 and 5, averaging about pH 4. The acidity, deleterious to both plants and animals (Schofield, 1975) is caused by the presence of mineral acids, principally sulfuric acid. Sulfur dioxide is gradually converted to sulfuric acid in the atmosphere so the acidity contributed to rainfall would generally affect a region hundreds of miles downwind of the generating station. Basic substances in the atmosphere can neutralize the acid. It is not clear how coal and oil differ in their production of basic particles or whether particles produced in the combustion of these fuels are the principal source of acid neutralizing materials in the atmosphere.

Fauna

Setting

Mt. Hope Bay is a highly productive estuary supporting significant concentrations of shellfish, fish, and wildlife. It is part of the Atlantic flyway and hundreds of bird species pass through the area on spring and fall migrations. Information about the bay can be found in a study conducted from October 1969 to September 1970 by the Massachusetts Division of Marine Fisheries (John R. Curley *et al* 1974) and in the quarterly reports of Marine Research, Inc. which has conducted environmental studies in Mt. Hope Bay for New England Power Company since April 1970. These reports contain species lists and abundant data for plankton, benthic invertebrates, and finfish. Marine Research has summarized their work from 1970-1976 with respect to possible temperature, entrainment, or impingement problems at Brayton Point. More general summaries of their work can be found in the Environmental Impact Statement prepared by the Corps of Engineers, *Final Environmental Impact Statement for Fall River Harbor Dredging: Brown's Ledge Disposal* (1974).

The zooplankton community, which grazes on the phytoplankton, is composed of microscopic free-swimming animals. According to the investigations carried out by Marine Research, Inc., during 1975-76 the dominant members of this community consisted of 3 genera of copepod crustaceans (*Acartia*, *Eurytemora,* and *Saphirella*), polychaete worm and shellfish larvae, the latter being most abundant in the summer.

Well over a hundred species of benthic invertebrates are present, primarily crustaceans, molluscs, and polychaete worms. These provide food for birds, as well as for fish. Of particular interest is the presence of extensive shellfish beds in the bay, including the region around Brayton Point. These are mainly quahogs (*Mercenaria mercenaria*) but also include some softshell clams (*Mya arenaria*). The 1969-70 survey showed that shellfish beds were present along the entire western shore of Brayton Point and below its southern tip. Another bed was present a few hundred feet off the southeastern tip of Brayton Point and along the mainland shore east of the cooling water intake. The latter location is the site of a current transplantation program involving the town of Swansea and New England Power Company. Contaminated clams are ferried to the Cole River where they are allowed to undergo depuration (self-cleansing) for half a year before being harvested. The Cole River is presently the only location where shellfish can be harvested, because pollution in the Taunton and Lee Rivers makes shellfish elsewhere unfit to eat. On the first day of the transplant program for 1977, twenty boats gathered 238 bushels of clams. The transplantation program is in compensation for shellfish beds lost when a new exit canal for the cooling water flow was built along the western shore of Brayton Point in 1974. Under the provisions of a now superseded law, New England Power Company agreed to transplant 1367 bushels of clams each year for 10 years, 1367 bushels representing 25% of the standing crop of clams removed from the exit canal. The order for this transplantation program was issued in 1972 under Section 27A of Chapter 130 (laws governing marine fish and fisheries) of the Massachusetts General Laws. This section pertained to coastal wetlands and allowed the Director of Marine Fisheries to recommend mitigation measures for actions affecting such lands. Section 27A was repealed in 1972, when environmental regulatory responsibilities in the state were reorganized, but the order remains in effect. Protection of coastal wetlands including lands containing shellfish now falls under the Wetlands Protection Act, Massachusetts General Laws Chapter 131 Section 40. (In addition, wetlands and floodplains are covered by DOE regulations issued pursuant to Executive Orders 11990 and 11988, respectively.)

The largest alewife runs in the state occur up the Taunton River and the state is trying to reintroduce runs of American shad. The bay provides varied sport fishing, including striped bass, bluefish, weakfish, white perch, tautog, winter flounder, American eel, northern kingfish, and Atlantic tomcod (John R. Curley et al., 1974). It is also an important spawning and nursery area, particularly for menhaden and winter flounder;

both are commercially important species and are very abundant in the bay. Marine Research Inc. reports that larvae or eggs of over 30 species of fish occur in the bay.

Mount Hope Bay is a major concentration area for overwintering populations of scaup which are attracted by shellfish. It is one of the few overwintering areas in the state for canvasback ducks. Other overwintering ducks are black ducks and some goldeneye and bufflehead. A variety of other birds, such as heron, egrets, and sandpipers visit the salt marshes and tidal margins of the bay. The variety of land habitats, such as cultivated fields, abandoned fields, and wooded or brush areas support a variety of song bird species.

In 1970 the Brayton Point Technical Advisory Committee was initiated at the request of the Acting Director of the Massachusetts Department of Natural Resources. This committee is composed of 19 representatives from Federal and state agencies plus the Director of Marine Research Inc. The advisory committee coordinates environmental requirements among the many agencies having permitting or reviewing functions for proposed changes at Brayton Point. Recent environmental changes have focused on the cooling water system and have included measures to decrease the temperature of the exit plume, to redirect the exit plume for the Lee River southwards toward the center of the bay, to increase its rate of mixing with bay water and to decrease impingement of fish on intake screens.

Impact and Mitigation

Conversion from oil to coal will not alter the design or operation of the circulating water system. Therefore, the operation of Brayton Point Generating Station will have the same aquatic impacts that presently exist. Because the winter flounder is considered a resident fish, it has received the most attention in studies. Certain modifications undertaken at the

Brayton Point Station that included widening the intake channel and re-directing the screen wash sluiceway system to ambient water have improved the impact on the adult population. Because larval winter flounder are seasonally entrained into the plant cooling system, New England Power Company is funding studies to determine the importance of this impact on winter flounder populations in Mt. Hope Bay. These studies are scheduled for completion in 1979.

High iron concentrations in leachate from coal pile runoff (see the Water Quality section of this chapter) threaten both flounder and shellfish. Because flocculent precipitates of iron hydroxide can smother fish eggs and block respiratory channels of fish and shellfish, the Marine Aquatic Life and Wildlife section of the National Academy of Sciences' Report, Water Quality Criteria 1972, states that "Special consideration should be given to avoiding discharges or iron-containing effluents into water where commercially important bottom species or important food organisms dwell." It suggests that concentrations of iron equal to or exceeding 0.3 mg/l constitute a hazard to the marine environment and that temporary iron concentrations from untreated coal pile runoff may exceed the 0.3 mg/l criterion in a plume that may reach as far as 9000 ft. from the discharge point. In addition as much as 5900 kg of iron may be introduced to Mt. Hope Bay annually from coal pile runoff. Much of this iron would precipitate out as hydroxide floc in the area of discharge. In view of the importance of winter flounder, the close association of its spawning grounds to the coal pile runoff and the stress it is already under from entrainment and impingement, this impact should be considered significant. It can be avoided by collecting and treating the coal pile runoff, or using well washed coal as discussed in the Water Quality Section.

Manganese and zinc may also precipitate from the discharge stream in the area of the outflow. These metals will not have immediate impacts on fish or shellfish but can be bioconcentrated and may accumulate to toxic levels. The principal impact would be on shellfish beds near the coal pile. Since they are relatively fixed bottom-dwelling organisms' shellfish are more liable to be repeatedly exposed to coal-pile runoff. Manganese can be concentrated many thousand-fold by shellfish. These higher concentrations would be passed on to wildlife feeding on the shellfish such as ducks or gulls. The most probable effect on either shellfish or wildlife would be chronic sublethal toxicity.

The manganese impact can be mitigated through primary treatment of coal pile runoff or by using well washed coal.

A long-term positive impact of using coal will be less frequent shipments of oil and less chance for oil spills to occur which would seriously affect waterfowl or shellfish.

There will be negligible biological impacts at the Freetown ash disposal site. The site represents already developed land and a former gravel quarry; and no adverse water quality discharges are expected (see Water Quality Section).

Biotic Communities and Critical Habitats

Setting

The policy proposed by the Massachusetts Coastal Zone Management Program is to "Conserve ecologically significant resource areas (salt marshes, shellfish beds, dunes, beaches, barrier beaches and salt ponds) for their contributions to marine productivity and value as natural habitats". Two salt marshes occur in the vicinity of the station, one approximately five acres on the northwest corner of the station's property and another approximately 14 acres immediately adjacent to station property east of the water intake. An estimated total of 410 acres of salt marsh occurs in the Taunton River and upper end of Mount Hope Bay.

Shellfish beds occur in the immediate vicinity of the station as described in the water quality section of this chapter. In 1970 the Lee River on the west side of the station was estimated to contain 104,000 bushels of legal sized clams (quahogs) on 277 acres. Shellfish densities were not measured in the bay by Curley et al (1974).

Impact and Mitigation

Conversion will not affect salt marshes. No fly ash, bottom ash or dredged material from the Brayton Point Generating Station will be placed on or in salt marshes. Neither will these materials be placed in a location from which fly ash leachate, bottom ash leachate or dredge material leachate could drain into salt marshes.

Rare and Endangered Species

Many fish species reach the northern limits of their distribution in the waters south of Cape Cod and are, therefore, uncommon in Mt. Hope Bay (Curley, et al., 1974). Based on discussions with personnel of the Massachusetts Division of Fisheries and Wildlife, no rare or endangered species on the Federal or Massachusetts lists occurs in the vicinity of the generating station.

3.2 HUMAN ENVIRONMENT

3.2.1 Land Use

General

Conversion of an electric generating station from oil-fired to coal-firing may affect land use in several ways. Constructing additional facilities -- for handling coal and ash and for pollution control -- and developing land for ash disposal will affect the land directly. Such impacts are limited to the particular site, unless an insufficient amount of land available for ash disposal requires development of an off-site location. Significant archeological or paleontological resources might be destroyed during construction unless special procedures are utilized.

Secondly, the additional construction operation activity associated with coal combustion may affect people indirectly, depending on their particular association with the generating station. (For example, dust generated by facility operation may annoy nearby residents.) The levels of various pollutant discharges, together with the current and projected (planned) land use, partially determine the indirect effects of a particular action on people both today and in the future.

These indirect impacts affect people but are a direct function of land use patterns. Noise and dust may annoy residents in the vicinity of the station or transportation route. Increased air pollutants may have adverse effects on public health in the vicinity of the station, particularly among very young people, elderly people, and people with chronic respiratory illnesses. Increased air and water emissions may reduce the area's aesthetic value and thus its recreational value. Land use patterns (i.e., residential density, industrial use, etc.) near the station largely determine the effect on people -- noise only becomes a problem if people can be bothered by it. However, future land-use patterns may develop differently in order to minimize or avoid future human contact with the generating station.

The following section on land use describes the setting, impacts, and mitigation measures associated with the direct land use effects of coal conversion and indirect effects on existing and projected land use.

Direct Land Use (Archeology/Paleontology)

Setting

The Brayton Point Generating Station is located on a 250-acre site in the southern part of the Town of Somerset, Massachusetts on Mt. Hope Bay. The southern part of the site is occupied by the powerhouse, stacks, coal pile, fuel oil tanks, and substation. (See Figure 2-4). The western part of the site is occupied by spray cooling canals. The northern part of the site is occupied by old ash ponds.

There are no known archeological or paleontological resources at the actual station site. In the Brayton Point area, most archeological sites are found along areas of modern construction and excavation. These sites occur predominantly in Swansea and South Somerset. A large Indian burial site in Somerset is quite close to the Brayton Point Station between Wilbur Avenue and Interstate 195. South Swansea has several Indian sites - all of which are graveyards, two are built over. Several aboriginal rock shelters have also been found in Swansea.

Outside the immediate area, there are several large prehistoric sites in Fall River and many Indian sites in Dighton along the Taunton River. The most recent sites were Indian fields of the Colonial Period which are now a gravel pit. All periods are represented in the sites in Freetown, and Berkley, Massachusetts. Very few of the many local sites were investigated by professional archeologists. Many were reported by amateur archeologists.

Impacts

No additional land would be required for coal storage at the Brayton Point Station as a result of the proposed action. The existing coal storage area, with a capacity of 600,000 tons, would provide sufficient storage. A sufficient amount of land is available on site for bottom ash ponds. However, approximately 400 acre-feet of ash presently stored on-site would need to be excavated in order to reactivate the ash ponds. This ash would be disposed of off-site. An insufficient amount of space is available on-site for the disposal of fly ash. Fly ash would be trucked to an off-site disposal area. Under coal conversion, approximately 153 acre-feet per year of fly ash would be produced. (See section on Public Utilities for a discussion of fly ash disposal.)

There are no known archeological sites that would be affected by the proposed action. It is possible, given the rich Indian heritage of the Mt. Hope Bay area, that a presently undocumented site could be disturbed during road or pipeline construction related to ash transportation.

Mitigation

Before excavation plans are finalized, a trained archeologist should be called in to perform a preliminary site investigation. This could involve test holes, a walking tour and analysis of available data on historic movements and settlers and Indian tribes in that vicinity.

If the archeologist suspects the presence of artifacts, construction workers should be briefed as to the proper procedures to be used in order to protect archeological resources. These would include calling in an archeologist to examine artifacts which are discovered and delaying work in the immediate area of the find until the examination has been completed. If it appears that there may be significant archeological resources present, it may be possible to dig, catalog, and preserve artifacts.

Indirect Land Use

Setting

The generating station is surrounded by water to the south, west and east. To the north is the older residential community of Somerset. To the west across the Lee River is the Ocean Grove section of Swansea, which is the location of some of the more expensive homes in the area. Across the Taunton River to the southeast lies the downtown section of Fall River. The shore areas are mainly used for industrial purposes with shipping terminals and warehouses, mills and textile factories located there. Many of these multi-story industrial structures dating to the late nineteenth century are now vacant. Interstate 195, following the course of the Quequechan River, divides Fall River in half; the southern downtown area has become the retail district while the northern part has become office oriented. Over two-fifths of the land in Somerset, Swansea and Fall River is forested (University of Massachusetts, 1973). Urbanized land comprises slightly more than one fourth of the total. About 30% of Fall River and 20% of Swansea are developed while nearly half of Somerset is developed (Table 3-16). In the twenty years from 1951 to 1971 urban land has more than doubled in Somerset. Slower growth for urban development rates have been measured in Swansea (73%) and Fall River (27%). New urban land in Fall River, mainly in the northern part of town, has resulted from factory construction rather than new home building.

From 1951 to 1971 in Fall River, industrial and commercial acreages increased at the expense of forested land. Residential and agricultural land use totals changed negligibly. Agricultural uses of the land changed significantly, however. Almost all pastures (92%) were abandoned, tilled acreage increased by one fourth and 185 acres of abandoned and pasture lands became power line rights-of-way.

TABLE 3-16

LAND USE AND LAND USE CHANGE 1951 - 1971 IN FALL RIVER, SOMERSET, AND SWANSEA

	Fall River			Somerset			Swansea			Total		
Land Use	1971 Acres	Percent of Total	% Change from 1951	1971 Acres	Percent of Total	% Change from 1951	1971 Acres	Percent of Total	% Change from 1951	1971 Acres	Percent of Total	% Change from 1951
Urban	6,687	27.3	27	2,766	44.8	109	2,953	20.2	73	12,406	27.4	49
Residential	3,063	12.5	4	2,042	33.0	71	2,124	14.6	44	7,229	16.0	28
Commercial	973	4.0	15	163	2.6	308	106	0.7	1,225	1,242	2.7	39
Industrial	786	3.2	28	269	4.4	607	46	0.3	475	1,101	2.4	67
Transportation	859	3.5	267	103	1.7	*	349	2.4	*	1,311	2.9	460
Open/Public	1,006	4.1	59	189	3.1	302	328	2.2	55	1,523	3.4	71
Forest	12,183	49.8	-16	848	13.7	-38	6,873	47.1	-12	19,904	44.0	-16
Agricultural/Open	1,588	6.5	-1	1,049	17.0	-55	3,470	23.8	-25	6,107	13.5	-26
Wetlands	3,541	14.5	14	1,350	21.8	17	848	5.8	93	5,739	12.7	22
Mining and Waste	120	0.5	1,233	39	0.6	*	123	0.8	4	282	0.6	122
Outdoor Recreation	341	1.4	105	128	2.1	1,064	328	2.3	3,544	797	1.8	329
Total	24,460	100		6,180	100		14,595	100		45,235	100	

*No acreage for category in 1951

Source: William MacConnell, Remote Sensing 20 Years of Change in Bristol County, Massachusetts, 1951 - 1971, 1973.

Somerset ranks below Fall River in acreage of heavy industrial land. The percentage of Somerset's land in both industrial and commercial uses is comparable to figures for Fall River.

Brayton Point Station occupies one of the five sites zoned for industrial use in Somerset. No height restrictions are in effect. Only 50% of the site area may be covered with buildings. The Brayton Point station is in full compliance with these requirements. Land zoned for residential uses surrounds the Brayton Point Station. One area immediately to the east of the station and fronting on Mount Hope Bay is designated for open recreation. Two of the town's five industrial sites are located within 2000 feet of the station. Several small business districts are also designated within 1.5 miles of the plant property. Local zoning is presented in Figure 3-6.

In the towns surrounding the Brayton Point Station, most housing units are single family dwellings (Table 3-17). The 1970 Census indicates that 82% of Fall River dwellings were multi-family and 18% were single family dwellings. For Somerset and Swansea these figures are reversed; the preponderance of the population lives in single family units.

Elderly residents (over 65) comprise 14% of the Fall River population (Table 2-6). Detailed data of this nature were not available for Somerset and Swansea. East of Brayton Point in the downtown section of Fall River is a large neighborhood with a high density of elderly residents (Figure 3-7).

TABLE 3-17

1970 CENSUS SURVEY OF HOUSING NEAR BRAYTON POINT

	Single Family Housing		Multi-Family Housing	
	# Units	%	# Units	%
Fall River	6130	18.0	27973	82.0
Somerset	4450	80.1	1045	18.9
Swansea	3480	89.9	389	10.1

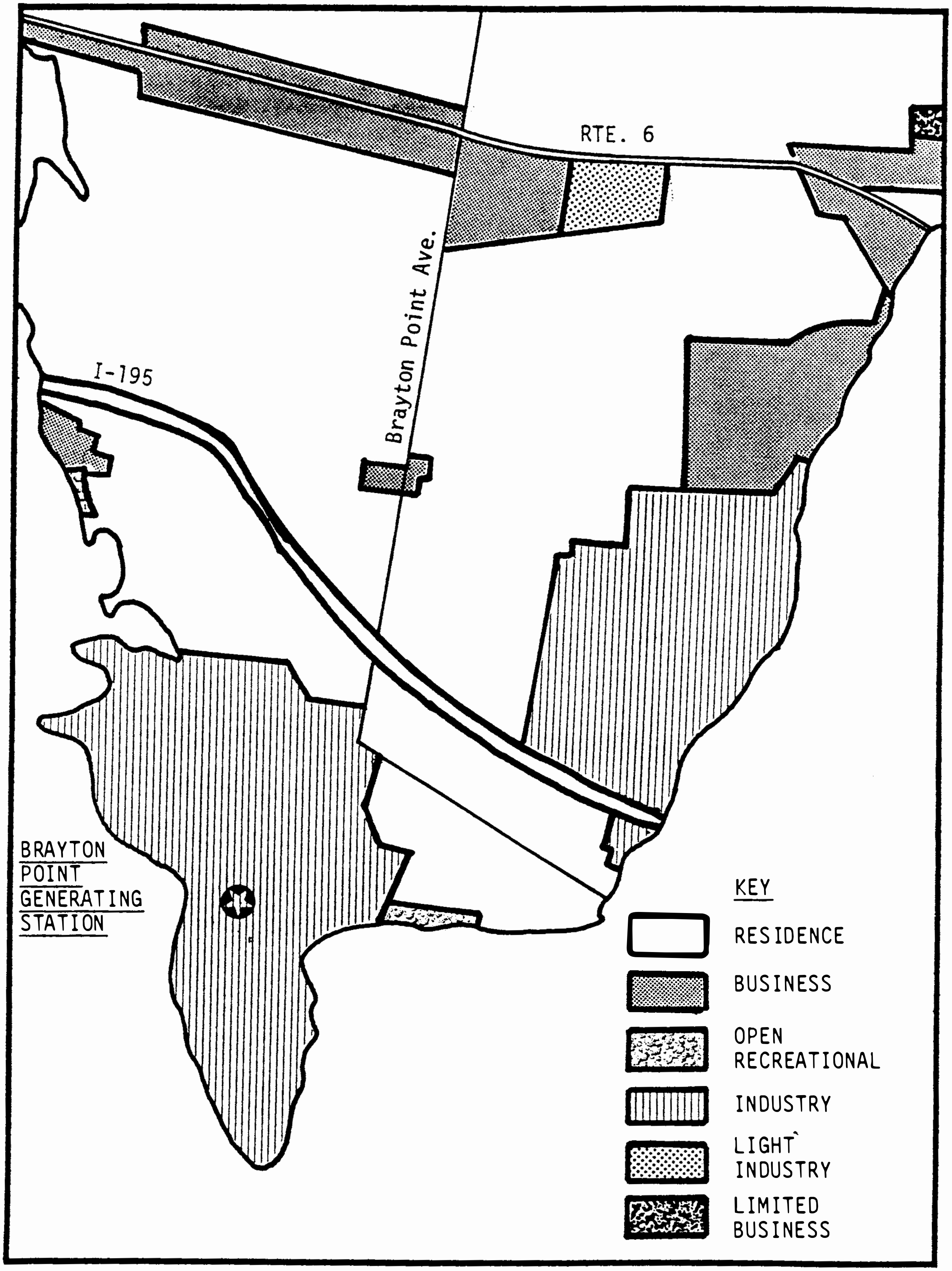

FIGURE 3-6

LOCAL ZONING MAP

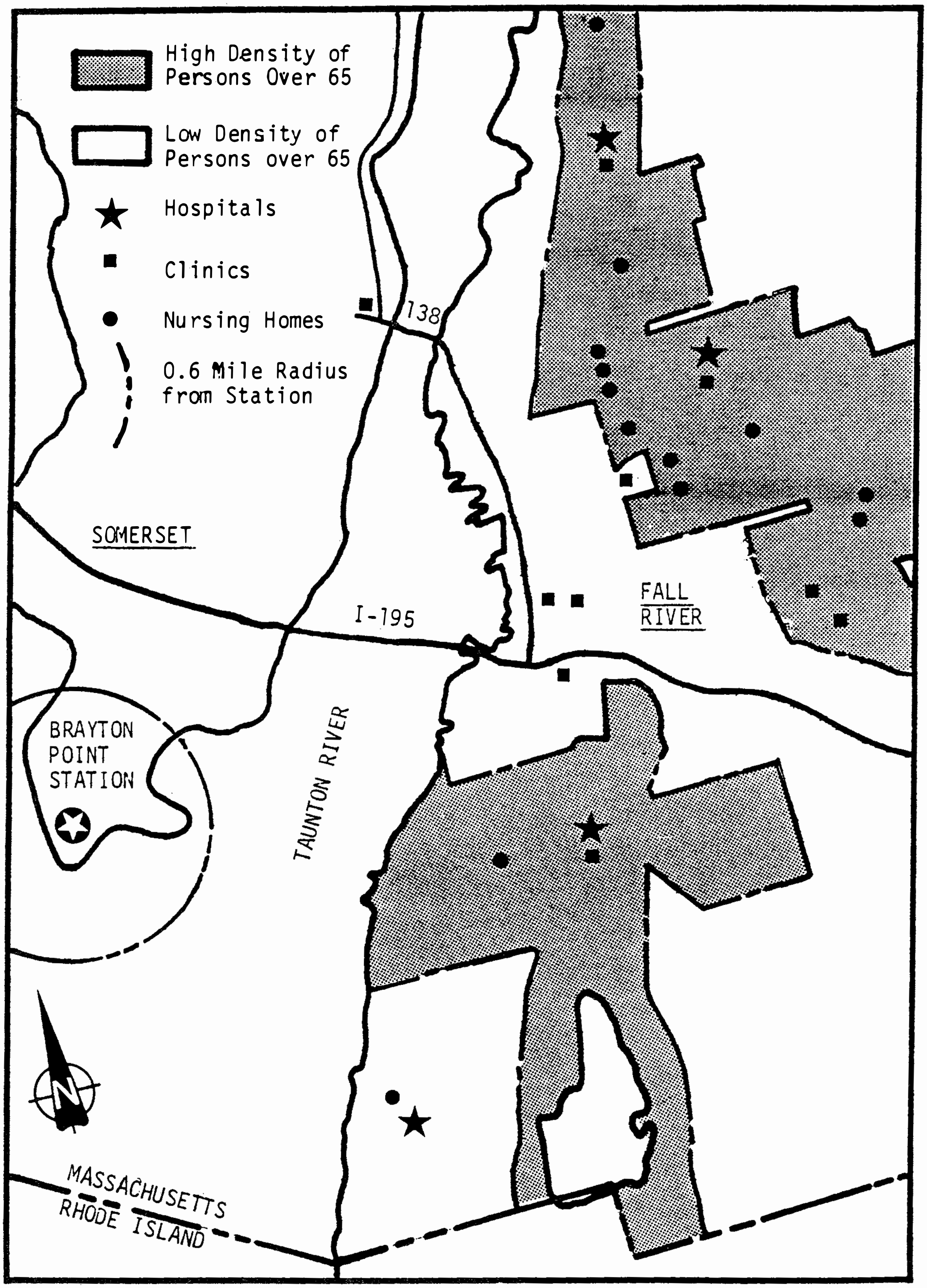

FIGURE 3-7

PUBLIC HEALTH FACILITIES AND HIGH DENSITY OF ELDERLY RESIDENTS - 1975

As of 1976, 129 acres were devoted to recreational use in Somerset. These included parks, beaches, marinas, golf courses, playgrounds, athletic fields, stadiums and drive-in theatres.

There are two recreation sites in close proximity to Brayton Point Generating Station; the adjacent beach area to the east and the Fall River Bicentennial Park 1.2 miles across the river. This waterfront park is 75% complete and is expected to open later this year.

Most medical facilities in the vicinity are in Fall River. Somerset and Swansea share a private, walk-in clinic on Route 6 by the Brightman Street Bridge. There are no nursing or old age homes in Somerset. Fall River facilities include 4 hospitals, 13 nursing homes, 10 clinics and 4 mental health centers, which are spread throughout the city (Figure 3-7). Eleven of these are between 1 1/2 and 2 1/2 miles from the generating station.

The Fall River Academy Building and the Customshouse (1834) are nationally recognized historic sites as is Battleship Cove. The USS Massachusetts, USS Joseph Kennedy, the Submarine Lionfish, and PT 796 are moored in Battleship Cove, Fall River as memorials to World War II, the Korean War and the Vietnamese War.

There are three historical sites in Swansea recognized by the Massachusetts Historical Commission: the Martin House, a museum and farm complex dated to the early 1700's, the Luther Home (1819) and Luther Store (1811). No sites are reported in Somerset. It is anticipated that many buildings in Fall River will receive historic recognition after an inventory is completed and submitted to the Massachusetts Historical Commission. Sites are selected for unique architecture, historical and social associations and implications. In Fall River, these would include mill owners' houses, workers' houses, mills and factories and several churches. There are over 500 buildings already on the inventory.

Impacts

The proposed action should have a negligible effect on land use patterns and trends in the vicinity. The commitment of land for the project would be limited to a landfill site.

Conversion would have no effect on population or the economy which might cause a change in housing demand, therefore stimulating construction and further land use. There would be no impact on medical facilities or historical sites.

To the extent that conversion affects air quality and thus human health, it could have an impact on residential land use patterns. In general, air emissions from coal burning are likely to have a more deleterious effect on human health than oil burning; in Brayton Point's case, only sulfur oxide emissions might, under possible but not probable conditions, affect human health. Presence of sulfur oxides can cause bronchitis and lung disease. The most susceptible populations -- vigorous athletes and persons (especially the elderly) with a pre-existing tendency to lung disease-- are located across the bay in Fall River, and thus are outside the zone of highest concentrations (i.e.,within 0.6 miles of the stacks) The only recreation site within this 0.6 mile radius is a rock strewn beach -- an unlikely site for active athletes.

Acid mist and rain damage surface detail of limestone and marble. While the incremental effect of Brayton Point sulfur emissions may be difficult to separate from the already acid pH of New England rainfall, small increases in the locale may guarantee acid rain conditions. Deterioration of the Fall River historic buildings due to this phenomenon has not been reported, but neither has it been investigated.

Mitigation

Trucks transporting ash from the station to the disposal site may release small amounts of ash along the route if the trucks are not covered. By covering the loads of ash, the amount of ash spilled can be minimized.

The proposed action is not likely to insure any land use changes nor is it likely to have significant impacts on existing land uses. The impacts that the proposed action might have on existing land use relate primarily to air pollution. Air pollution mitigation measures are presented in the air quality section.

Plans and Growth Projections

Setting

The Southeastern Regional Planning and Economic Development District (SRPEDD) has predicted construction of strip commercial and residential developments at suitable vacant highway interchanges and along major roads. Growth is expected in all categories of land use except transportation and agriculture. There is a possibility of coal mining in the region, but no level of activity has been projected. Also expected is the development of service and support facilities for Outer Continental Shelf drilling and exploration activities in Fall River and New Bedford. In general, it is anticipated that the suburban towns should expect greater increases in residential land than the cities.

By 1990, the Somerset population is projected to increase 23% over the 1975 population. Sixty percent of this increase will take place in the northern part of the town; the southern section, including Brayton Point up to Read Street, north of Route 6, is projected to undergo 22% of the increase. The central part of Somerset which includes the "downtown" section should have a population increase of 18% of the total projected growth.

According to a survey of Somerset residents conducted by the Massachusetts Coastal Zone Management Office, a primary concern is to conserve open space along the town's waterfront at the Taunton River. The Massachusetts State Department of Public Works (DPW) is planning improvements on the Brightman Avenue Bridge in Somerset. This project is in the early planning stage and the DPW does not expect completion before 1983.

The City of Fall River has undergone a population decline since the Depression. City officials are attempting to improve the economic base of Fall River; land is available, as are road, rail, and shipping facilities. In response to a lengthy questionnaire prepared by the Massachusetts Office of State Planning, residents of Fall River indicated a desire for industrial development. The city will welcome all types of industry and has provided financial benefits to encourage new business. In particular, Fall River planners want to revitalize the economically depressed urban core. An industrial park near the Fall River Municipal Airport has been prepared for development as well. Major docking and dredging activities are being planned by private corporations in conjunction with the Army Corps of Engineers programs. These would improve the ship channels serving the Gulf Oil, Pacific Oil, Northeast Petroleum and Texaco Oil Companies in Tiverton, and NEPCo, Montaup Electric Company, the State Pier, and Shell Oil Company in the Fall River Harbor. The last maintenance-dredging activity occurred in 1962-1963.

A major Federal action that might affect this region is the Federal Government's recently adopted policy of encouraging the development of offshore oil and gas resources. Two outer continental shelf(OCS) lease sales have been proposed by the Department of the Interior that may affect communities in the Brayton Point area, the Mid-Atlantic (OCS sale 40) and the North Atlantic (OCS sale 42). If these sales occur as they have been proposed, it is possible that offshore drilling support activity would locate in Fall River, Massachusetts, bringing additional people into the area. Fall River is only one of several locations that may be considered by oil industry officials for the location of service base activity. Other communities in southeastern New England that are likely candidates would include New Bedford, Massachusetts and Davisville, Rhode Island.

The review of new permits and the renewal of existing permits for the Brayton Point Generating Station may fall under the review of the Massachusetts Coastal Zone Management Program.

Impacts

The proposed fuel conversion at Brayton Point would have a negligible effect on local growth. It is not anticipated that construction workers would be brought into the area as there is a large number of unemployed construction workers residing in the area.

The conversion of the Brayton Point Generating Station to coal would not have significant effect on the distribution and amount of population in the immediate vicinity or the region. While at this time specific hiring figures are not known, NEPCo expects to hire a number of construction workers, several new workers for the dock operation, and an unspecified number of truck drivers for ash transport. The small number of jobs associated with station operation and construction would not generate a significant change in the level of services currently supplied by the local economy over either the short or the long term. However, construction activity would reduce slightly the number of unemployed construction trade workers in the Fall River area.

The conversion to coal which occurred during the 1973 oil embargo did not affect the assessed valuation of Brayton Point homes. Thus, a change in future home values on the Point and subsequent shifts in development patterns would be unlikely if an NOE is issued.

The conversion of Units 1, 2,and 3 of the Brayton Point Generating Station to coal would have no effect on the use of Fall River port facilities to support offshore oil and gas exploration and development activity.

Mitigation

Since conversion of Units 1, 2 and 3 is not expected to effect land use, no mitigation measures are either required or recommended.

3.2.2 Public Utilities and Services

General

In some cases, the conversion of a generating station from oil-firing to coal-firing can adversely affect public utilities and services by imposing increased demand on their water supply, waste water treatment facilities, solid waste disposal facilities, and protective services. Public water supply could be adversely affected if the generating station and local community draw from the same source; the impacts could become critical if the public supply is already strained. Utilization of a public land-fill site for ash disposal could dramatically reduce its life expectancy; if a region has a shortage of available future sites, then ash disposal could further exacerbate this shortage. Although it is unlikely, conversion to coal combustion could pose increased demand for local police and fire services. The frequency of fires is not great enough to justify the purchasing of new equipment or hiring additional staff, but it does require some contingency planning.

If converting a generating station caused significant additional population growth, even temporarily, community services could be strained. However, the conversion from oil to coal does not involve enough activity to induce additional or problematic local growth.

Public Utilities

Setting

The town of Somerset receives its fresh water supplies from the town reservoir which is fed by local brooks. Sewerlines currently serve 10,906 people, 60% of the town's population. Daily waste volume is about 1.29 MGD. By the year 1990, the town will be 100% sewered and the waste treatment plant would be handling 2.74 MGD. The treatment plant is located on the Taunton River between I-195 and Route 138. 70% of total waste production, (0.9 MGD) receives secondary treatment and its liquid effluents are emitted into the river. Sewage solids are burned at the town landfill. Landfill capacity is estimated at 10 years, since the town recently purchased an adjacent parcel of land for future operations. The town will not accept flyash from generating stations for disposal.

The Warren Reservoir is located within Swansea, but it supplies the neighboring town of Warren, Rhode Island with drinking water. Swansea fresh water supplies are pumped from between five and seven well fields in the town. None of Swansea is sewered; all homes and other facilities rely upon septic tank treatment of domestic wastes. Plans exist to sewer Swansea's densest population center, Ocean Grove. By 1990 approximately 35% of the town will be sewered. Because the water table is high in that area, there are problems with certain septic tank fields. It has been reported that water quality in the Warren Reservoir has deteriorated since the construction of a subdivision on its eastern border; no conclusive evidence has as yet been documented. The existing landfill is nearing capacity and a new site is being prepared at a higher elevation. This site will use a cut-and-fill operation and have a twenty-five year capacity. Disposal of fly ash will not be permitted.

Fall River drinking water is supplied solely by reserves in North Watuppa Pond; this water is filtered prior to distribution. The pond and surrounding lands are controlled by the Fall River Water Board and are not available for any form of recreation. The town generates 30 MGD of sewage which is treated in a plant on the bay above the Fall River/Tiverton town line. There are outfalls and overflows from sewer lines which reach the Taunton River before processing. Sewage solids are taken to the one city landfill which is located north of Wilson Road off Route 24, south of the municipal airport. The state indicates it would like this particular landfill closed because of non-compliance with operational and capacity regulations. Half of the town waste, approximately 50 tons/day, is incinerated prior to trucking to the landfill. The landfill is not used for chemical wastes or fly ash. The Fall River Wastewater Treatment Plant is currently being upgraded to a level between secondary and tertiary. The water would be clean enough for use in the Brayton Point Generating Station cooling water system. Funds and approval for laying pipeline to supply eight to ten MGD of this future effluent are currently being sought. At the present time, Fall River is selling to NEPCo three to four MGD of potable water from the city reservoir.

Impact

There will be no significant impact on municipal public utilities as a result of the proposed action. Water use by the station should remain at approximately the same level if a dry ash removal system is installed. The station has its own wastewater treatment facilities so that coal conversion would not affect the Somerset wastewater treatment system. The station would not use a municipal landfill for fly ash disposal and therefore will not have any direct impact on municipal solid waste facilities.

A major consequence of the proposed action would be a significant increase in the amount of solid wastes produced at the station. The station would produce approximately 153 acre-feet of fly ash per year. There is no room on-site to dispose of this volume of fly ash. The New England Power Company has contracted for a 35-acre disposal area in nearby Freetown, Massachusetts. The site is a former gravel pit. In 1976, it was estimated that the site would have a life span of 5 to 10 years. All permits required for operating the site have been obtained.

A Limited Environmental Impact Report on the Freetown fly ash landfill was prepared in 1976 by the Thompson and Lichtner Company, Incorporated for the Massachusetts Department of Environmental Quality Engineering pursuant to the Massachusetts Environmental Policy Act (Massachusetts General Laws, Chapter 30, Section 62). The authors concluded that there would be no degradation of inland ground water or surface waters by siltation or by percolation of leachate because of the low permeability of compacted fly ash (Thompson and Lichtner, 1976).

Under a 1976 Amendment to Chapter 111 of the Massachusetts General Laws, Section 150A (Chapter 118 of the Laws of 1976), coal ash may be handled differently from other types of solid wastes. Sanitary landfills, used for the disposal of common trash, require approvals from the local boards of health and the Massachusetts Department of Environmental Quality Engineering (DEQE). Coal ash is not considered a solid waste when it is used as a raw material for concrete block manufacture, aggregate, fill, base for road construction, or other commercial or industrial purpose or stored for such use. Therefore, a coal ash storage area does not require local approval, although the DEQE has the authority to prevent and abate nuisance conditions that might arise from the ash storage area. If ash is not to be used commercially, an ash disposal site would require a local permit. However, DEQE may waive the requirements and allow the disposal of the ash providing DEQE determines that the disposal area will not create a nuisance and that damage to the environment is minimal.

The Federal Government, through the U.S. Environmental Protection Agency, is currently developing regulations regarding the disposal of solid wastes under the Resource Conservation and Recovery Act of 1976 (Public Law 94-580). Part of the program involves classifying types of waste as to whether or not they are hazardous; another part of the program involves developing regulations for the disposal of hazardous wastes. EPA is developing standard criteria for classifying wastes. A final determination as to whether or not fly ash will be classified as hazardous has not yet been made. If fly ash is classified as a hazardous waste, special handling procedures would be required in disposing of fly ash and its commercial utilization would be severely curtailed.

Some studies have indicated that fly ash may leach pollutants into ground water under certain conditions, depending upon the characteristics of the particular fly ash, site geology, and operating practices (Bern, 1976). In some cases, it may be necessary to line the bottom and sides of the disposal area, just as ash ponds may be lined. The usual lining material is clay; synthetic plastic or rubber liners are commercially available but there is little experience with such liners to determine efficiency in retarding seepage or long term durability. Where artificial liners are employed, attention to proper ground preparation and liner installation appear to be essential to proper liner function (Argonne National Laboratory, 1978).

Disposal sites may be reclaimed after they have been fully utilized. The final layer of ash is covered with 2 feet of topsoil and revegetated to protect the landfill from erosion. Ash landfills may support small structures if they are properly operated, depending upon the moisture content of the fill, the amount of compaction of the fill, and the immunity of the fill from water seepage. If the moisture content of the fill reaches a certain level, the fill will become unstable. Unlike regular sanitary landfills, ash disposal sites do not present any fire or explosion hazard due to the formation of methane gas.

Mitigation

The impact of disposing of ash can be mitigated by finding a commercial use for it. Fly ash has been used in soil stabilization projects, as a filler in asphalt, as road fill material, and as a filter medium in wastewater treatment plants (Bern, 1976). One of the problems in developing markets for ash is its low value and relatively high transportation costs. The supply in a given area generally far exceeds the quantity that can be used locally.

Fire and Police

Setting

The Somerset Fire Department reported that it maintains a volunteer fire truck with a response time of four minutes to the generating station.

Similarly, ambulances would be able to reach the plant in this time and then travel to hospitals in Fall River (the Somerset clinic only provides a walk-in service).

Fall River fire facilities include six fire stations which maintain a total fleet of approximately 20 fire fighting and accessory vehicles. If necessary, the Fall River Fire Company could supplement Somerset firemen at the Brayton Point Generating Station. The response time would be less than five minutes.

Somerset police maintain a patrol in the station area. Advanced first aid training is mandatory for the policemen. They would provide assistance to the utility in an emergency situation.

Impact

The proposed action would not affect fire and police services. In the event of an emergency, however, these services would be readily available to the generating station.

3.2.3 Transportation

General

The conversion of a natural gas/oil-fired generating station may affect the local or regional transportation network through changes in fuel transportation. Natural gas is delivered by pipelines; once constructed, they have virtually no impacts. Oil is generally delivered in bulk to a generating station by rail car or transshipped from rail to barge (where adequate water transportation facilities exist). Coal is generally transported by rail or barge (where adequate facilities exist), although it is sometimes transported by trucks over relatively short distances. Conversion to coal may increase traffic congestion from coal deliveries. However, increased traffic might justify further expansion and improvement of transportation facilities, thereby actually improving overall performance of the transportation system.

Off-site coal ash disposal would probably increase traffic congestion (and noise and dust) en route. If the route includes secondary roads not designed for heavy loads, then roads may deteriorate from excessive wear, requiring additional maintenance sooner than anticipated.

Setting

Considerable road construction, linking the major cities in this region has occurred in the Southeastern Regional Planning and Economic Development District (SRPEDD) during the last 25 years. Rail lines have been in existence for considerable time as have port facilities.

Conrail, operating on the old lines of the Penn Central, schedules a freight train to Fall River on alternate days. The tracks run along the waterfront docking and warehousing facilities. No tracks are located either in Somerset or Swansea. There are no rail connections to the plant.

The port of Fall River has 15 terminals, eight of which receive petroleum, two are industrially-related, one handles cargo and four are used mainly for moorings. Three of these piers are in Somerset, two are held by utilities - NEPCo and Montaup Electric Company. The ship channel is 400 feet wide and 35 feet deep at mean low water (M.L.W.).

The Southeastern Regional Transit Authority (SRTA) has two buses scheduled daily from Fall River to Brayton Point. The morning bus leaves

Fall River at 8:00 am, the afternoon route starts at 3:15. This is a low passenger-volume route which serves the residents of Brayton Point rather than the generating station. While there are designated stops on Brayton Point Avenue, they are few and far between.

As recorded in Waterborne Commerce of the United States, 1704 ships entered the port in 1973, including 154 tankers which were towed and 264 self-propelled tankers. Maintenance plans are under way to dredge the channel and ship turning basin.

There is no airport in Somerset. The closest facility, the Fall River Municipal Airport, handles only general aviation.

Impact

The main impact on local transportation would take the form of an increased volume of trucking if the proposed action is implemented. Disposal of flyash in dry or wet form would require trucking activity beyond existing levels. If 25 ton trucks are used to haul the ash 5 days a week, 38 round trips would be necessary each day to remove all the ash from the site. This would create 76 additional trips along Brayton Point Avenue, the only existing access road from the site. As seen in Figure 2-6, the average daily travel (ADT) on this road north of Route 195 is 4500 trips. Traffic on the avenue south of Route 195 is much reduced and consists mostly of cars and school buses. The additional trucking volume represents only 1.6% of the measured volume on the avenue; the actual increase in the Brayton Point residential neighborhood could be much higher. Even though the traffic increment is comparatively small, the increase in trucking volume per se could be large. Noise, fumes and accident hazards would increase. There is a school and playground on the access route, bringing many children into proximity with large truck traffic. The trucks should not interfere with the SRTA bus service on Brayton Point.

The proposed conversion to coal would alter the nature and volume of ship traffic in the Mt. Hope Bay Channels. When burning oil in all four units at Brayton Point, about 100 tankers are required each year or approximately two berthings per week occur at Brayton Point. If Unit 4 only burns oil, 21 tankers per year can supply the requisite amount of oil of one every other week. About 119 colliers per year would be required to deliver the necessary amount of coal. Thus, the yearly volume of ship traffic to NEPCo would increase from 100 to 140 or by nearly 40%. The Fall River Port Authority director (personal communication, 1978), expressed the opinion that this increase would have an insignificant impact on existing or projected channel traffic. Coal colliers may remain at berth as much as seven times as long as oil tankers. This would not affect shipping patterns, however, a routine scheduling problem would ensue if small volume barges are used instead of the large volume colliers.

Mitigation

The problem of increased truck traffic in a quiet residential neighborhood, along a route which passes a school and a playground can be mitigated by scheduling trips to the landfill. The trucks would have to avoid traveling during periods of arrival and dismissal of the school. They would also have to travel during the daytime and early evening so as to minimize incremental noise. Communications between the school and generating station officials would coordinate the traffic and school schedule to optimize safety and noise reduction.

In 1974 when the station previously burned coal, an agreement was worked out between the utility and the town regarding the routing and operating times of the ash disposal trucks. A similar agreement would be worked out under the proposed action.

Brayton Point residents awaiting the SRTA bus would be subjected to the high roadside concentrations of diesel fumes, dust and noise levels emitted by passing ash trucks. Since the bus runs twice daily, during periods of school arrival and dismissal, the scheduling suggested above will also mitigate the deleterious health and annoyance impacts which occur to bus passengers.

No mitigation of ship traffic impacts is necessary, since the incremental change is insignificant.

3.2.4 Noise

Summary: Notice of Effectiveness

Converting Brayton Point to coal in order to implement the NOE will create only one additional and significant source of noise: off-site disposal of wastes by trucks along the proposed residential route could produce significant adverse noise impacts on nearby residents. Procedures that often produce large amounts of noise at coal fired generating stations -- coal delivery by train, use of coal car shakers -- are not planned for this generating station.

Summary: Generalized Description of Impacts on Noise Levels

Noise impacts are determined not only by the amplitude and frequency of sounds being emitted at the source, but also by the amount of background noise at the receiver, geometric spreading, atmospheric absorption and ground absorption. Background noises include sound we would hear if the generating station did not exist; a very low background noise means even low intensity intruding sounds are very noticeable. Geometric spreading, the spherical spreading of noise over a flat, hard surface, determines the basic reduction of the noise with distance; meteorological factors can create atmospheric absorption that rapidly reduces high pitched noises (such as wheel flange rubbing and metal-to-metal impacts) over long-distances and more slowly reduces low-pitched noises. Thus, as distance increases the spectral quality of the sound as well as its intensity will change. Elevation changes, such as hills and sloping lands, act as natural barriers that interfere with the movement of sound across the land. Ground absorption, created by surface qualities (independent of elevation) dampen sounds (much like carpet in a room) and can further reduce sound transmission over greater distances.

Common major sources of noise at coal-fired generating stations are motorized equipment, such as bulldozers and loaders, that move the coal and waste, and electrostatic precipitators that remove ash particles from the air. Less noticeable sources of noise include coal crushers and pulverizers; conveyors moving coal; coal ash transportation (by truck) and deposition (involving excavation). Other sounds associated with many kinds of generating facilities are paging and alarm systems, boiler draft fans, cooling towers, and steam valves. A noticeable humming sound is normally produced and this comes from power generators and auxiliary equipment located inside the powerhouse. Appendix D describes common noise levels for purposes of comparison.

In general, the measurable amount of noise is only a key to the amount of annoyance people experience. Steady noise tends to be less noticeable than occasional noises of the same noise amplitude. People also tend to accommodate themselves to some kinds of noises and therefore do not consider them a nuisance. The impact of noise is thus an individual, subjective judgment that cannot be accurately modeled by acoustical science, although some indicators are known and various regulations drawing a sharp dividing line between acceptable and unacceptable magnitudes have been adopted by a number of states and municipalities.

Noise impacts can often times be reduced by enclosing equipment and by scheduling operations for daytime shifts.

Various governmental standards and regulations are aimed at the control of noise pollution. In this case, significant Federal regulations are limited to EPA railroad equipment noise standards, which currently require no reduction in noise exposures of people living near the railroads. The Federal Occupational Safety and Health Act (OSHA) indirectly controls community noise levels through its ability to limit worker noise exposure. However, power generating stations within the OSHA limits can still produce significant amounts of community noise.

The State of Massachusetts has neither noise regulations nor enabling legislation permitting regulation by other jurisdictions. However, it does have a qualitative (nuisance) regulation: any facility continuously producing noise in excess of 10 dB(A) above background noise may be required to submit plans for reducing noise to acceptable levels.

Setting

The utility has made a considerable effort to control noise from Unit 3 and other equipment. Neither the utility nor the Commonwealth of Massachusetts Department of Environmental Quality Engineering presently receives noise complaints. Site visits and measurements indicate that the station's normal noise emission barely exceeds the ambient noise due to surf, wind, and distant traffic. Since the station principally supplies base load, the four steam turbine generators operate nearly continuously and noise from start-up and shut-down activities is infrequent. Only Unit 4 is cycled to meet peak power demands. Occasional transient generating station sounds are noticeable. For example, the back-up warning beeper on a front end loader and the "buzz" of vibrators in the electrostatic precipitators are barely identifiable. The principal noise sources at the station itself include induced and forced draft fans, precipitator rappers and vibrators, transformers (core vibrations and cooling fans), steam discharge vents, interior equipment noise transmitted through the building structure, cooling pumps and on-site vehicular activity. Four 2.5 MW diesel engine peaking generators are operated for periods of about an hour in the start-up process of one of the main steam driven generators or during unusual demands for peak power. The extensive spray cooling system produces a low level of smooth broadband sound free of objectional noise components.

Comments by the engineer of the Southeastern Massachusetts Regional Air Pollution Office indicated that since 1971 station noise has not been a significant problem, including the periods in 1974-75 when coal was being used.

Spot noise level measurements and statistical samples of longer duration were obtained at representative locations in the residential areas near the generating station (Figure 3-8). The four diesel-powered peaking generators were operated by the station for a brief period to allow us to measure their noise level. The findings are listed in Tables 3-18 and 3-19. Additional noise data taken in prior years in South Swansea and provided by NEPCo (Table 3-20) indicate that the level of noise produced by the station has not changed significantly over the past four years. Furthermore, the use of coal during 1974-75 did not modify these community noise levels significantly.

Since fuel is delivered by tanker and no rail line exists, there is no significant off-site noise generation by the plant at the present time. The approximately 250 employees of the plant use Brayton Point Avenue to reach the station, but this traffic does not constitute a significant portion of the local traffic volume.

Impact

A summary of the noise aspects following conversion to coal of Brayton Point Generating Station, Units 1, 2 and 3 is presented in Table 3-21.

Truck traffic necessitated by fly ash disposal will constitute the only significant conversion-related noise impact. Ash removal requires an estimated 4 to 5 trucks/hour (25 ton hauls). These trucks are expected to operate 8 hours per day on weekdays during the daytime shifts 8 am to 4 pm. The hourly L_{eq} of 5 trucks/hour with a maximum level of 90 dB(A) is approximately 66 dB(A) at 50 ft. This value is approximately equal to the FHWA limit of 67 dB(A) on highway noise in residential areas. The truck source level used is typical of existing dump trucks at high engine speed.

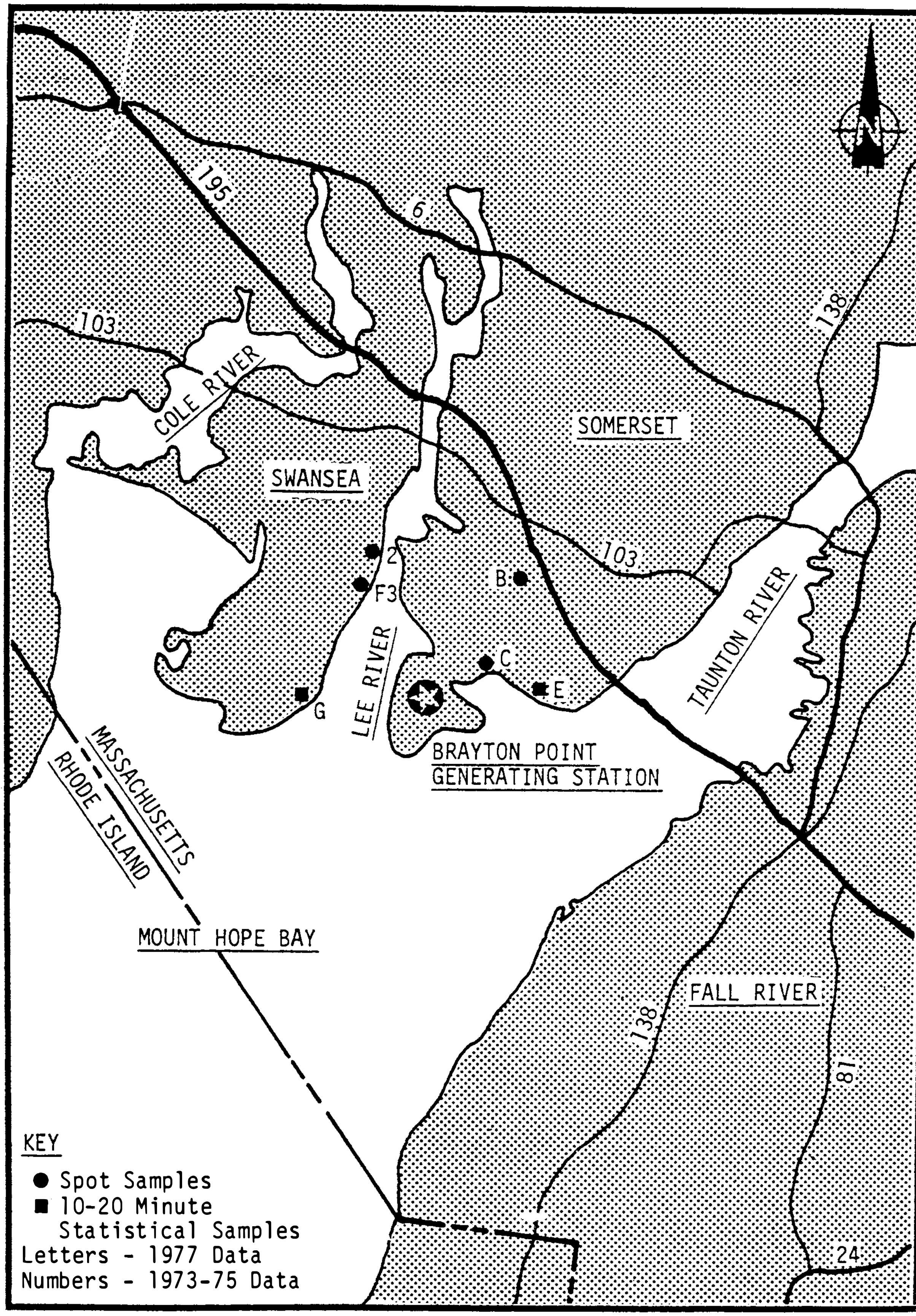

FIGURE 3-8

NOISE MEASUREMENT LOCATIONS

TABLE 3-18

1977 BRAYTON POINT COMMUNITY NOISE DATA SPOT SAMPLES*

Location	Date/Time	dB(A)	Contributing Principal Noise Source
B	25 Oct/2:50pm	47-9	Residual Plant and Community Activities
C	25 Oct/2:50pm	56-8 49-51	Residual Plant Activity Residual Plant Activity
E	25 Oct/3:00pm	52 53-6	Precipitator "Buzz" Transient Loader Back-Up Signal Transient
E	02 Nov/1:45pm	49-51	Residual Plant Activity
F	25 Oct/4:00pm	47-8	Surf and Insects
G	02 Nov/2:50pm	46-8	Surf and Insects

* See Appendix C for a description of instrumentation used.

Source: Cambridge Acoustical Associates, Inc., 1978

TABLE 3-19

1977 BRAYTON POINT COMMUNITY NOISE DATA
STATISTICAL DATA SAMPLES
(10 Minute Duration)

Location	Date/Time	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{EQ}
E	02 Nov/1:45pm	57	54	53	51	50	53
E	02 Nov/1:55pm	60	55	53	52	51	54
G	02 Nov/3:00pm	52	50	49	48	47	49 est

Source: Cambridge Acoustical Associates, Inc., 1978

TABLE 3-20

SELECTED NOISE LEVEL MEASUREMENTS IN SOUTH SWANSEA

Measurement Location	Operating Fuel	Date/Time	dB(A)
Loc 3: Easterly End of Bayside Ave., 2,000 ± Ft. From Plant	Oil	15 June 73 7:10 am	46
	Unit 1 - oil Unit 2 - oil	14 May 74 7:00 am	49
	Unit 3 - coal	17 July 74 9:00 am	46
	Oil	19 Nov 75 12:30 pm	44
Loc 2: Easterly End of Lawrence St. 2200 ± Ft. From Plant	Oil	15 June 73 7:30 am	46
		14 May 74 6:30 am	47
	Unit 1 - oil Unit 2 - oil Unit 3 - coal	23 Oct 74 12:40 pm	45

Source: NEPCo, 1975

TABLE 3-21

COMMUNITY NOISE ASSESSMENT SUMMARY

	100% Oil Utilization	100% Coal Utilization
FUEL DELIVERY, UNLOADING AND STORAGE	No. 6 residual oil by 25 to 40,000 ton tankers	23,000 ton colliers, bucket crane to crusher via conveyers at 500 ton/hr to 600,000 ton capacity storage yard and bunkers in plant, outdoor stock piling with dozers and front-end loaders
Process Noise Impact	Not Significant	Minor Significance
ELECTRICITY GENERATION	At 83% capacity factor, Units 1 and 2 are 250 MW each and use approximately 318 barrels of oil per hour; Unit 3 is 657 MW and uses approximately 716 barrels of oil per hour; exhaust gases pass through electrostatic precipitators: minor ash volumes are generated.	At 83% capacity factor, Units 1 and 2 each burn about 70 tons of 13,825 BTU/lb coal/hr; 3 requires about 174 tons of the above coal/hr. Ash generated by above coal is about 9%; hence, total for all units is about 28 tons/hr or 672 tons/day. If 25 ton trucks are used, 38 round trips will be required daily (5 day work week) to transport ash to the landfill site.
Process Noise Impact	Marginally Significant	Marginally Significant
WASTE DISPOSAL	Minor amounts of ash trucked to on-site settling ponds.	Ash must be hauled off-site by large trucks or other means and taken to a landfill. Four to five trucks (25 ton) per hour for eight hours/day would be required.
Process Noise Impact	Not Significant	Potentially Significant
Overall Noise Impact of Station Without Further Mitigating Measures	Marginally Significant	Potentially Significant

Noise generation by coal delivery unloading and storage equipment is a typical at Brayton Point, since coal arrives by collier rather than by railroad or truck. Contributions to community noise from coal delivery, unloading and storage operations at Brayton Point are limited to bulldozers and loaders. Typical loaders and bulldozers measured under this study during full power operation at various power plants indicate a range of 70 to 78 dB(A) at 100 feet with a fast meter response. Using the 6 dB per doubling of distance spreading loss applicable to concentrated sound sources, the levels at 1000 feet would be 50 to 58 dB(A) or barely audible above the typical existing 48 to 54 dB(A) background noise measured in nearby residential areas. At 2200 feet, e.g., at the South Swansea shore line, the levels would be six or seven dB lower, hence, virtually inaudible. Conveyors and coal crushers are relatively quiet in operation. Since coal is highly friable, the forces required for crushing are modest and create little noise. Coal also produces much less impact noise than rock or gravel where it drops onto sheet metal chutes, etc. A typical coal crusher and conveyor house produces 71 dB(A) at 50 feet. By far the noisiest coal handling equipment used at some generating stations, railroad car shakers, are not utilized at Brayton Point.

Coal pulverizers at Brayton Point are located inside the buildings and do not contribute significantly to the total outdoor noise. The intermittent noise produced by the buzzer and rapper of the electrostatic precipitators are barely audible above the overall ambient noise.

Mitigation

Except for truck-related noise, on-site coal utilization activities at Brayton Point are not expected to produce a significant increase in noise in surrounding residential areas. Use of especially quieted trucks producing even less noise than the EPA regulated medium and heavy new truck noise levels of 83 dB(A) at 50 feet for 1978 and of 80 dB(A) at 50 feet for 1984 should be considered.

3.2.5 Aesthetics and Community Attitudes

Setting

The region surrounding the generating station is of moderate relief and rolling terrain ranging from sea level to 300 feet. The Brayton Point generating station is visible from many points in the area. The stacks are higher than any natural feature within 20 miles until one reaches the town of Lincoln, north of Providence.

The power plant is situated on the tip of the point and may be seen from the coastal sections of Ocean Grove, South Swansea, Brayton Point, Warren, and Tiverton, and much of downtown Fall River. Local trees and buildings may obscure the plant. Transmission lines and towers, coal conveyors and unloading tower, oil tanks and the coal pile can be identified from the coastal areas to the east, as well as the stacks and main buildings which are visible from all sides.

The chairman of the Board of Assessors in Somerset felt that the presence of the plant had no relationship to home values and that the age of the Brayton Point community was the most important factor in assessing structures.

Impact

Odor problems are unlikely to be significant if Units 1, 2, and 3 of the Brayton Point Generating Station are converted to coal. Sulfur dioxide may be sensed by humans above the threshold concentration of 3 ppm, which is 100 times the primary standard for the state and six times the secondary standard. Instantaneous concentrations of up to 1 ppm would be likely in the immediate vicinity, but this value is below the threshold. This is the only effluent which might be sensed through odor.

Residents of Brayton Point were aware of coal burning activities during the winter of 1974-1975 because of the increase of grit and dust in yards, on houses and cars (From June 1, 1974 to February 27, 1976 Units 1, 2 and 3 burned coal for 14.3, 2.5 and 60.3% of total operational hours respectively.) In 1974-1975, however, Brayton Point burned high ash content coal as opposed to the low ash coal to be burned should an NOE be issued. Consequently, presence of particulates can be expected, albeit less than in 1974-1975, especially to the east and southeast (in the direction of prevailing winds) if the proposed action is implemented. A very important part of the conversion plan is the upgrading of precipitator capacity. This will insure that the particulate impact will be less than the 1974-1975 period.

In the past residents of South Swansea have voiced some complaints concerning noise produced by the Brayton Point Generating Station. These noise sources have been mitigated by NEPCo. In the course of preparing this environmental statement, no community opposition was discovered with regard to the proposed coal conversion at Brayton Point. It is anticipated that the proposed fuel conversion would have little effect on general community attitudes.

4. TEMPORARY AND CUMULATIVE RESOURCE UTILIZATION

This section summarizes those factors which are substantially related with regard to magnitude and time, but which are usually found in separate sections in many other EIS's, vis., "The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity" and "Any Irreversible of Irretrievable Commitments of Resources that Would be Involved in the Proposed Action Should it be Implemented." These include potential oil savings, ash disposal, water resources utilization, traffic, and associated secondary impacts.

4.1 PROJECT IMPLEMENTATION NOW VERSUS DEFERRAL TO A LATER DATE

The primary concern in prompt implementation of the ESECA Coal Conversion Program is the reduction in demand on foreign oil. Brayton Point Generating Station, as part of the New England Electric System, imports 87% of its total refined oil needs. Without conversion, Units 1, 2, and 3 will consume 12.3 million barrels of oil annually by 1984.

Issuance of an NOE does not mean an immediate reduction in oil imports. A lag time of up to five years may be necessary for conversion activities to be completed. The DOE is proceeding with all dispatch in meeting the requirements of ESECA. The use of domestic coal or other fuels instead of foreign oil would reserve the more limited oil resource for non-substitutable uses. These include gasoline, lubricating oils, and chemicals (pesticides, plastics, etc.) derived from oil. Development of alternative fuels and energy sources would also be stimulated by determined actions to conserve dwindling world-wide oil supplies and to limit the increasing per capita demand for power in the United States.

4.2 SHORT-TERM IMPACTS

Temporary impacts of the proposed action are associated primarily with construction activities. Construction includes upgrading existing equipment and the construction of a wastewater treatment sludge disposal area.

On-site construction for improvement and modifications of existing equipment will involve movement of workers and material to the site. Construction activities could employ several hundred people at any given time during the four to five year construction period. During these activities, there would be an increase in local noise and dust levels. However, this increase should not be significant.

NEPCo plans to construct a 4 acre sludge disposal area at the Brayton Point site to dispose of wastewater treatment sludges. Only a small part of the site will be exposed at any given time. The site will be trenched, the trenches will be lined with an impervious material, and leachate will be collected and treated. The construction of the sludge disposal area will not have any significant impacts.

4.3 CUMULATIVE IMPACTS

Cumulative impacts fall into two categories: transportation-related and fuel-related. To transport coal for Brayton Units 1, 2 and 3, 40 more ships would have to dock than if all four units burned oil. This would be a docking total of 140 ships per year or 280 movements or an increase of 40%. The impact of this increase to the users of the Fall River Harbor, both pleasure craft and commercial operators, is expected to be negligible. Since the volume of oil delivered to NEPCo would be cut from 15 to about 3 million barrels per year, the probability of an oil spill as well as the occurrence of small leakages from bilge water, etc. would be significantly decreased.

Certain deleterious impacts can be associated with truck transport of ash from the station to a disposal site. These trucks would be a continuing source of noise (annoyance), diesel pollution (health concerns) and traffic (safety problems) to the residents of Brayton Point.

Regarding fuel consumption, there are long-term impacts resulting from mining activities, rail transport, combustion and waste disposal. The mining and transportation impacts have been generically addressed in the ESECA programmatic EIS. Since NEPCo has not designated a long-term domestic coal source, specific mining impacts cannot be dealt with at this time.

Coal burning operations require an on-site active coal pile which would be the source of fugitive dust and possible contaminated runoff. Continued exposure of the bay's fish and larvae to high metal concentrations from pile runoff is projected to be damaging over the long-term to future populations. If the foundation of the pile were to be rebuilt to include drainage to the station's wastewater treatment system (neutralization and clarification), the possibility of highly polluted runoff would be eliminated.

A continuing aspect of burning coal is the need for an ash disposal area. As mentioned earlier, 247,000 tons of ash would be generated each year. The total annual volume of fill is 153 acre-feet; 3060 acre-feet (102 acres to a depth of 30 feet), over the 20 years of expected coal-fired operation. During the first 5 to 10 years of coal burning operations at Brayton Point, the ash will be used to reclaim a gravel pit in Freetown, Massachusetts. No adverse air or water quality impacts are anticipated at the Freetown site. When the fill is completed, the site will be made available for light industrial development. At that time, an additional landfill site will be required in order to dispose of the rest of the ash that will be generated at the Brayton Point Station during remaining coal burning operations.

Over the period of the proposed action, a slightly larger work force would be employed at the generating station. NEPCo has estimated that perhaps two additional employees would be necessary to handle the unloading of the coal. There would be an as yet unspecified number of drivers required for the ash trucks. It is not known at this time whether the latter would be hired by NEPCo or by a disposal contractor.

4.4 COMMITMENT OF NON-RENEWABLE RESOURCES

There will be a sizeable commitment of coal for the generating station to meet long-term consumption needs. The resultant ash will require a 102 acre disposal site (assuming 30 feet depth of fill) which cannot be used for any purpose other than landfilling while the station is burning coal. Eventual uses of the ash disposal site are dependent on the planning of the disposal operation and the amount of resources devoted to reclamation.

Reclamation of ashfills calls for a planned program utilizing labor, time, money and materials. Ash has been used as a fill material in quarries and other unused excavations. If handled properly, fly ash makes an excellent foundation material because the bulk of materials settling occurs during rather than after construction. With proper drainage and stepped slopes, reclaimed ashfills can support light industrial buildings up to five stories without unusual foundation designs (Bern, 1976, p 241).

While issuance of an NOE would not necessitate the opening of a new mine, significant quantities of labor, machinery, and money would still be necessary to guarantee a constant fuel supply. These same factors are also requisites for transportation of coal to the station and in the installation of precipitators and other improvements to existing equipment. Development of pollution control devices would involve technical expertise, as would improvements to mining and mine reclamation practices. Mining involves a commitment of land and, due to recent Federal legislation (Public Law 95-87; August 3, 1977), the reclamation of such land. The latter requires expenditures of money, time, labor and materials such as topsoil, seeds, seedlings and saplings.

4.5 LIMITATIONS ON BENEFICIAL USE OF THE ENVIRONMENT

Increase in water pollution in Mt. Hope Bay resulting from coal conversion could decrease fish populations. This loss might be noticed as smaller catches taken by commercial and sport fishermen in the area.

The increase in shipping traffic would not interfere with existing volumes of boating in the bay, according to the Fall River State Pier Authority.

During the period of coal-firing, a landfill would be in operation for ash disposal. Since such sites are not normally close to residences, the aesthetic impact would be small. Truck noise, pollution and traffic would increase local disturbances in the community neighboring the generating station. The station itself is currently highly visible from surrounding areas and the additional facilities necessary to implement the proposed action would not contribute to the overall visual impact.

5. PROBABLE ADVERSE ENVIRONMENTAL IMPACTS WHICH CANNOT BE AVOIDED

Unavoidable adverse environmental impacts will occur as a result of the issuance of a Notice of Effectiveness. Temporary adverse impacts will result from on-site construction. Long term adverse impacts will result from coal pile runoff and truck transport of ash to a landfill.

The runoff from an active pile of unwashed coal may contribute to deteriorated water quality in Mt. Hope Bay. The runoff may contain amounts of iron, copper, mercury, zinc, nickel, and lead which may exceed appropriate marine water quality criteria. Iron, zinc, and manganese would tend to precipitate and form a floc which would adversely affect fish eggs, fish fry, and benthic organisms. In addition, the metals have toxic affects on marine organisms. Effects from individual storm events would be short-term in nature. However, cumulative effects from the discharge of untreated runoff could be serious.

The use of washed coal would mitigate the impact of coal site runoff but might not be sufficient to eliminate the need for primary treatment. Primary treatment would effectively eliminate the long-term adverse effects of coal pile runoff and would moderate temporary adverse effects from single storm events.

Truck transportation of ash from the generating station to a landfill site will result in an increase of 38 (25-ton capacity) round trips per day. These trucks will increase maximum noise levels to 86 dB(A) for residences along the truck route at a typical setback of 50 feet. Moreover, the trucks will also produce their own emissions along the truck route.

NEPCo has contracted for disposal of ash at a landfill in Freetown, Massachusetts. The site has received all required state and local operating permits. The Freetown site has an expected capacity of 5 to 10 years.

Ash disposal will require 153 acre-feet of disposal volume each year. Over the expected 20 years of coal fired operations, approximately 3060 acre-feet (102 acres filled to a 30 foot depth) will be required for ash disposal. Because of the excellent drainage characteristics of the Freetown site, and low ash permeability, no significant water quality impacts are expected due to ash disposal. Through proper terracing of the site, the ashfill may be reclaimed as a site for light industrial use. When the Freetown site has reached its capacity in 5 to 10 years, the utility will have to find an additional site.

6. ALTERNATIVES TO THE PROPOSED ACTION

The objective of the proposed action is to reduce the consumption of oil at the Brayton Point Generating Station, Units 1, 2, and 3 without either impeding the use of the facility for generating electricity or replacing the facility. Several alternatives to the proposed action were considered on a national level and these alternatives are summarized below. Site specific alternatives are discussed at greater length.

The Final Revised Environmental Impact Statement for the ESECA Coal Conversion Program, May 1977, considered the following alternatives to the proposed action:

- nuclear energy,
- geothermal energy,
- solar energy,
- outer continental shelf (OCS) oil,
- shale oil,
- oil from coal, and
- conservation

The first three of these alternatives cannot provide direct replacement for oil since the power plants in question cannot be adapted to nuclear, geothermal, or solar power. They could shift from their present oil supply to domestic oil resources, such as OCS oil, shale oil or oil from coal, if these were available. The absence of significant supplies of oil from these sources is the inhibiting factor in the near term, although limited amounts of oil from all three may be available by 1985.

Conservation programs could reduce the growth of national electrical consumption and, in turn, the need for new generating facilities and the growth in utilization factors for existing facilities. Conservation alone would not result in the consumption of less oil over the long term except by early retirement or decrease in utilization factors at oil fired units.

Thus, these seven alternatives are not potentially practical and/or authentic alternatives to the proposed action.

6.1 FUEL MIX

DOE's regulations implementing ESECA contain no mechanism which allows for the simultaneous burning of coal and petroleum products or natural gas pursuant to a Prohibition Order issued under section 2(a) of ESECA. An ESECA Prohibition Order extends to 100% of the petroleum products or natural gas being burned, with the exception of those amounts used for start-up, testing or flame stabilization. Accordingly, this alternative is not considered to be viable under DOE's current regulatory approach for implementation of ESECA.

6.2 ALTERNATE FUELS

This statement has treated the proposed action as being in practice synonymous with conversion to coal. In fact, use of wood or refuse-derived fuels (RDF) instead of all or part of the coal required for Brayton Point's operations under the NOE would be consistent with the proposed action. Neither, however, is a feasible alternative to coal.

Either wood or RDF could, in theory, be combusted in place of oil or coal at Brayton Point Generating Station Units 1, 2, and 3. Sufficient wood grows in New England to fuel these three units, but institutional, economic and technical factors inhibit its use as a primary fuel. RDF are technically unacceptable as primary fuels at Brayton Point.

Wood

Wood is a viable low sulfur primary fuel for steam electric generating stations. Its suitability as a fuel for Brayton Point is a function of the energy requirements at Brayton, the amount of available wood in New England, the geographic distribution of the wood relative to Brayton Point, the economics of harvesting and transport, and the technical feasibility of modifying the Brayton Point power plants to burn wood. Since it is uneconomical to burn sawlogs or pulp bolts as fuel, we consider only chips, slash, scrap, and bark as fuel.

On base load Brayton Point Units 1, 2, and 3 (1157MW) would require about 4.1 million tons of dry wood per year. Extrapolating from Pecoraro's (1977) analysis the annual yield from 9.5 million acres of forest would be required to fuel Brayton Point Units 1, 2, and 3 at an 80% capacity factor. Assuming 30 years between harvests of each plot of land, the area to be harvested yearly would be 320,000 acres. In other words, to fuel Brayton Point at 80% capacity, the waste wood from 9.5 square miles of forest would have to be used per week.

The forest area available for harvesting, shown in Table 6-1, is located in New Hampshire, Vermont, and Maine. Forest land ownership patterns in Connecticut, Rhode Island, and Massachusetts are such that large scale harvesting would be uneconomical. We estimate that between 11 and 22 million acres of forests are suitable for economical harvesting. This is probably an upper limit and the actual harvestable area could be half of this. The amount of wood to fuel Brayton Point Units 1, 2, and 3 is equal to scrap from 9.5 million acres of forest or 45 to 90% of the total available forest land in New England which we estimate might be economically harvested. Not all of this forest, however, is presently being harvested. In fact, the scrap from all of the forest currently harvested in all of New England would satisfy only two thirds of Brayton Point's demand for fuel.

TABLE 6-1

FORESTED LAND IN NEW ENGLAND

State	Forest Area* (million acres)	Commercially Useful Forest Area** (million acres)	(%)	Estimated Mean Distance to Brayton Point (miles)
CT	1.86	None	0	-
RI	0.40	None	0	-
MA	2.95	None	0	-
NH	4.99	4	18	150
VT	4.99	4	18	170
ME	17.75	14	64	275
		Weighted mean distance to Brayton Point		235

* Pecoraro *et al* (1977) p.9.

** Refers to areas where ownership patterns and attitudes are conducive to wood harvesting on a large scale, economical basis. For northern New England States, an optimistic 80% of total area was assumed. Walden estimate based on data of Pecoraro *et al*, pp. 16-18, and the "New England Energy Situations and Alternatives for 1985."

Pecoraro (1977) has estimated recovery costs for green wood chips F.O.B. the woodloft to be approximately $13.50/ton, for an equivalent cost of $18.41 per ton of dry woodchips or $1.08 per 10^6 BTU. Kunhardt reports a cost of $1.04 per 10^6 BTU for locally harvested woodchips used to fuel a 10-MW boiler of the Burlington (Vermont) Electric Department. Using Pecoraro's trucking cost estimates, we compute $10.65 per ton of green woodchips (60 ton truck) to be transported the estimated mean distance of 235 miles to Brayton Point, or approximately $0.85 per 10^6 BTU. Even if the woodchips were free at the woodloft, the cost at Brayton Point would be $1.93 per 10^6 BTU. At $3/ton F.O.B. the lot for green woodchips ($0.24 per 10^6 BTU), the cost at Brayton Point is $2.17 per 10^6 BTU.

Thus, the Brayton Point Units could be fueled entirely with chipped wood by burning more than half the sustained chip yield of New England forests now and potentially in production, at an estimated fuel cost of 21 to 36% more than the cost of 2.2% sulfur oil ($1.59/$10^6$ BTU). Neither the cost nor the technical feasibility of modifying Units 1, 2, and 3 to burn wood is known. Nor have institutional impediments to long term arrangements for woodchip harvesting on this scale been analyzed. Moreover, given that at least 70% more of New England's forests would have to be harvested than are at present to satisfy Brayton Point's fuel requests, conversion to wood would result in significant adverse environmental consequences.

Use of wood as a primary fuel at Brayton Point Generating Station would require extensive modifications for fuel storage, fuel handling, and fuel combustion. Wood received in chipped form would require special storage facilities to avoid the problems of rot, which is extensive in humid areas; spontaneous combustion due to build-up of methane gas formed during fermentation of stored wood; and freezing of wet wood. Prior to combustion, wood would require drying using waste heat present in stack gas. This would require the construction of drying facilities. Since wood is too fibrous to allow abrasion and injection as a pulverized fuel, the boilers at Brayton Point would have to be converted to a spreader-stoker configuration. For wood combustion, significantly greater quantities of oil would be required for flame ignition and stabilization than when burning coal.

Wood is not a feasible fuel for firing Brayton Point; if wood is to be used to fire steam generating plants, it would be more appropriate to use it in northern New England power plants thereby cutting its cost (especially the value of petroleum to transport it) in half.

Refuse-Derived Fuel

The feasibility of generating electric power on a large scale from refuse-derived fuel (RDF) is well documented in the Proceedings of the Fourth and Fifth National Congresses on Waste Management Technology and Resource and Energy Recovery, the 1976 National Waste Processing Conference, and the EPA/EEI Proceedings on the Use of Solid Waste as a Fuel by Investor Owned Electric Utility Companies. For example, in Ames, Iowa in 1975, a pulverized coal boiler of 33-MW capacity has been modified to burn RDF to supply up to 20% of its heat input (this is the generally accepted maximum RDF firing rate). In that same year, a 125-MW pulverized coal boiler at the Union Electric power plant in St. Louis was modified to accept up to 10% of its heat input as RDF. The RDF at these first generating plants have been, essentially, shredded refuse.

More recent work in New England has focused on a proprietary fuel, "ECO-II fuel" produced and marketed by Combustion Equipment Associates (CEA) of New York, New York. They have contracted with the Connecticut Resource Recovery Authority to process the refuse from 400,000 residents (2200 tons of solid waste/day) in the greater Bridgeport area. This waste is sorted and to the combustible fraction, a chemical embrittling agent is added prior to comminution. The final dried product is a fine powder with heating value of approximately 7800 BTU/lb, and a sulfur content of less than 0.5%. The Bridgeport facility will produce the ECO-II fuel product which will be burned at the United Illuminating Company's Bridgeport Harbor Generating Station where it will be mixed with residual fuel oil. The Bridgeport CEA facility is presently (July 1979) undergoing a start-up phase. It is expected that the Bridgeport Harbor Generating Station will burn ECO-II fuel as a residual fuel oil supplement by late August 1979.

Tests of the ECO-II fuel have also been made at the Narragansett Electric Company's South Street Station in Providence, Rhode Island. The results of a five-week test burn of 220 tons of ECO-II fuel that was completed in June 1979, are not all available. They will be incorporated into an application that the utility will file with the State of Rhode Island for a SIP revision which would allow the burning of the ECO-II fuel. The ECO-II fuel does not meet the current SIP for particulates and Providence is a non-attainment area for particulates.

At the present time there is no commercial source of RDF which could supply Brayton Point's needs if the utility decided to burn RDF. To burn RDF at Brayton Point it would be necessary to construct a large RDF plant. The operation of this plant would require reliable access to the refuse of approximately two and one-half million people to provide sufficient RDF to supply 20% of the heat input to Units 1, 2, and 3 at an 80% load factor. The RDF plant operation would also require an approved landfill site for disposal of the non-combustible solid waste from the processed refuse. This would require much careful planning and it is not clear that population density is high enough in the vicinity of Brayton Point to provide a sufficient quantity of refuse for the generating station's demand.

Refuse-derived fuels are not viable alternative primary fuels for Brayton Point Units 1, 2, and 3.

6.3 EARLY RETIREMENT

Early retirement of Brayton Point Generating Station Units 1, 2, and 3 (life expectancy 24 years) would remove 1157 MW of generating capacity, 25.7% of the New England Electric System (NEES) 1978 capacity. By 1984, NEES is scheduled to have an additional 114 MW capacity, from its share of Seabrook I. Small and inefficient units are scheduled to be retired as the new, larger, more efficient units are brought on line. The Brayton Point units are among the most efficient units in NEES and would not be included in such a retirement schedule.

Early retirement of Brayton Point Units 1, 2, and 3 would shift the generating load to other NEES units or force the purchase of power from outside NEES. Assuming that this generating load were transferred to another site in the northeastern United States, the choice of likely fuels is limited to oil, coal, and nuclear. Use of oil would clearly be contrary to the intent of ESECA. Use of coal at a site other than Brayton Point would be pointless since there are no technical or environmental disadvantages to Brayton Point as a coal burning site.

Early retirement of Brayton Point Units 1, 2, and 3 is not a valid alternative to coal conversion.

6.4 NO ACTION

The no action alternative would result in continuation of present conditions at Brayton Point as described in Section 2.1. Although Units 1, 2, and 3 are already base-load units (because of their high efficiency) in NEES, a slight increase in capacity factor and thus in oil consumption is projected (Table 2-2). The ESECA Programmatic EIS indicates that supplying this quantity of oil over the anticipated life of the units is technically feasible though subject to political uncertainties. There would be, thus, a risk of generating shortfall which could occur in the future as it did in 1974.

An extensive discussion of environmental impacts of the no action alternative on a program basis is presented in the ESECA programmatic EIS. Major impacts for the likely scenario at Brayton Point are given here.

Oil for Brayton Point would be transported by oil tanker. Tanker traffic would be expected to increase slightly over the next few years to meet the increased power generation described above. The most serious environmental impacts on air, water and biota would result from an oil spill anywhere near the U.S. coast, within Narragansett Bay, within Mt. Hope Bay, or at the Brayton Point dock. As much as 50% of an oil spill could evaporate into the air. Oil spills which catch fire would also introduce additional pollutants into the air. The presence of a surface layer of oil or dispersed oil from an oil spill would make marine waters unfit for uses designated under Massachusetts classifications (Appendix A). Oil spills can injure marine organisms and water fowl due to coating with oil, toxic concentrations of petroleum-related compounds and detergents used to clean up oil spills, and destruction of habitat and feed supplies. By contrast, a collier accident and ensuing coal spill would have a limited impact on water quality at the time of the spill and would destroy (bury) less than an acre of ocean or estuary floor.

The use of coal would require land for ash disposal and use of oil would not.

The no-action alternative does not achieve the congressional goals expressed in ESECA.

7. SUMMARY OF ISSUES RAISED IN PUBLIC COMMENTS CONCERNING THE BRAYTON POINT DRAFT EIS

A number of issues were raised in the public comments concerning the Brayton Point Draft EIS (October, 1978), both in written comments and in testimony received at the public hearing that was held in Somerset, Massachusetts on November 21 and 22, 1978. The major issues fall into one of three categories; water quality, air quality, and human factors.

7.1 WATER QUALITY

7.1.1 Standards

Various comments were raised concerning the issue of water quality standards used or discussed in the text of the DEIS. Table 3-2 of the draft incorrectly labeled column 3 as Federal standards when it should have read criteria. This was corrected in the FEIS. Additionally, it was contended that the actual numbers used for criteria were in many instances incorrect. The intent of using criteria values was to provide a quantitative number that could be compared with actual or probable discharges from coal pile runoff and to use these numbers in assessing the impact of the runoff on overall water quality. Three sources of water quality criteria were used: the 1972 study for the EPA carried out by the National Academy of Sciences and the National Academy of Engineering, the 1976 EPA study, and 1979 EPA first phase draft criteria developed in response to a consent decree to determine new quantitative criteria for some 69 hazardous or toxic substances. To date, only 27 of the criteria have been published, and these only in draft form. Only arsenic is included among the 27 substances of the pollutants of concern in the EIS.

For a number of parameters, quantitative values are available only in the 1972 study. These numbers were based on the best information available to tne scientists empaneled to write the study. In many cases, due to limited data availability, the numbers are conservative determinations as to probable hazardous concentrations; as conservative estimates, they provide a margin of safety in dealing with uncertainty. Because of the lack of precision in determining these numbers, EPA in its 1976 study substituted general considerations of lethalness, usually specifying for each parameter that concentrations should not exceed 0.01 of the concentration which was lethal to 50% of a sensitive resident species over a period of 96 hours (0.01 of the 96-hour LC_{50}). This criterion, of course, depends on specification of a sensitive resident species as well as its 96-hour LC_{50}. This would have to be done on a site specific basis for Mt. Hope Bay in order to incorporate native species and their particular sensitivities to the pollutants under consideration. Such work is beyond the scope of the EIS.

New criteria values will be developed for nickel, iron, and manganese by EPA. These numbers may be less strict than the present (1972) numerical values, but this cannot be predicted. At present, the only values available for assessing the impact of coal pile runoff are those values given in Table 3-2 of the FEIS.

Use of these values in the EIS does not bind NEPCo, the Commonwealth of Massachusetts, or EPA to any specific type or level of wastewater treatment. Before coal firing operations can take place, a revised NPDES permit will be issued to regulate discharges from activities related to coal conversion. This permit will be developed and issued jointly by the Commonwealth's Division of Water Pollution Control and EPA; specific discharge limitations will be based on the most current information available at time of issuance and any new regulatory restrictions that may exist.

It was pointed out that the EPA Effluent Guidelines for rainfall runoff at existing sources have been remanded by a federal court to EPA for review and reissuance. The Effluent Guidelines Division of the Office of the Assistant Administrator for Water and Hazardous Materials indicates that a new draft version of these guidlines will be published in June or July of 1979. The specific pollutants to be controlled and the specific discharge limitations have not yet been determined. Once published in draft and final forms, these guidelines will determine minimum requirements for the new NPDES permit as it applies to coal pile runoff. Pollutants that are not covered by these guidelines may still be subject to NPDES limitation based on the judgement of the State and EPA.

7.1.2 Coal Pile Runoff

Numerous comments were received concerning the issue of coal pile runoff, possible levels of contaminants and needs for control. In the FEIS, Table 3-2 has been changed to incorporate only actual monitored runoff data from existing coal piles. Such studies are few and can only provide a general indication of the levels of contamination that might be expected. In Table 3-2, the mean values for coal pile runoff as measured at the Tennessee Valley Authority (TVA) plant have been used. The concentration values used are much lower than the values that were used in the table in the DEIS but still high acidic coal is used. Because only monitored data is used, certain pollutants are not listed (as they were not monitored). Selenium is the prime example. Many comments indicated concern over the possible harm that might result from discharge of this substance. This concern was generated by the high concentration indicated in the DEIS. It has been determined that this value was 1000 times higher than actually measured in the experiment; the value was incorrectly published in the source document.

7.1.3 Water Quality Modeling

Extensive water quality modeling was not possible due to data limitations and the scope of the EIS. In order to provide an alternative assessment to that presented in the DEIS, a new modeling approach was developed and included in the FEIS. This approach involved modification and simplification of a basic dispersion equation commonly used in air and water quality modeling exercises. Modification allows one dimensional modeling of the maximum extent of the impact of pollutants discharged from coal pile runoff before they are diluted to acceptable (criteria) levels. This model shows the maximum distance from discharge point before the pollutant plume is sufficiently mixed so that concentrations are below criteria levels. As the plume proceeds from the discharge point, certain lateral and vertical mixing is assumed to occur, while the central portion of the plume (at a width equal to the width at discharge) maintains a concentration above criteria levels. Calculations are made for each pollutant of concern for the distance from the discharge point at which sufficient mixing has occurred so that the particular pollutant is no longer above its criteria concentration.

7.1.4 Dredging

NEPCo has indicated that no dredging will take place as a result of the proposed action. Periodic maintenance dredging will be required regardless of whether or not the station converts to coal. When maintenance dredging does occur, it will be subject to the regulation of the U. S. Army Corps of Engineers. NEPCo has also indicated that it does not plan to construct a new dock, which would have required dredging. As a result, all references to dredging activities have been deleted from the EIS.

7.2 AIR QUALITY

7.2.1 Air Pollution Emission Rates

Many of the emission rate issues raised can be answered by listing calculation assumptions in more detail. Table 7-1 lists the emission rate calculation assumptions. The firing rates and the emission factors from Table 3-13 can be used to calculate uncontrolled emission rates. Note that the total nitrogen oxide emissions do increase with coal firing (contrary to one comment received) although not to the degree suggested in the Draft EIS. The particulate and sulfur dioxide emission rates are more complicated.

The oil-fired particulate emission rates in the Draft EIS were incorrect because they were calculated using incorrect control efficiencies. The rates in the Final EIS are based on measurements (Table 7-2). Although measured values are the most accurate, assumptions had to be made to make the rates compatible with Tables 3-11 and 3-12. These are also listed in Table 7-2. The coal-fired emission rates were modified by control efficiencies chosen so that emission rates meet the SIP limitations. Several commenters suggested that the coal-fired and oil-fired particulate rates were approximately equal. The particulate control equipment at Brayton Point has been designed for even greater collection efficiency as shown in the "design" emission rate calculations. Therefore, the actual increase in particulate emissions could be less than the emissions legally permitted which are used in the Draft and Final EIS.

The sulfur dioxide emission rates are directly related to the sulfur content of the fuel. The sulfur variability in fuel assumptions were questioned by several commenters. DOE assumed that the sulfur content of the coal was equal to the 24-hr limit (2.31 lbs $S/10^6$ BTU) for the 3-hour and 24-hour averaging periods and that the annual average sulfur content met the monthly limit (1.21 lbs $S/10^6$ BTU). Although the sulfur content

TABLE 7-1

EMISSION RATE CALCULATION ASSUMPTIONS

	UNIT 1	UNIT 2	UNIT 3	UNIT 4	REFERENCE
STATION DATA					
1) Design Heat Rate (10^6 BTU/MW-hr)	9.3	9.3	8.8	10.9	EIS p. 2-10
2) Net Unit Output (MW)	250	250	657	440	EIS p. 2-10
3) Maximum Heat Rate (10^9 BTU/hr)	2.33	2.33	5.78	4.80	(1) x (2)
4) Boiler Type	Ory Bottom	Ory Bottom	Ory Bottom Tangentially Fired	Dry Bottom Tangentially Fired	-
FUEL DATA					
Maximum Rates					
5) High Sulfur Coal Heat Content (10^6 BTU/ton)	27.65	27.65	27.65	-	EIS p. 2-15
6) High Sulfur Coal Firing Rate (ton/hr)	84.3	84.3	209.	-	(3)÷(5)
7) High Sulfur Oil Heat Content (10^6 BTU/bbl)	6.22	6.22	6.22	6.22	EIS p. 2-15
8) High Sulfur Oil Firing Rate (bbl/hr)	375	375	929	772	(3)÷(7)
9) Capacity Factors (%)	83	83	83	45	EIS p. 2-13
Average Rates					
10) High Sulfur Oil (bbls/hr)	311	311	640	288	(8) x (9)
11) Coal (tons/hr)	70	70	173.5	-	(6) x (9)
EXAMPLE CALCULATIONS					
12) NO_x Emission Factor (lbs/10^3 gal)*	105	105	50	50	EIS p. 3-49
13) NO_x Emission Rate Oil Firing (lbs/hr)	1650	1650	1950	1620	(12) x (8)
14) NO_x Emission Factor (lbs/ton)	18	18	18	-	EIS p. 3-49
15) NO_x Emission Rate Coal Firing (lbs/hr)	1520	1520	3760	-	(14) x (6)

* Conversion factor is 42 gal/bbl.

TABLE 7-2

PARTICULATE EMISSION RATES MEASURED AT BRAYTON POINT

Measurements (Donovan, 1978) Date	Unit	Particulate Emission Rate ($lbs/10^6$ BTU)
Mar 24 - Apr 5, 1978	1	0.050
Mar 31 - Apr 4, 1978	2	0.083
Mar 3 - Mar 7, 1978	3	0.028
Apr 12 - Apr 13, 1978	4	0.025

EMISSION RATE CALCULATIONS

Unit	1	2	3	4
Oil Fired Emissions				
TSP Emission Rate ($lbs/10^6$ BTU)	0.050	0.083	0.028	0.025
Maximum Heat Rate (10^9 BTU/hr)	2.33	2.33	5.78	4.80
TSP Emission Rate (lbs/hr) Measured	116	193	162	120
Estimated TSP Emission Rate (lbs/hr)	394	394	975	810
Control Efficiency	70.5	50.9	83.4	85.2
Coal Fired Emissions				
SIP Emission Rate Maximum ($lbs/10^6$ BTU)	0.08	0.08	0.08	
Maximum Heat Rate (10^9 BTU/hr)	2.33	2.33	5.78	
Maximum Emission Rate (SIP Limit) (lbs/hr)	186	186	462	
Estimated Uncontrolled Emission Rate (lbs/hr)	12900	12900	32000	
Necessary Control Efficiency (%)	98.6	98.6	98.6	
Design Maximum Emission Rate ($lbs/10^6$ BTU)	0.06	0.06	0.06	
Design Maximum Emission Rate (lbs/hr)	140	140	347	
Necessary Control Efficiency (%)	98.9	98.9	98.9	

in the "worst case" 3-hour period would exceed the 24-hour average limit, insufficient data were available to determine the 3-hour sulfur content.

7.2.2 Air Quality Modeling

This section describes the characteristics and limitations of the models used to project emissions and air quality impacts associated with both coal and fuel oil combustion. The short-term impacts associated were made using PTMTP. An earlier modeling study of the Brayton Point Generating Station (Radian, 1975) was adapted for the long-term concentrations. The procedures are described below.

The basic model used for the short-term concentration estimates was PTMTP. PTMTP is an EPA-approved Gaussian plume model that predicts atmospheric concentrations for short time periods (Khanna, 1976). DOE used this model for averaging times of 24 hours or less. Terrain effects were incorporated by reducing the stack height so that the difference between the plume and the ground at a specific location was approximated.

The short-term concentrations from Units 1, 2, 3, and 4 were predicted using meteorological data for a day when high sulfur dioxide measurements were recorded at the Globe Street monitor. On the day used for modeling, persistent strong winds blew from the station towards the monitor. It was assumed that the concentration is directly proportional to emission rate and that the changes to the stack characteristics under different operating scenarios were negligible. With these assumptions, it is possible to scale results for different emission rates and pollutants, assuming that the pollutants all behave like gases. The 1-hour, 3-hour, 8-hour and 24-hour maximum concentrations predicted during this day were used for the scaling estimates.

The long-term average concentrations were estimated using CDM (Radian, 1975). The annual average concentrations were estimated by scaling the Radian results for appropriate emission rates. An annual joint frequency distribution of wind speed, wind direction, and atmospheric stability from the Green Airport in Warwick was used as meteorological input for this model.

7.2.3 Background Air Quality

The revisions to the SIP relaxed the sulfur in fuel limitations but made the particulate emission limits more stringent. This trade-off was made, in part, to reduce the generating station's impact on local particulate levels. The ambient air quality predictions made in the Draft EIS showed that the station would contribute to particulate standard exceedances in the Fall River area. It was suggested that the high background levels listed in the EIS were unrealistic so that the station's impact would not exacerbate an exceedance. An EPA study (Oi *et al*., 1977) showed that the primary cause for the exceedances was traffic-generated road dust and that the Brayton Point and Somerset stations did not contribute significantly to the particulate problem. The EPA study used TSP monitors that were not representative of conditions outside the region influenced by roadways. In 1978, a special monitoring program attempted to quantify the problem using monitors that met the EPA guidelines (i.e., Zone A monitors). Although the final conclusions are not available, exceedances were measured during the study. This should not change the major conclusions of the first study, namely, the Fall River particulate exceedances are cause by traffic-generated road dust. DOE concedes that the background particulate levels in the Draft and Final EIS are probably not representative of background levels away from roadways. However, this does not change the primary conclusion that particulate concentrations attributable to the coal conversion will have a negligible effect on local TSP levels or exceedances.

The background air quality concentrations were estimated for the study area in the following manner. It was assumed that the short-term concentrations measured on the days with the highest concentrations when the wind was not blowing from the station to the monitor could be used as conservative estimates of background. It was also assumed that background concentrations estimated for 1977 also represented current conditions and conditions in 1984. Finally, the background concentrations were assumed to be equal throughout the area impacted by the station.

7.2.4 Air Quality Impact on Rhode Island

Several comments were received that requested additional information about the effect of the proposed action on Rhode Island. Rhode Island is an attainment area for sulfur dioxide while Providence is the only non-attainment area for particulates. Bristol and Tiverton are both about five miles from the station. Maximum station sulfur dioxide concentrations will increase in both areas about 15%: the 24-hour average will increase from 156 ug/m^3 to 184 ug/m^3 and the 3-hour average will increase from 218 ug/m^3 to 253 ug/m^3. Particulate concentrations will also increase slightly. Note that the annual impact will be reduced over the impacts in Massachusetts because the wind does not blow as often from the north and east. The station conversion will not cause any violations of the NAAQS in Rhose Island.

7.3 HUMAN FACTORS

7.3.1 Transportation Impacts

At the public hearing on the Draft EIS, the issue of public safety was raised concerning the truck traffic from ash removal operations. The Wilbur School, with approximately 95 students in grades kindergarten through 4, is located along the only access road to the Brayton Point Generating Station. Approximately 76 truck movements per day (38 round trips) would pass by the school.

Several alternatives for reducing transportation impacts in the vicinity of the school were discussed. One alternative was the construction of a ramp from Brayton Point Avenue onto Interstate 195. This would have eliminated the truck traffic in the vicinity of the Wilbur School. However, the construction of a ramp would have required the approval of (and funding from) the Federal Highway Administration, which stated that the ramp could not be built. (See text of letter, Section 9.) Another alternative was to impose the same regulations on the ash hauling operations that were imposed on the utility back in 1974 when the utility also burned coal. During previous coal burning operations, trucking in the vicinity of the Wilbur School was not permitted during the time period in which school buses picked up or delivered students to the school. Approximate hours for the suspension of activities were: 7:00 am to 8:50 am, 11:30 am to 12:45 pm, and 2:20 pm to 3:45 pm. There were no incidents under these regulations in the past. These same regulations will be implemented after coal conversion at Brayton Point.

7.3.2 Socioeconomic Impacts

Mr. Elwood Robertshaw, business manager of the International Brotherhood of Electrical Workers, Local 437, stated that the Draft EIS neglected to indicate that conversion of the Brayton Point Generating Station would have beneficial economic impacts in the Fall River area. Unemployment in the area's construction trade is approximately 50%. Coal conversion at the Brayton Point Station would employ 500 to 600 people for four to five years and thus, would have a favorable impact on the local economy.

8. WRITTEN COMMENTS RECEIVED

I. Federal Agencies

A. Department of Agriculture, Soil Conservation Service
B. Department of the Army. Corps of Engineers
C. Department of Energy, Region I, Boston, Massachusetts
D. Department of Health, Education, and Welfare
E. Department of Housing, and Urban Development
F. Department of Interior, Office of the Secretary
G. Department of Interior, Bureau of Mines
H. Department of State
I. Department of Transportation, Federal Highway Administration
J. U. S. Department of the Treasury
K. U. S. Environmental Protection Agency
L. National Science Foundation

II. State Agencies

Commonwealth of Massachusetts

A. Department of Environmental Quality Engineering
B. Energy Facilities Siting Council
C. Energy Office
D. Thomas Norton, House of Representatives

Rhode Island

E. Department of Environmental Management
F. Energy Office
G. Providence Department of Planning and Urban Development

III. Private Organizations

A. The Energy Exchange
B. Massachusetts Voice of Energy
C. New England Energy Task Force
D. New England Power Company

IV. Private Individuals

A. Alfred Dupont
B. Eugene Kosmiski
C. Albert Remy
D. Charles Schofol
E. Joseph Silvia
F. Rudolph St. Pierre
G. Henry Vaillancourt

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

29 Cottage Street, P.O. Box 848, Amherst, Massachusetts 01002

November 8, 1978

Mr. Steven A. Frank, Chief
Environmental Evaluations Branch
Room 7202, 2000 M Street, NW
Washington, D.C. 20461

Dear Mr. Frank:

Subject: DOE/EIS - 0036-D, Draft Environmental Impact Statement, Coal Conversion Program, New England Power Company, Brayton Point Generating Station, Units 1, 2 and 3

The above referenced document was forwarded to this office for review and comment. We have reviewed the statement and have no comments that are relative to our areas of concern.

The opportunity for review and comment is appreciated.

Sincerely,

Benj Isgur

Dr. Benjamin Isgur
State Conservationist

cc:
G. H. Loomis, Director, Environmental Services Division, Washington, D.C.
Director, Office of Federal Activities, Environmental Protection Agency, Washington, D.C.
Dr. Evelyn Murphy, Secretary, Executive Office of Environmental Affairs, Boston, Mass.

NOV 16 1978

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

15 Dec 1978

DAEN-CWR-P

Mr. Steven A. Frank
Chief, Environmental Evaluation Branch
Department of Energy
Room 7202
2000 M Street, NW
Washington, D. C. 20461

Dear Mr. Frank:

This is in response to your letter of 13 October 1978, which provided a copy of the Draft Environmental Impact Statement (DEIS) for Coal Conversion at the New England Power Company's Brayton Point Generating Station, Plants 1, 2, and 3, in Somerset, Massachusetts, for our review and comment.

We have reviewed the DEIS in accordance with our areas of responsibility and expertise and offer the following comments:

a. General comments: The DEIS indicates that conversion activities could result in some long term adverse impacts. Most of these activities would not be regulated within the jurisdiction of the U. S. Army Corps of Engineers programs or responsibilities. These impacts would be caused principally by runoff from stock piled coal and by air pollution from burning coal. However, impacts associated with dredging, disposal of its material, and additional docking facilities would be reviewed under the Corps regulatory responsibility. The impact statement should discuss the dredging quantities, the area to be dredged, the sediment characteristics, the location of the disposal site and impacts expected to the aquatic environment from the disposal. This information is necessary in the impact statement for the Corps to evaluate a permit activity. Although the specific plans for dredging and docking facilities may not have been finalized for the Draft EIS, the impact statement should present the above information for all practicable alternative dredging and disposal schemes and docking facilities. In addition, alternatives to dredging should be discussed and this might include coal delivery by rail or truck.

b. Detailed Comments:

(1) The first paragraph on page 3-8 of the Draft EIS should be corrected to note that a Corps permit would be required under

a. See section 10.1.4 on dredging. NEPCo has indicated that dredging is not a part of the proposed action. All references to dredging have been deleted from the final EIS.

16 DEC 1978

DAEN-CWR-P
Mr. Steven A. Frank

Section 10 of the River and Harbor Act of 1899 for any work affecting the navigable waters of the United States. This would include dredging, construction of new dock facilities, or the modification of existing facilities if the work is in waters around Brayton Point.

(2) Permit reviews would also be necessary for the disposal of dredged material if placed in a water or navigable water of the United States. Under the authority of Section 404 of the Federal Water Pollution Control Act of 1972, as amended (presently referred to as the Clean Water Act of 1977), a permit from the Corps would be required for the discharge of dredged or fill material into waters of the United States and adjacent wetlands. No discharge of dredged or fill material will occur at a proposed disposal site in a navigable water if the Administrator of EPA determines that such a discharge will have an unacceptable adverse impact on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife or recreational areas. The first paragraph on page 3-8 should accurately reflect this information.

(3) In a like manner, if the proposed project should include the disposal of dredged materials in ocean waters a permit from the Corps would be necessary. Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 authorizes the Corps to regulate the dumping of dredged material into the ocean by evaluating such discharges according to the EPA Ocean Dumping Criteria of 11 January 1977 (Federal Register).

(4) The above discussions would provide information to help evaluate the impacts to shellfish beds in the Brayton Point area and the impacts at a disposal site. This would help define to what extent shellfish beds would be "endangered" (page 3-61) while supporting your general conclusion that impacts associated with dredging and disposal would be "short term" (page 3-68), except for the removal of shellfish which would be "long-term" (page 3-68), but "not a significant" impact (page 3-19).

(5) We enthusiastically favor the mitigating measures briefly discussed on page 3-68. Dredging during the off-spawning period, and shellfish sampling with effective transplantation would help to minimize impacts associated with dredging. The impact statement should briefly discuss the implementation and coordination of the sampling program.

(6) Does the discussion on "Direct Land Use (Archeology/Paleontology)" include a review of the underwater areas to be affected by new dredging and dock construction? Such considerations should be addressed in the impact statement.

1) This part of the text has been deleted.

2) Same as 1 above.

3) Same as 1 above.

4) Same as 1 above.

5) Same as 1 above.

6) Same as 1 above.

15 DEC 1973

DAEN-CWR-P
Mr. Steven A. Frank

We appreciate the opportunity to review and comment on this DEIS. Should you have any questions, you may contact Mr. William F. McCarthy, Chief, Environmental Analysis Branch, U. S. Army Engineer Division, New England, 424 Trapelo Road, Waltham, Massachusetts 02154, or by calling (617) 894-2400, Extension 552.

Sincerely,

James W. Peck

JAMES W. PECK
Colonel, Corps of Engineers
Assistant Director of Civil Works,
Atlantic

1 2 DEC 1978

Department of Energy
Region I
150 Causeway Street
Boston, Mass. 02114

MEMORANDUM FOR BARTON R. HOUSE
ASSISTANT ADMINISTRATOR
OFFICE OF FUELS REGULATION

FROM: HAROLD J. KEOHANE
REGIONAL REPRESENTATIVE Harold J. Keohane

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR COAL CONVERSION OF BRAYTON POINT GENERATING STATION, PLANTS 1, 2 AND 3, SOMERSET, MASSACHUSETTS

We have reviewed the above-mentioned impact statement and wish to make the following additional editorial suggestions:

General Comment:

1. We have looked at the comments submitted by New England Power Company at the public hearing of November 21, 1978. They appear to be technically accurate and should be incorporated into the final EIS if possible to make the statement reflect updated situations.

Specific Comments:

1. Page vii, Section 4-Mitigating Measures: We feel that there is another mitigating procedure for coal pile runoff and that is to collect and treat all coal pile runoff through the waste water treatment system.

2. Page 2-1, Section 2.1.2 - The last two sentences are repeated again in Section 2.1.5 on page 2-12. Should one of these statements be deleted?

3. Page 2-7 - The paragraph before Section 2.1.4 should be deleted. It is an introductory statement that appears to be unnecessary.

4. Page 2-17, Section 2.2.1, fourth paragraph - It is suggested that the first sentence be rewritten by defining "area" and reduce the wordiness, i.e., the Southeastern Massachusetts-Northern Rhode Island area contains limited mineral resources.

5. Page 2-17, Section 2.2.1, fifth paragraph:
   a) Second line - Add the words "the potential for" before "significant amounts". The coal deposit has not been fully evaluated yet.

General Comment

1. NEPCO's comments have been incorporated into the final EIS.

Specific Comments

1. The text has been changed.

2. The sentences on page 2-1 have been deleted.

3. The paragraph has been deleted.

4. The text has been revised.

5. The text has been revised.

b) Third line - Delete "of about 250 million years ago". The existing reference to the Pennsylvanian Period defines the geological time adequately.
c) Fifth line - Change "multi-million" to "200,000". This cost is more exact.
d) Sixth line - Change "will take several more years" to "is almost complete". Our latest information indicates the study is almost finished and will not be extended.

6. Page 3-1, Section 3 - The description paragraph at the top of the page is not necessary and could be deleted.

7. Page 3-5, Section 3.1.5:
   a) Partial paragraph at the top of the page - It is felt that some reference should be made to the fact that the discharge will need a NPDES permit from EPA.
   b) First complete paragraph - This paragraph could be deleted. It is general material which is discussed in the following paragraphs.
   c) Last paragraph, third line - Add "class" before "SB" to specifically define the water quality standard.

8. Page 3-6, first paragraph, eighth line from top - Add "class" before "SB" to specifically define the water quality standard.

9. Page 3-19, summary paragraph, first line - Delete "To summarize". This phrase is just repeating that this section is a summary.

10. Page 3-47, first paragraph, top of page - This sentence could be deleted. This is an introductory type paragraph which is not needed.

11. Page 3-52, last paragraph, last line - Change "smelled" to "detected by the sense of smell".

12. Page 3-61, Section 3.1.4:
    a) First paragraph, second line - Delete "combustion to implement the NOE". This phrase does not add any additional information to the sentence.
    b) Second paragraph - Delete the second sentence and start third sentence by changing "Such" to "Surrounding". The second sentence describes the local communities, which is not necessary for the topic under discussion.

13. Page 3-90, Section 3.2.3, last line - Change "converting" to "conversion" and delete "a generating station from natural gas/oil". The entire EIS concerns conversion, and this additional phrase is not needed.

14. Page 3-91, second paragraph - This paragraph can be deleted. This is another introductory paragraph which is not necessary.

6. The paragraph has been deleted.

7a. The paragraph has been deleted; a general discussion of cooling towers is not appropriate for the Brayton Point Station.

b. The paragraph has been deleted.

c. The text has been revised.

8. The text has been revised.

9. The text has been revised.

10. The text has been revised.

11. The text has been revised.

12 a&b. The text has been revised.

13. The text has been revised.

14. The paragraph has been deleted.

15. Page 3-92, last paragraph, sixteenth line - Change "avenue" to "access route".

15. The text has been revised.

16. Page 3-94, Section 3.2.4 - Delete the first sentence. We are all aware that Brayton Point burns oil now.

16. The sentence has been deleted.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
GOVERNMENT CENTER
BOSTON, MASSACHUSETTS 02203

February 12, 1979

Mr. Steven A. Frank
Chief, Environmental Evaluations Branch
Room 7202
2000 M Street, N.W.
Washington, D.C. 20461

Dear Mr. Frank:

HEW's Regional Environmental Council has reviewed the DEIS on the Brayton Point Generating Station, Somerset, Mass.

Attached is a memo from our PHS agency. Also, we express strong concern that every safeguard possible be exercised to minimize the impact of the 74 truck trips per day on the school and its students.

1) See section 10.3.1

Thank you for giving us the opportunity to review this document.

Sincerely yours,

Donald Branum

Donald Branum
Regional Environmental Officer

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION

O : Donald Branum, Regional Environmental Officer DATE: January 18, 1979

DHEW - REGION 1
RECEIVED
JAN 22 1979

FROM : Ira J. Somerset
Regional Shellfish Specialist

SUBJECT: Review of EIS - Coal Conversion Program - NEPCO's Brayton Pt., Mass.

This is a well-written, general statement of possible environmental effects which would be caused by the reconversion of Units 1, 2, and 3 to coal from oil. Projected beneficial effects are a reduction of hydrocarbon releases (oil spills and evaporation), reduced sulfate levels, and savings of 12 million barrels of oil annually. Identified adverse effects include increased emissions of combustion products, dust, hydrocarbons, and nitrogen oxides. Water runoff from the coal pile will contain heavy metals and selenium. Channel dredging, increased truck traffic, and ash production and disposal requirements also will be necessitated by this project.

Recommendations are made to treat the coal pile runoff with pH adjustment and sedimentation to reduce the heavy metal discharges (except selenium) to the estuary. The ash will be trucked to a gravel pit in Freetown for disposal.

The EIS points out that there are high levels of heavy metals and organics in the sediment in the vicinity of the power plant. Although dredging will be required (and maintenance dredging subsequently), the impact of the dredging and disposal of these materials was not discussed. Mercury was found in the sediments at levels of approximately 3.4 mg/kg (inorganic), and selenium in coal pile runoff can be expected in concentrations of 13 to 25 mg/l (this will not be reduced by the recommended neutralization and sedimentation). The selenium could be very important since it is bioconcentrated and is a cumulative poison.

The fill area in Freetown is an abandoned sand and gravel pit about six feet above the water table. The EIS states that there should be no problem of groundwater contamination because of the low permeability of compacted flyash. Although the figures cited for compacted flyash are in the poor aquifer-poor drainage category, non-compaction, or irregular compaction or inclusion of bottom ash will result in higher permeability through the ash pile to the highly permeable sand and gravel layers.

Before the benefits of the reconversion to coal can be rationally assessed, specific performance data from similar plants should be evaluated, tests made in the M.T. Hope Bay area, and treatment requirements specified. Then, the effects and the costs of the change could be assessed. Items which appear to require further treatment are:

1. If sedimentation is required, how will the sediment be disposed of?
2. How to remove the selenium from the coal pile runoff?
3. Effects of coal and coal dust on the marine organisms in the area?
4. Effects of oil and fuel drips from trucks carrying ash?
5. Effect of spray cooling canals?
6. Effects of dredging the new channel?
7. Effects of dredged material disposal (and location)?
8. Effects of radioactive products released into the environment through the combustion and handling of coal.

Ira J. Somerset
Regional Shellfish Specialist

1. NEPCO has not specified how the sediment may be disposed. It may be disposed with the coal ash; it may be disposed with the oil bottom ash; or it may be disposed at the site in a separate storage area.

2. Selenium is not expected to pose a problem as it was anticipated in the Draft EIS. See Section 10.1.2.

3. The effects of coal and coal dust on the marine environment are not expected to be significant.

4. The effects of oil and fuel drips from trucks carrying ash are not expected to be significant.

5. The spray cooling canals are used only for Unit 4, which is not being converted to coal. No impact is anticipated.

6. Dredging is not part of the proposed action. See Section 10.1.4.

7. Same as 6.

8. The effect of radioactive products released from coal combustion is small and insignificant in comparison to natural background radiation.

REGION I
Room 800
J. F. Kennedy Federal Building
Boston, Massachusetts 02203

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
AREA OFFICE
BULFINCH BUILDING, 15 NEW CHARDON STREET
BOSTON, MASSACHUSETTS 02114

NOV 2 4 1978

IN REPLY REFER TO:

1.1SE

Steven A. Frank, Chief
Environmental Evaluation Branch, Room 7202
2000 M Street, N.W.
Washington, D.C. 20461

Dear Mr. Frank:

Re: DOE-EIS-0036-D
Brayton Point Generating Station
Coal Conversion Program
Somerset, Massachusetts

The Draft Environmental Impact Statement submitted to HUD's Office of Environmental Quality, for the conversion of the Brayton Point Generating Station from gas/oil to coal, has been referred to the Boston Area Office of HUD for review and comment.

This office has reviewed the above DEIS and finds no conflicts with future HUD objectives and proposals that may be undertaken within this SMSA boundary.

Thank you for giving this office the opportunity to review and comment on the Draft EIS.

Sincerely,

Area Manager

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

In Reply Refer To:
ER 78/1019

DEC 8 1978

Mr. Steve Frank
Division of Coal Utilization
Room 7202
2000 M Street, N.W.
Washington, D.C. 20461

Dear Mr. Frank:

This is in response to your agency's recent publication of the draft environmental impact statement for the Coal Conversion Program at Brayton Point Generating Station, Units 1, 2, and 3, Bristol County, Massachusetts. We have reviewed the document and have the following comments.

General Comments

We conclude that the statement generally discusses pertinent aspects of the proposed conversion and reflects the fact that consideration is being given to adequate environmental safeguards in areas of concern to this Department. Further, we feel that the conversion from oil and gas to coal would have no appreciable effect on mineral resource extraction and processing in New England except for the possible benefits of a more stable power supply.

Specific Comments

Page 2-17, paragraph 3

It is stated that 50,000 short tons of vanadium are mined near Woonsocket, Rhode Island. We are not aware of any vanadium reserves or mining operations in this vicinity. This should be checked.

Page 2-17, paragraph 4

Although the possibility of "significant reserves" of anthracite under the Narragansett Basin exists, exploration has not confirmed it. The statement's description of the seams should indicate how folding and faulting has disrupted continuity and that much

1. The Draft EIS was incorrect. According to the National Atlas of the United States of America, (U.S.G.S., 1970), the northwestern part of Rhode Island (Woonsocket area) has vanadium reserves of greater than 500 short tons.

2. The text has been revised.

more has to be learned. Instead of stating that the Department's Bureau of Mines is funding a multimillion dollar geological assessment, a more accurate statement would be: "The most recent assessments have been supported by the National Science Foundation and currently by the Bureau of Mines."

Page 3-2, paragraph 2

It is stated that three test holes each 1500 feet deep were drilled at Brayton Point. Our information is that only one of the test holes indicated a thick coal seam. It should also be stated that test holes were unable to demonstrate continuity of the seam. The sentence: "The depth of the bed is 732 feet." should read: "The depth to the bed is 732 feet." The "meta-coal" in the fifth sentence should be corrected to "anthracite."

Page 3-4, last paragraph

We are uncertain what is meant by the discussion regarding the cooling tower inasmuch as existing plant cooling methods presently employ canals and spray modules. This should be checked with the description of existing facilities and corrected if necessary.

Pages 3-8 and 9

The impact statement addresses the need for dredging the New England Power Co. ship channel and turning basin, modification of the existing dock facility, and periodic maintenance dredging. Under date of March 9, 1978, New England Power Co. applied to the Corps of Engineers for a permit to dredge the ship channel and deposit the resulting fill material. Comments made at that time by the Department's Fish and Wildlife Service (FWS) on the application included the following recommendations: (1) no wetlands be used as dredge-spoil area, (2) no dredging be conducted during the period March 15 to June 15 (to protect upstream-migrant alewives and spawn), and (3) the National Park Service be contacted regarding their possible interest in the disposal site.

FWS comments on any subsequent applications for maintenance dredging probably would include at least these same recommendations. Because of the heavy concentration of mercury known to exist in surface sediments of the Mt. Hope Bay complex, a recommendation probably would be made to employ methods to minimize sediment disturbance during dredging and to insure that no significant impact would result from deposition of spoil.

The draft statement indicates the Company has considered possible impacts to the environment from stack emissions, coal-pile

3. The text has been revised.

4. The paragraph has been deleted.

5. The text has been revised. Dredging is not part of the proposed action, according to NEPCo See Section 10.1.4.

runoff, ash pile runoff, and fugitive dust. Adequate safeguards appear to have been planned for the conversion process, to conform to the National Pollutant Discharge Eliminiation System (NPDES). We concur that effluent limits will have to be placed on iron, managanese, and selenium to protect Class SB uses of the Bay, and that a suitable monitoring system will have to be implemented to assure compliance. We concur, too, that precautions must be taken to prevent wind and water erosion of the ash fill at the Freetown deposition area.

Page 3-61

The statement is made that SO_2 (sulfur dioxide) emissions would damage plant life intermittently but would produce minimal long-term impacts. We believe that SO_2 emissions can have subtle, long-term effects on vegetation and soils through deposition of acid precipitation in the leaves and secondarily through root interactions in the soil. The effects on terrestrial animals are indirect, through the previously mentioned interactions, and the impacts are cumulative.

The impacts of acid precipitation on aquatic biota can be direct (rainfall or snow) or indirect (runoff of acidic water). The deleterious effects are not due entirely from the acid. Other agents from urban, industrial, and commercial sources, especially toxic heavy metals and organic toxins, may accompany the acidic inputs. The impacts, therefore, can be both cumulative and long-term.

The impact statement notes that there are no ambient air quality standards for sulphates (one source of acid precipitation). Thus "... no mitigation measures are required. However, sulphates can be reduced by reducing the amount of SO_2 emissions. If the Brayton Point Generating Station burns coal not exceeding the specified sulphur content, it will comply with State SO_2 standards and thus limit sulphate impacts ..." Every effort should be made, therefore, to minimize the impacts from sulphate emissions through use of lowest-sulphur-content coal possible.

We hope these comments will be of assistance.

Sincerely,

Deputy Larry E. Meierotto
SECRETARY

6. The text has been revised.

STATEMENT OF:

WILLIAM R. BARTON — Bowman
DIRECTOR OF THE NEW ENGLAND LIAISON OFFICE
U.S. BUREAU OF MINES
NEWMARKET, NH 03857
NOVEMBER 22, 1978 10:00 AM

BRAYTON POINT COAL CONVERSION WILL BE AN IMPORTANT STEP IN DIVERSIFYING NEW ENGLAND'S ENERGY MIX AND REDUCING REGIONAL DEPENDENCE UPON IMPORTED AND EXPENSIVE PETROLEUM. AFTER REVIEWING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE PROPOSED COAL CONVERSION PROGRAM, I AM CONFIDENT THAT IT CAN BE CARRIED OUT BOTH IN AN ENVIRONMENTALLY ACCEPTABLE AND ECONOMICALLY FEASIBLE MANNER. THE MONITORING PROGRAM TO BE MAINTAINED BY THE COMMONWEALTH OF MASSACHUSETTS WILL INSURE THAT AIR QUALITY STANDARDS WILL BE MET.

THE BUREAU OF MINES HAS WORKED WITH THE FEDERAL REGIONAL COUNCIL ENERGY TASK FORCE AND COAL COMMITTEE TO RECOMMEND AND ASSIST IN THE DEVELOPMENT OF A FEASIBLE CONVERSION ETHIC AND PLAN. IN ADDITION, WE SUBSCRIBED $5,000 TO HELP UNDERWRITE A SPECIAL EPA, MASSACHUSETTS DEQE, NEW ENGLAND POWER COMPANY, MASSACHUSETTS ENERGY OFFICE, DOE STUDY GROUP TO ARRIVE AT ACCEPTABLE COMPROMISES AND STANDARDS THAT WOULD MAKE CONVERSION TO COAL BURNING A FEASIBLE COURSE OF ACTION AT BRAYTON POINT. WE HOPE THAT OUR SUPPORT HAS BEEN OF HELP IN BRINGING THE COAL CONVERSION PLAN TO THIS STAGE ON THE ROAD TO POSSIBLE REALITY. A REALITY THAT SHOULD RESULT IN MORE ASSURED AND LESS COSTLY FUTURE ENERGY WHILE LONG-TERM SOLUTIONS TO OUR ENERGY PROBLEMS ARE BEING DEVELOPED. IT CAN AND MUST BE DONE WITHOUT VIOLATING THE ENVIRONMENTAL STANDARDS AND REGULATIONS MASSACHUSETTS AND NEW ENGLAND MUST ADHERE TO AND ENFORCE.

DEPARTMENT OF STATE

Washington, D.C. 20520

BUREAU OF OCEANS AND INTERNATIONAL
ENVIRONMENTAL AND SCIENTIFIC AFFAIRS

November 3, 1978

Mr. Steve Frank
Division of Coal Utilization
(DCU), Room 7202
Economic Regulatory Administration
Department of Energy
2000 M Street, N.W.
Washington, D.C. 20461

Dear Mr. Frank:

Officials of the Department of State have reviewed the Department of Energy's "Draft Environmental Impact Statement on the Coal Conversion Program, New England Power Co., Brayton Point Generating Station, Somerset, Massachusetts" and have no comments to make on it.

We appreciate the opportunity to review the draft statement.

Sincerely yours,

Bill L. Long

Bill L. Long
Acting Director
Office of Environmental
Affairs

8 I H

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE
100 Summer Street - Suite 1517
Boston, Massachusetts 02110

Draft EIS, Coal Conversion Program
New England Power Company
Somerset, Massachusetts

IN REPLY REFER TO: HB-MA

December 20, 1978

Mr. Steve Frank
U. S. Department of Energy
Division of Coal Utilization
Washington, D. C.

Dear Mr. Frank:

We have reviewed the Draft EIS submitted by you with respect to the possibility of providing access to I-195 to remove the ash hauling trucks of the New England Power Company from the local roads. We have also discussed the matter with Massachusetts Department of Public Works personnel at headquarters and district levels. This proposal is suggested as an alternate method to reduce their impact on the community.

Based on the assumptions used in the Draft EIS, there would be approximately 9 to 10 trucks per hour in an eight-hour-day involved in the operation to and from Freetown. These trucks would have to traverse approximately 1/2 mile to one mile of local residential streets.

Provision of vehicular access to the Interstate system is based on a demonstrated public transportation need and not permitted for private use or when the traffic desire is minimal. Unless there is a developed public demand for additional access to I-195, the State Highway Department would be unable to advance a proposal for another interchange. Accordingly, we are not in a position to support direct access from the plant property as a possible noise impact control measure as mentioned on Pages 3-102.

Sincerely yours,

N. J. Van Ness
Division Administrator

Edwin P. Holahan

By: Edwin P. Holahan, Assistant
Division Administrator

cc: Mr. Tierney, DPW
Mr. Hurley, DPW
Mr. Cronin, District 6 DPW

The reference to the possibility of the construction of a new ramp to provide the station with access to I-195 has been deleted.

DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

November 28, 1978

Dear Mr. Frank:

This is in response to Mr. House's October 13 request for comments on the draft environmental impact statement for the New England Power Company's Brayton Point Generating Station, Units 1, 2, and 3, Somerset, Massachusetts. The Department has no comment.

Sincerely,

Anthony V. DiSilvestre
Assistant Director (Environmental Programs)
Office of Administrative Programs

Mr. Steven A. Frank
Department of Energy
Chief, Environmental Evaluations Branch
2000 M Street, N.W., Room 7202
Washington, D.C. 20461

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

December 8, 1978

Mr. Steve Frank
U.S. Department of Energy
Economic Regulatory Administration
Division of Coal Utilization
Room 7202
2000 M Street, N.W.
Washington, DC 20461

Dear Mr. Frank:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the proposed coal conversion program at Brayton Point Generating Station, Somerset, Massachusetts.

As you know, EPA is also in the process of reviewing the Commonwealth of Massachusett's proposed State Implementation Plan (SIP) revision regulating coal burning at Brayton Point. We wish to advise you of new developments in Southeastern Massachusetts which directly affect the proposed SIP revision. The proposed revision was adopted by the Massachusetts Department of Environmental Quality Engineering (DEQE) and submitted to EPA based on monitoring data and analytical results available to the DEQE at the time the revision was prepared. The State's submittal and EPA's evaluation of it did not include consideration of certain new information which has recently become available. Specifically, unexpectedly high hourly SO_2 levels have been monitored recently in Fall River while Brayton Point Station burned high sulfur oil. The new data are inconclusive, but indicate that the DEQE and EPA must continue to closely scrutinize the plant's impact on ambient sulfur dioxide levels, particularly during the present winter heating season. However, because of the preliminary nature of the data, and because the monitored levels do not approach the National Ambient Air Quality Standard (NAAQS), EPA is proceeding with a proposed rulemaking to approve this revision, which will be followed by a 60 day public comment period. If continued monitoring indicates conditions which are significantly different from those on which the revision is based, the State and EPA will reevaluate the approvability of the revision and will provide further opportunities for public review.

The comments which are contained in the attachment were prepared in accordance with our responsibilities under the National Environmental

Policy Act (NEPA). They focus primarily on the project's potential impacts on air quality, and surface and groundwater quality, as well as the adequacy of the Draft EIS's assessment of these impacts.

For the reasons discussed in the attachment, we have rated this EIS ER-2, in accordance with our national rating system (see enclosed explanation).

I hope these comments are useful to you in preparing the Final EIS. If you wish to discuss our comments, do not hesitate the contact me at 617/223-4635.

Sincerely,

Wallace E. Stickney

Wallace E. Stickney, P.E.
Director, Environmental & Economic
Impact Office

Enclosures

EXPLANATION OF EPA RATING

Environmental Impact of the Action

LO -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully, the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.

EPA, REGION I COMMENTS ON THE
DRAFT EIS FOR THE PROPOSED COAL CONVERSION
AT BRAYTON POINT GENERATING STATION

AIR QUALITY

In general, we find the Draft EIS's conclusions with regard to air quality to be in substantial agreement with the conclusions of the Massachusetts Department of Environmental Quality Engineering (DEQE) and of EPA on the potential viability of coal burning at Brayton Point. The methods used appear to be different from our own, however, so that estimated impacts vary somewhat from the DEQE/EPA estimates. For the most part, the comments below are directed at further clarification of the specific assumptions made and the techniques followed.

One technical area where the EIS is weak involves the treatment of sulfur variability in coal. The phenomenon is not addressed in estimating the peak 24 hour and 3 hour SO_2 concentrations nor the annual average under the current SIP. Specifically, it appears that the same maximum sulfur content for 3 hour and 24 hour average predictions was assumed, although the maximum 3 hour average sulfur content would clearly be higher than that for 24 hours. Moreover, in making SO_2 projections, assuming coal is used under the present SIP (sulfur emissions not to exceed .55 lb/10^6 Btu), the EIS analysis mistakenly assumes that .55 represents an average sulfur content. This misinterpretation of the coal burning provisions of the current SIP results in an incorrect estimation of the baseline, against which increased SO_2 concentrations are measured. If the plant burned coal under the existing SIP (no short term revision), the situation would be far more restrictive and the resulting SO_2 levels lower than the EIS indicates. We wish to emphasize that the average vs. maximum distinction is precisely what necessitated proposing a specific regulation for coal burning at Brayton Point, rather than governing Brayton Point coal burning by an extension to the present temporary SIP revision for Southeastern Massachusetts. 1)

1) The final EIS does not include the projections for the old existing SIP because the proposed revision in the Draft EIS has been accepted and will govern coal burning at the station. The 24-hour maximum sulfur content was used for both the 3-hour and 24-hour average predictions because insufficient information was available on the sulfur content in coal distribution to estimate a 3-hour average sulfur content. No sulfur variation in the fuel was assumed.

An additional recommendation concerns the summary presentation in which the air impacts of increased emissions from coal use at Brayton Point are apparently compared to impacts of emissions under the present SIP, without short term revision. The appropriate comparison of coal impact and present conditions would be to compare coal to the existing high sulfur SIP, since this, rather than low sulfur oil, is indicative of present conditions. 2)

2) See 1 above.

The following specific comments are presented according to page number in the EIS. They highlight where sulfur in coal variability should be treated in the analysis and where clarification is desirable.

Comment		Response
Page 3-27:		
The discussion of impact on particulate levels notes an increase of 1 ug/m^3 in ambient 24-hour concentrations. This summary statement should make clear whether the estimated increase is over a base case of low sulfur or high sulfur fuel oil. The entire section is generally confusing on this question.	3)	3) The Final EIS includes current conditions and conditions under the new SIP only.
This summary paragraph further states that the exceedance of the secondary standard is due to background levels which currently exceed the standard. Use of the term "background" can be misleading; we suggest that "background" be defined or that the term "existing" or "non-plant related" replace "background".	4)	4) The text was revised.
Regarding the SO_2 summary discussion, we are unable to determine whether the "projected increase of 121 ug/m^3" results from the difference in use of coal vs. low sulfur oil or coal vs. high sulfur oil. This should be made clear in the summary sections.	5)	5) See 3 above.
Page 3-28:		
The EIS states that "impact on air quality in neighboring Rhode Island is small." Quantification in support of this statement should be provided to alleviate the concerns of Rhode Island.	6)	6) Rhode Island impacts have been calculated. See section 10.2.3.
Page 3-31:		
The current coal SIP is misstated. Specifically, .55 represents an "instantaneous" maximum (perhaps could be stretched to mean 24-hour maximum). The EIS mistakenly treats this as an average sulfur content.	7)	7) See 3 above.
Page 3-32:		
The discussion on applicability of New Source Performance Standards (NSPS) correctly states that a modification resulting from an ESECA order is not subject to NSPS. Noteworthy also is the fact that coal burning modifications to Brayton Point Station would not be subject to NSPS regardless of the ESECA order because the plant (Units 1, 2, 3) was constructed with the capability to burn coal prior to the issuance of NSPS. (40 CFR 60.2(h)).	8)	8) The text has been revised.
Page 3-38, 3-39, 3-46:		
Regarding existing particulate air quality, a distinction between Zone A and Zone B sites (defined in proposed EPA monitoring regulations), and summary data presented for each situation, would be valuable.	9)	9) This issue is discussed in the text on particulates.

Page 3-39:

Table 3-9 is unclear.

(a) What is the location of the projected levels? 10)

(b) How were the "background" levels estimated?

(c) What does the first footnote mean? Does this explain the method of projection of "background" to 1982?

Page 3-40:

What sulfur content coal was assumed for short term predictions? 11)

Page 3-41, 3-42, 3-44:

These tables represent the crux of our concerns regarding the treatment of sulfur variability. Under what coal sulfur content were the emissions calculated for each averaging time in each of the 4 SIP/NOE categories? 12) For example, for the maximum emission rates, it appears that 2.31 lb sulfur/10^6 Btu was used; but this represents a 24 hour maximum sulfur content and not the hourly maximum. Also the column under NOE/current SIP is incorrectly calculated by assuming a maximum of .55 lb sulfur/10^6 Btu.

Clarification of how the emission rates were derived would be helpful, especially regarding the very large differences between the NOE and oil calculations for TSP and NO_x.

Page 3-44:

Table 3-13. What sulfur content was assumed to generate each of the SO_2 concentrations? 13)

Page 3-45:

Quantification of the impact on Rhode Island should be provided. 14)

Page 3-46:

Table 3-14. Again, how is growth accounted for in 1982 projections? 15)

Page 3-53:

We recommend that the mitigation sentence be rephrased. Presently the statement implies that sulfur content will be limited to 1.57%; it should read "use of coal with an average sulfur content of 1.57%, or less." 16)

10) a) Background was assumed to be regional ambient levels not influenced by Brayton Point emissions.

b) The background was estimated as follows:

1) The time periods with the highest concentrations were examined to see if the generation station influenced the measurements.

2) The highest reading that was unaffected by the station was used to establish a conservative background level.

c) No changes were assumed due to growth.

11) Coal with a sulfur content equal to 3.19%. was used for the short-term averages.

12) See 1 and section 10.2.

13) See 1 and section 10.2.

14) See 6 above.

15) See 10 c above.

16) The text has been revised.

SURFACE WATER QUALITY

In our opinion, the Draft EIS's analysis of water quality impacts from coal and ash storage could be improved in several respects. Some of the deficiencies, discussed below, probably cannot be corrected until New England Power Company applies to EPA for the necessary NPDES permit modifications to accommodate the potential water discharge changes. At that time (100 days prior to initiation of coal-oriented discharges), New England Power should have identified more specifically the coal source and the spectrum of chemicals that may be present in the wastewater discharges.

It should be noted that since EPA's Effluent Limitations for Coal Pile and Ash Pile Runoffs have been remanded, the discharge limitations required in the NPDES permit will therefore be based on Water Quality Criteria, 1972. In addition, all applicable effluent standards developed for toxic materials under Sections 301, 304, and 307 of the Clean Water Act will be applied to each plant discharge. 17)

We wish to emphasize the importance of maintaining high water quality standards in Mount Hope Bay. This Bay is a rich spawning and nursery area for many types of aquatic species. The Bay has a slow flushing time of about 6 days with wide variations within it depending on the specific location. This slow flushing time combined with discharges of untreated or unwashed coal and ash pile runoff could result in bioaccumulation of toxic substances in the lower elements of the food chain. However, we believe that with use of stringent mitigating measures, discussed in the Draft EIS, these impacts can be minimized. 18)

1. According to the Draft EIS, New England Power is unable at this time to specify the source of the coal to be used at Brayton Point. Therefore, the EIS chemical analysis was based on a hypothetical coal sources. No justification is given for use of the selected coal pile runoff chosen from Wachtler et al. (1977). This very acidic (pH - 2.0) runoff from a Western type coal, although admittedly a worst case, may not truly represent the runoff from the expected coal pile. This acidity increases the formation of water soluble heavy metal compounds which are emphasized in the EIS. The more neutral coal (pH - 6.3 and 7.6) from more accessible Eastern or Applachian coals may be more appropriate for estimating the potential chemical constituents to be discharged. 19)

The simplistic concept of a mixing zone used in modeling the impacts of coal pile run off in Note 5 of Table 3-2 and described in the text is unacceptable. New England Power and its subcontractors have approached the thermal mixing zone problem through extensive computer programs. The chemical plume, because of its potential toxicity, should be given the same consideration and detailed study as the thermal plume in Mount Hope Bay. Therefore, the two columns of data concerning mixing zones are of little value in understanding the effects of the chemical plume upon the local biota around the discharge or upon the biological life in the Bay as a whole. 20)

17) The comment is noted and has been incorporated as appropriate in table 3-3 of the FEIS and in subsequent analysis.

18) Comment Noted.

19) In the FEIS, observed coal pile runoff values were used in Table 3-3.

20) In the FEIS, a different modeling approach is used. It is described in section 10.1.3 and in the text on pages 3-20 through 3-22.

The coal pile runoff data (untreated) test conditions are not described or explained. Are these average values to be expected during a total rainstorm event (0.7 cm in one hour)? Is this assumption correct when the water soluble chemicals on the surface of the coal are dissolved in the initial flush-out during the first portion of a rainstorm? The EIS should provide a hydrograph of a design storm event, the gross volume of runoff of the event, or the expected chemical concentration during the rainstorm event. 21)

In addition, the EIS should contain a description of the chemical plume location due to tidal action (incoming or outgoing) and its effects upon shellfish beds or finfish spawning grounds (Figure 3-1). 22)

We also request that the following information be provided in the final EIS:

- A sketch showing the wastewater discharge points that will be affected by the coal conversion (Figure 2.8 and 3.1). 23)

- Schematic diagrams of the current wastewater treatment system and the several other discharges as they now exist, and of the projected treatment system and any other affected discharges (Figures 2.3 and page 1-10). 24)

- An analysis of fly ash pile runoff if such a pile is to be used (chemistry and flow rate). 25)

- An analysis of bottom ash pile runoff and supernatant overflow from a bottom ash settling pond (chemistry and flow rate). 26)

- An assessment of the impact of the coal ash upon the cleaning of the fireside of the tubes, air preheater, etc. (chemicals to be used, frequency, and flow rate). 27)

- A discussion of the changes necessary in the wastewater treatment system to accept the changes in the ash or cleaning chemical composition. 28)

- An assessment of the relative leachability of the fly ash and bottom ash of the referenced coal. 29)

2. At the DOE's public hearing on the proposed coal conversion at Brayton Point, on November 21, 1978, Mr. Jack Faslow of New England Power Company stated that dredging of the ship channel will not be needed to accommodate coal colliers. The Draft EIS states that dredging and modification to the docking facility will be necessary. This conflict should be resolved in the Final EIS. If dredging is going to be needed, a more thorough analysis of impacts than is now provided in the Draft EIS will be required. This analysis should include a discussion of the specific amounts and quality of the dredged material; alternative disposal sites; and impacts of disposal. 30)

21) Table 3-3 of the FEIS utilizes a new approach to calculating coal pile runoff impacts. It is described in section 10.1.2.

22) See page 3-21 of the FEIS.

23) Figure 3-2 shows existing discharges. Those that will be affected are 004, 010, & 013.

24) See Figures 3-3 and 3-4 .

25) Fly ash will be dewatered, the supernatant returned to the sluice system, and the damp fly ash trucked to the Freetown landfill site.

26) It is not known whether or not coal bottom ash sluice water will be recycled. NEPCo intends to meet NPDES limitations for any discharges. Supernatant will be discharged to the treatment system currently utilized.

27) Exact treatment has not yet been determined, but it is not expected to vary greatly from present levels.

28) The old coal pile bottom ash treatment system will need to be reactivated. Additional volume may need to be added. Added pollutants from more frequent or altered cleaning may need additional treatment.

29) Fly ash and bottom ash composition will depend on coal characteristics which have not yet been determined.

30) NEPCo has stated that dredging is not a part of the proposed action. Therefore, all references to dredging in the EIS have been deleted.

GROUNDWATER IMPACTS

The Draft EIS does not include sufficient information on the impacts of ash disposal at the Freetown disposal site. The Draft EIS briefly presents the conclusions of the report done for Massachusetts by Thompson and Lichtner Company; however, none of the data supporting these conclusions are presented. In order to properly evaluate the fly ash disposal impacts, the following information, which is probably available in the Thompson and Lichtner Report, should be provided in the Final EIS, or in an appendix: 31)

- surficial geology and soil types at the Freetown site; type and depth to bedrock.
- extent, productivity and use of the underlying aquifer.
- methods of ash disposal, types of covering to be used, if any; and operational constraints to be imposed.
- frequency and type of groundwater monitoring to be conducted.
- location of water supply wells in Freetown and the potential for contamination.
- seasonal fluctuation in the water table.
- location of the disposal site in the aquifer (i.e., recharge or discharge area).

31) The landfill site and its characteristics are described in detail on pages 3-26 through 3-34.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

OFFICE OF THE
ASSISTANT DIRECTOR
FOR ASTRONOMICAL,
ATMOSPHERIC, EARTH,
AND OCEAN SCIENCES

January 15, 1979

1) See page 3-26 and Section 10.1.2

Mr. Steve Frank
Division of Coal Utilization
Department of Energy
2000 "M" Street, N.W.
Room 7202
Washington, D.C. 20461

Dear Mr. Frank:

Several individuals in the Foundation have reviewed the DEIS, Coal Conversion Program New England Power Co. (DOE/EIS - 0036-D). Our only comment concerns the statement made on page 2-18, i.e., "Since no ground water aquifiers exist near or are affected by the Brayton Point Generating Station, only marine and fresh waters are discussed..".

1) We feel that this statement may be misleading. There is a water table below the Brayton Point Generation Station that will be affected by runoff from the coal piles. Also, heavy metals and selenium will probably reach the water table and may create adverse effects. This point should be considered in greater detail in the EIS.

Sincerely yours,

Daniel Hunt
Deputy Assistant Director

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The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
100 Cambridge Street, Boston 02202

DAVID STANDLEY
Commissioner

November 21, 1978

Office of Public Hearing Management
Department of Energy
Box V U, Room 2313
2000 M Street N.W.
Washington, D.C. 20461

RE: SMAPCD--SOMERSET--Brayton Point
Coal Conversion
Draft EIS

ATTENTION: Mr. Barton R. House
Assistant Administrator and
Hearing Chairman

Gentlemen:

The Division of Air and Hazardous Materials has reviewed the Draft Environmental Impact Statement concerning the Coal Conversion Program at New England Power Company's Brayton Point Station Units 1, 2 and 3. The document was prepared by the Department of Energy, Economic Regulatory Administration, Division of Coal Utilization and is dated October, 1978.

As you are undoubtedly aware, the Department of Environmental Quality Engineering on August 7, 1978 adopted appropriate regulations and submitted to the U.S. Environmental Protection Agency a State Implementation Plan Revision that allows for a voluntary conversion of Units 1, 2 and 3 at the Brayton Point Station to coal. This package included a Memorandum of Understanding executed by the Department and New England Power Company. The content of the Regulations and Memorandum of Understanding represent an intensive effort for more than one year by Private, State and Federal Agencies to negotiate a conversion program that would satisfy economic, ESECA and environmental requirements.

The Department strongly supports conversion of the Brayton Point Station Units 1, 2 and 3 to coal if the conversion is consistent with the terms of the above referenced package, currently under review by E.P.A. The key environmental elements of this package include:

1. Precipitator design for an emission rate of 0.06 pounds of particulate per million Btu.

2. A regulatory particulate emission limitation of 0.08 pounds per million Btu.

3. A regulatory average coal sulfur limitation of 1.21 pounds per million Btu.

4. Constant availability of sufficient, approved fly ash disposal capacity for at least one years operation of all applicable units.

5. Conformance by converted units with an approved application and other applicable laws and regulations, not specifically exempted.

6. Provisions for extension after November 1, 1980 after full review of impacts of the conversion by the Department.

It must be understood that the Department's support of the conversion is premised on strict conformance with these elements and cannot be expanded to include other proposals without intensive review.

As a result of its review of the air quality aspects of the Draft Environmental Impact Statement the Department is particularly concerned that there are significant errors in contaminant emission rates in the air quality summary in Section 3 of the document. The two most noteworthy errors are associated with emission rates for particulate matter and nitrogen oxides.

Relative to particulate matter, it is totally erroneous to indicate that particulate emissions could increase as much as twelve times when the station converts to coal. In accordance with the Massachusetts Adopted Regulations, allowable particulate emissions on coal would have to be less than current allowable particulate emissions on oil. Design emissions on coal are only slightly greater than actual measured emissions on oil. It is apparent that these errors are a result of inaccurate listings for particulate emission rates in tables contained in Section 3. These tables list unrealistically low emission rates for units on oil and higher than probable emission rates for the units on coal. Some of the errors are greater than an order of magnitude. 1)

Relative to oxides of nitrogen emissions, it is erroneous to indicate that these emissions would increase by 73 per cent. The Department's review has revealed that NO_x emissions for the units on coal should be very similar to the units on oil. Factors for coal and oil firing contained in AP-42, "Compilation of Air Pollutant Emission Factors" support this conclusion. Also, New England Power Company officials have indicated confidence that NO_x emissions on coal will be consistent with AP-42 factors. 2)

These emission rate errors are highly significant and must be corrected in the Final E.I.S. Also, correction of emission rates will require correction of modeled ambient concentrations since they are emission rate dependent. Based on these facts, it is the Department's opinion that Section 3.1.3 will need substantive revision before publication of the Final E.I.S. 3)

1) See section 10.2.1

2) See Table 10-2 in section 10.2.1

3) The modeling was revised for the Final EIS.

All necessary corrections to the text have been made and a summary of the air quality issues is provided in section 10.2.

Should you wish to discuss any elements of these findings, please do not hesitate to contact me, Mr. Donovan or Mr. Hagg of my staff.

Very truly yours,

Anthony D. Cortese, Sc.D.
Director
Division of Air and Hazardous Materials
Room 320
600 Washington Street
Boston, Massachusetts 02111

C/lp/RED

cc: Commissioner Standley

Mr. Anderson

EPA Region 1 Air Branch

DOE Region 1

New England Power Company

SMAPCD

Mr. O'Connor

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02346

DAVID STANDLEY
Commissioner

PAUL F. ANDERSON
Chief Environmental Engineer

November 29, 1978

Mr. Steven Frank
U.S. Department of Energy
Economic Regulatory Administration
2000 M Street NW
Room 7202
Washington, D.C. 20461

RE: SMAFCO--SOMERSET--Brayton Point Coal Conversion

Dear Mr. Frank:

This letter is written in response to a request by Mr. House at the hearing on the Draft EIS concerning Coal Conversion conducted on November 21-22 in Somerset, Massachusetts.

Relative to particulate emission rates for the four units at the Brayton Point Station, please be advised that the most recent emission tests were conducted in March and April of 1978. During these tests the units were operated at capacity with residual oil having a maximum sulfur content of 2.2% as the fuel of use. The results of these tests are as follow:

Date	Unit	Particulate Emission Rate (pounds per million Btu)
March 29 - April 5, 1978	1	0.050
March 31 - April 4, 1978	2	0.083
March 3 - 7, 1978	3	0.028
April 12 - 13, 1978	4	0.025

These particulate emission rates should be compared to an allowable rate of 0.12 pounds per million Btu for Units 1, 2 and 3 and 0.05 pounds per million Btu for Unit 4. For purposes of correcting emission rates in the Draft EIS, the Massachusetts S.I.P. Revision that would allow coal conversion at the plant specifies an allowable emission rate on coal for units 1, 2 and 3 of 0.08 pounds per million Btu with precipitators designed to meet 0.06 pounds per million Btu.

Use of these emission factors and rates to correct the pounds per hour rates in the Draft EIS will result in realistic comparisons of emissions from the subject generating units on coal and oil. 1)

1) These measurements were used to revise the text of the Final EIS and to develop section 10.2. See Table 10-2.

At the hearing Mr. House also requested a copy of the results of SO_2 modeling performed to predict the impact of the Station while burning higher (2.2%) sulfur fuel oil. Unfortunately, the Department does not have an extra copy of the document to send you at this time. I have, however, requested New England Power Company to send you a copy under separate cover. The document you will be receiving is titled "The effect on local air quality of increased sulfur content fuel at the Brayton Point and Somerset electric generating stations" and was prepared for New England Power Company by Environmental Research and Technology, Inc., Concord, Massachusetts.

The Department appreciated the opportunity to present testimony before DOE on November 21. Should you have any further questions relative to these matters, please do not hesitate to contact me.

Very truly yours,

For the Commissioner

Robert E. Donovan

Robert E. Donovan, Chief
Air Quality Control Section

RED/lp

cc: New England Power Company
20 Turnpike Road
Westborough, Mass.
ATTN: Mr. John Kastow

Walden Research Division
850 Main Street
Wilmington, Mass. 01887
ATTN: Mr. Roger Caiazza

Dr. Cortese

DAEM
Engineering Branch

THE COMMONWEALTH OF MASSACHUSETTS

ENERGY FACILITIES SITING COUNCIL

MICHAEL S. DUKAKIS
GOVERNOR

CHRISTOPHER D. SULLIVAN
CHAIRMAN

DEPARTMENT OF ENERGY HEARING - BRAYTON POINT

Statement of Lillian Morgenstern, Ph.D.,
Environmental Planner,
Mass. Energy Facilities Siting Council

The Energy Facilities Siting Council is a regulatory agency which licenses major electric, gas and oil facilities proposed for construction in the Commonwealth of Massachusetts. Although the Coal Conversion Program for the Brayton Point Generating Station, Somerset, MA is not a new facility, the following comments are offered within the context of helping DOE fulfill its public hearing intent of achieving a balanced coal conversion program.

The Brayton Point Oil-to-Coal Plan is applauded as the nation's first voluntary oil-to-coal conversion project. This plan is exemplary in that it simultaneously achieves two critical balances. It achieves on the one hand a balance between the genuine national need to lessen dependence on foreign oil while maintaining a full working partnership between federal, state, and utility representatives. On the other hand, the plan supports and upholds the spirit of the Energy Supply and Environmental Coordination Act (ESECA) of 1974 and amendments for meeting essential needs for energy independence while seeking and identifying, most clearly, the adverse environmental consequences inherent in converting from oil to coal use at a major electric generating facility.

The Commonwealth of Massachusetts has consistently through both its statutory authorities and its legislation sought to provide a necessary power supply for its people with a minimum impact on the environment at the lowest possible cost. DOE's draft Environmental Impact Statement has also successfully balanced these very practical considerations. We are therefore in favor of the issuance of the Notice of Effectiveness and the subsequent oil-to-coal conversion at Brayton Point because the alternatives for not doing so are currently unacceptable in the not-too-distant wake of the 1973 oil embargo and subsequent hardships endured by the people of the Commonwealth.

DOE has boldly exposed those adverse environmental impacts which could result from this conversion while clearly and consistently delineating measures which would mitigate those adverse consequences. This reveals the real balance which has been sought and achieved

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by cooperation between the staff of the DOE, the Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Quality Engineering (DEQE), the New England Power Company (NEPCO), the Massachusetts Energy Office and the Bureau of Mines.

The Brayton Point conversion plan has the fullest potential for becoming a successful program which can be both economically sound and environmentally acceptable to the people of this Commonwealth providing that all techniques and procedures identified in this EIS necessary to mitigate adverse environmental consequences are conscientiously and scrupulously adhered to.

It is imperative, for example, that:

- Adverse effects on water quality resulting from dredging be ameliorated by the most appropriate dredging techniques applicable.

- Acidic runoff from on-site unwashed coal storage piles which would subsequently release high concentrations of heavy metals with disastrous effects, be controlled either by the use of well-washed coal and/or by the collection of runoff and conventional primary treatment.

- Chemical reduction and precipitation be made prerequisites for mitigating the effects of selenium.

- Adequate operational care to prevent wind and water erosion of the ash be stipulated and following monitoring made a condition for continuation of the Freetown ash disposal landfill.

- Electrostatic precipitators for the removal of particulates be utilized and their operating efficiency monitored and verified on an appropriate predetermined schedule.

- Fugitive dust emissions be kept to a minimum by specifying applicable acceptable methodologies in advance.
- The sulfur content of the coal supply be assured to ensure full compliance with all air quality standards.
- Sulfates be reduced whenever possible.
- NO_x control modification capabilities be added to the Brayton Point System.

The primary DOE concern for implementation of the ESECA Coal Conversion Program, of reducing demand for and dependence on foreign oil, can be aided and supported by this proposed conversion at Brayton Point.

The primary concern of the Energy Facilities Siting Council, to provide a necessary power supply for its people with a minimum impact on the environment at the lowest possible cost, can also be achieved by a timely and thorough implementation of those measures available for mitigating all adverse consequences of this conversion.

As Mr. Keohane, DOE's Regional Representative, has stressed "public participation in this hearing is critical to help government and industry achieve a balanced program." We submit these comments with the specific intention of helping DOE achieve a conversion program which is, in Mr. Keohane's words and in ours, "economically sound and environmentally acceptable."

Again, we support a conversion plan for Brayton Point consistent with and bounded by the full mitigation of all adverse environmental impacts.

I hope these comments will be of assistance in your continuing planning for a successful Brayton Point conversion effort.

Lillian Morgenstern

Lillian Morgenstern, Ph.D.

Dated: November 21, 1978

at Somerset, Mass.

THE COMMONWEALTH OF MASSACHUSETTS

ENERGY FACILITIES
SITING COUNCIL

MICHAEL S. DUKAKIS
GOVERNOR

CHRISTINE D. SULLIVAN
CHAIRMAN

Barton R. House
Assistant Administrator of
Fuels Regulation
Economic Regulatory Administration
Office of Fuels Regulation
Washington, D.C. 20461

November 28, 1978

Dear Mr. House:

I appreciate the opportunity to testify at the DOE Brayton Point Oil-to-Coal hearing in Somerset, Mass. on November 21, 1978.

In response to a panel question regarding the reduction of sulfates at Brayton Point, I submit the following commentary for your consideration.

I am concerned that many of the effects attributed to the presence of varying amounts of sulfur oxides in the atmosphere may actually be due to a combination of sulfur oxides and undifferentiated particulate matter. It is my understanding that it is the combination of sulfur oxides and particulates which may produce an effect greater than the sum of those two pollutants individually.

The problem of actual assessment derives from interactions between: pollutants; reactions of pollutants with oxygen and water in the atmosphere; and finally the influence of sunlight and temperature on these reactions. I believe that sulfuric acid and irritant particulate sulfates have a greater irritant potency than does sulfur dioxide by itself.

It would appear that the potentiation by particulates of toxic reaction to sulfur dioxide occurs when conditions which promote conversion of sulfur dioxide to sulfuric acid (photochemical or catalytic) are present. The degree of synergism appears to be related to the concentration of particulates in the atmosphere. A three-four fold

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Room 1413 One Ashburton Place Boston, Massachusetts 02108 (617) 727-1198

potentiation of irritant reaction to sulfur dioxide can occur when particulates capable of oxidizing sulfur dioxide to sulfuric acid occur. Application of sulfur dioxide exposures to ambient concentrations at Brayton Point may not therefore be sufficient because they ignore this synergistic effect.

The DOE EIS states (pp. 3-54) that "there are no ambient air quality standards for sulfates, so no mitigation measures are required." Perhaps that statement should be reconsidered because sulfuric acid and sulfates are always found in the particulate phase in a polluted atmosphere as either suspended matter or in dustfall.

The EIS further states (pp. 3-54) "Sulfates can be reduced by reducing the amount of SO_2 emissions." I believe that it is rather the particulates which must be reduced as far as possible in combination with that sulfur dioxide. I reiterate my concern that electrostatic precipitators must be fully utilized and their operating efficiency monitored and verified on an appropriate predetermined schedule.

Other readings in which you might be interested include:

Cuffe, S. T. et al. "Air Pollutant Emissions from Coal-Fired Power Plants, Report 1." Journal Air Pollution Control Association, Vol. 14 Sept. 1964.

Dvorak, A. J. et al. "Assessment of the Health and Environmental Effects of Power Generation in the Mid-west." Vol. II, Ecological Effects, Argonne National Lab. 1977.

Dvorak, A. J. et al. "The Environmental Effects of Using Coal for Generating Electricity." NUREG-0252. 1977.

Greenburg. L. and Jacobs, M. B. "Sulfur Dioxide in New York City Atmosphere." Ind. Eng. Chem., Vol. 48, Sept. 1956.

Smith, W. S. and Gruber, C. W. "Atmospheric Emissions from Coal Combustion, An Inventory Guide." U.S. Dept. HEW, Public Health Service, PHS-Pub 999-AP-24, 1966.

Thank you for this additional opportunity to comment.

Very truly yours,

Lillian Morgenstern

Lillian Morgenstern, Ph.D.
Environmental Planner

LM:hrm

STATEMENT OF THE MASSACHUSETTS ENERGY OFFICE TO THE ECONOMIC REGULATORY ADMINISTRATION OF THE DEPARTMENT OF ENERGY IN THE MATTER OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ON COAL CONVERSION OF BRAYTON POINT UNITS 1,2,AND 3: DELIVERED 21 NOVEMBER 1978 BY JAMES CONNELLY, DEPUTY DIRECTOR.

Mr. Chairman: Thank you for the opportunity to speak here today on behalf of the Massachusetts Energy Office. I am James Connelly, Deputy Director of that office.

Five years ago next month, William Simon, then Administrator of F.E.O., released a list of electric generating stations deemed suitable for emergency conversion to coal. Brayton Point, the largest fossil-fuel plant in New England, featured prominently on that list. In due course, Units 1,2, and 3 were converted to coal; and for about a year substantial savings in foreign oil imports were registered--thanks in large measure to the E.P.A's willingness to grant variances to New England Power. At the time, critics claimed disastrous effects on regional air quality must surely ensue. As we now know, the record of operations, while not without occasional blemish, was one of responsible management and good faith on the part of New England Power. The experience of this short-term conversion gives observers in the region good reason to expect a due regard for environmental safety in the future operation of these units.

The Draft Environmental Impact Statement under discussion today has been reviewed by the Energy Office and found to be adequate in addressing the major impacts that conversion can reasonably be expected to have. Many of the questions concerning negative impacts and means to their mitigation were raised, aired, and answered in negotiation over the last couple of years by a local working group comprising New England Power and the several federal and state energy and environmental agencies. Many of the premises that inform the discussion in the draft EIS were established in those negotiations to the satisfaction of those agencies charged with protecting air and water quality.

Approval of the draft EIS is a vital step toward issuance of the Notice of Effectiveness of the Prohibition Order. That Notice in itself will cap a manifold accomplishment.

First, the resultant conversion will constitute a long stride for this region toward meeting the national goal of reduced dependence on foreign sources of oil supply. Brayton Point is one of the largest consumers of foreign residual oil in the nation. Since late 1973, Federal policy has promoted nation energy self-reliance; but as we now know, the question has proven to be more complex than was naively thought in 1973-74. The Brayton conversion will be one of the first - if not, in fact, the first - important milestones along this road to self-reliance in this region.

Second, the economic benefits of coal conversion are themselves manifold. Conversion, even irrespective of the quality of coal required, would channel what would otherwise be petrodollars into development of our domestic coal industry -- with economic benefits redounding to Appalachian rather than Arab states. This is a desirable result from the national balance of-payments point of view. Under terms already agreed upon, conversion will go some steps further in allowing for coal at a cost that will benefit the purses of New England consumers as well. By allowing the burning of coal of 1.5 percent sulfur, conversion would save ultimate consumers substantial amounts each year. Very conservative estimates put the net savings realized by conversion at $10 million for each of the first five years of conversion (assuming 7 percent annual increase in oil prices and 5 percent in coal). Obviously, the longer these Brayton Units burn coal, the more will the disparity in inflation rate, for the fuels compared, lead to increased annual consumer savings. The fuel savings will be passed through immediately under fuel adjustment regulations, while the costs of capital improvements incident to conversion will be paid for over a much longer period in electric rates -- a lesser, but not unimportant benefit to customers. Some 75 percent of this annual $10 million savings to the region will go directly to Massachusetts rate payers -- with some $3 million going to residential consumers alone.

As the draft EIS clearly demonstrates, the third major advantage of conversion will be that these economic benefits may be purchased at no significant cost to the environment. The exemption under ESECA from having to install expensive flue gas desulfurization equipment or scrubbers is vital to both the economics and the environment. Little would be gained in air quality maintenance by requiring scrubbers -- and much would be lost in economic benefits, for scrubbers are costly to install and costly to operate. Indeed, it is the case that scrubbers would create other environmental difficulties in disposal of limestone sludge byproduct. Besides, there is probably not enough space for scrubbers at the plant site. The ESECA exemption avoids this serious problem at no appreciable sacrifice of air quality.

The 33 percent reduction in particulate emissions (to .08 lbs/MM Btu) that will be required meshes neatly with the sulfur emission relaxation. For the cost of installing new precipitator capacity is significantly eased by allowing for higher sulfur coal. The reason, of course, is simply that higher sulfur in fuel improves precipitator efficiency. And particulates are, after all, the critical air contaminant in the Southeastern Massachusetts region. The attainment problems in this area for Total Suspended

Particulates do not admit of relaxation of TSP emission, regulations. In fact, as members of the voluntary conversion work group agreed, greater stringency on particulate emission is virtually unavoidable, given the air quality status of the area for TSP.

Finally, no appreciable sacrifice in essential air quality protection should result from the allowance for a ± 15 percent uncertainty band in particulate emissions and the sulfur emission allowance of 2.31 lbs per million Btu in a 24-hour period. These allowances merely express recognition of the irreducible variation in coal quality that result from the intrinsic properties of a coal face and the exigencies of coal transport. Not to make such allowances would be to forego important consumer savings with no appreciable gain in air quality.

So, in closing, let me once more commend the Department on the thoroughness of this Draft EIS. I urge its approval and the consequent issuance of the Notice of Effectiveness. After five years no one can accuse us of acting in haste. Conversion of these Brayton Point units to coal will promote national goals of energy self-reliance, yield handsome and continuing savings to New England Power customers, and protect air quality in Southeastern Massachusetts.

The Commonwealth of Massachusetts
House of Representatives
State House, Boston

THOMAS C. NORTON
REPRESENTATIVE
122 READING STREET
FALL RIVER, MASS
HOME TEL. 674-0904

VICE CHAIRMAN
COMMITTEE ON
ENERGY

STATE HOUSE OFFICE
ROOM NO. 166
TEL. 727-1250

November 20, 1978

Mr. Barton R. House
Assistant Administrator
Department of Energy
Office of Fuels Regulations
150 Causeway Street
Boston, Massachusetts 02114

RE: PUBLIC HEARING ON BRAYTON POINT OIL-TO-COAL PLAN
TUESDAY, NOVEMBER 21, 1978
SOMERSET, MASSACHUSETTS

Dear Mr. House:

I want to go on record as being in favor of the conversion of New England Power's plant from burning oil to coal. As you know, the Legislature had to enact provisions for burning coal under Chapter 494 of the Acts of 1974 due to the oil embargo which imposed upon the consumers the infamous fuel adjustment clause. Your Agency's role in permitting this conversion can only serve in the best interest of the consumers of this area and the beginning of a comprehensive energy program for all of us.

Sincerely,

THOMAS C. NORTON
REPRESENTATIVE

TCN/d

8 II D

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

578005

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
83 Park Street
Providence, R. I. 02903

November 27, 1978

Office of Public Hearing Management
Department of Energy
Box VU
Room 2313
2000 M Street N.W.
Washington, DC 20461

Attention: Barton R. House

Gentlemen:

The Rhode Island Department of Environmental Management has reviewed the Draft E.I.S. on the conversion to coal from oil at the Brayton Point Generating Station in Somerset, Massachusetts. The Department of Environmental Management finds the EIS to be a well written and relatively comprehensive document. The Department also is in favor of the concept of coal conversion. The major concern about the statement lies in its lack of information regarding potential impacts on Rhode Island and its resources. Listed below are comments on the DEIS from the various divisions of our Department.

I. Air Quality

As stated on page 3-45, "The proposed action will not significantly affect the air quality in Rhode Island." The report does not do any modeling in the state of Rhode Island to support this conclusion. Even though we do support the findings that such a proposal would not have a significant impact, nevertheless we believe this modeling should be done, specifically for the Bristol and Tiverton areas. These communities are as close to the Brayton Point generating facility as are the monitors in Fall River which were used to evaluate this proposal. We have some background monitoring that was done in the Bristol and Tiverton area which could be used to supply background data.

(Note attached is a summary of this background data as requested at the public hearing by Mr. Frank.)

I. Air quality analysis has indicated that sulfur dioxide concentrations in Bristol and Tiverton may increase by about 15%. This will not cause any violations of the standard.

II. Fly Ash Disposal

The DEIS states that fly ash from the generating facility will be disposed of in Freetown, MA. Our Department is concerned that once this facility reaches its capacity, this material will be transported to Rhode Island; therefore, we would appreciate some information on the life expectancy of the Freetown site and information on where this residue would be disposed of once this facility is at capacity.

III. Impact to Rhode Island Fish and Wildlife

Obviously, large traffic will pass through the water of the East Passage of Narragansett Bay to Mount Hope Bay and Brayton Point. Traffic patterns should be analyzed to alleviate conflicts with finfish dragging grounds or areas of shellfish harvesting.

Runoff from coal piles or airborn particle matter resulting from coal unloading and movement may settle on the surface of bay waters. This material could impact marinas and shellfish populations. A saturation settling rate for these materials would be helpful.

Narragansett Bay and Mount Hope Bay support commercial and recreational fisheries for several species of finfish and shellfish. In particular, they provide spawning grounds for winter flounder and feeding grounds for tautog. Species to be found in this area include striped bass, bluefish, scup, bonita, fluke, alewives, shad and smelt. The latter three species are the subjects of fisheries restoration projects in Rhode Island and Massachusetts which involve fish stocking, and fish way construction. A list of species and their seasonal occurences would make this statement more complete.

Additionally, attempts to encourage the settlements of Osprey (a species of questionable endangerment) along the shore of Bristol and Touisset Point may be affected.

IV. Ship Movement in Rhode Island

The DEIS fail to identify impacts with other ship traffic. There is no information on the ports of Providence and Newport. Additionally your map of Narragansett Bay eliminated Aquidneck, Prudence and Conanicut Islands.

V. Water Quality

A. Runoff from Coal Pile - It does not appear as if iron and manganese would be much of a problem whether or not the runoff is treated. But if the selenium is not affected by the treatment, more information should be included on its possible adverse effects on the marine environment. It doesn't look as if it would be any problem at all in Rhode Island waters due to dilution and/or sedimentation, etc.

II. The life expectancy of the Freetown ash site has been estimated at 5 to 10 years. NEPCo is trying to develop alternative uses for the ash. If the demand for alternative use of ash is not sufficient to eliminate the need for a disposal area, a new disposal area will have to be developed. NEPCo has not made any plans for such a disposal site.

III.A. Coal-related traffic will use the same routes through Naragansett and Mount Hope Bay as are presently used for oil related traffic. The increase in traffic is expected to be approximately 40 ships per year. The impact of coal related traffic will not be significant in comparison to the base case.

B. Fugitive dust from the coal pile will settle out at a maximum rate of 1.2 g/m^3 -day assuming a deposition velocity of 2 cm/s. This is a maximum rate assuming persistent winds throughout the day and worst-case coal activity emissions.

C. A list of species sampled in the Davisville area of Narragansett Bay is attached.

D. Comment noted.

IV. Impacts on other ship traffic will be minor. Information on Providence was added to page 2-29. The map has been changed.

V.A. See Section 10.1.2.

D. Page 3.9. Mercury in Mount Hope Bay Sediments - Two points come to mind. First, it is not clear why fishing should (or could) be prohibited in the area of the dredging because of resuspension of sediments containing mercury. The uptake of mercury is through food chain and fish swim in and out of the area. Secondly, no mention is made of dredge spoil disposal. Since this appears to be the controlling factor in dredging operations, alternatives for spoil disposal should be discussed.

Very truly yours,

W. Edward Wood
Director

WEW/VB:pd

Attachment

cc: V. Bell
D. Varin
E. Goldfine
D. Tomata
T. Wright
P. Albert
R. Sisson
J. Lebourneau

V. B. Dredging will not take place as part of the proposed action. See Section 10.1.4.

III.C.

FINFISH SPECIES COLLECTED IN THE DEPARTMENT OF NATURAL RESOURCES MONTHLY TRAWL SURVEY DAVISVILLE STATION

Finfish Species	Relative Abundance[1]
Winter Flounder	Very abundant - seasonally
Four Spot Flounder	Very abundant - seasonally
Sand Flounder, "Sand Dab"	Very abundant - seasonally
Fluke, "Summer Flounder"	Very abundant - seasonally
Scup	Very abundant - seasonally
Butterfish	Very abundant - seasonally
Alewife	Very abundant - seasonally
Atlantic Herring	Very abundant - seasonally
Blueback Herring	Very abundant - seasonally
Sea Robin	Very abundant - seasonally
Cunner	Very abundant - seasonally
Silverside	Very abundant - seasonally
Red Hake	Very abundant - seasonally
Silver Hake, "Whiting"	Abundant - seasonally
Tautog	Abundant - seasonally
Squeteague	Abundant - seasonally
Mackeral	Abundant - seasonally
Sea Bass, "Black Bass"	Abundant - seasonally
Atlantic Cod	Occasional
Striped Bass	Occasional
Bluefish	Occasional
Hogchoker	Occasional
Dogfish	Occasional
Menhaden	Occasional
Ocean Pout	Occasional
Cusk	Occasional
Little Skate	Occasional
Thorny Skate	Occasional

1
Very abundant: 21 - 100 animals/tow
Abundant: 11 - 20 animals/tow
Occasional: 1 - 2 animals/tow

Source: Ganz & Sisson, 1977

Taken from: Coastal Resources Center, The Redevelopment of Quonset/Davisville: An Environmental Assessment, Marine Technical Report #55, University of Rhode Island Kingston, Rhode Island, 1977.

TESTIMONY OF DANTE IONATA, CO-DIRECTOR OF THE
RHODE ISLAND GOVERNOR'S ENERGY OFFICE ON THE
PROPOSED BRAYTON POINT GENERATING STATION
CONVERSION FROM OIL TO COAL, NOVEMBER 21, 1978

The following statement is delivered on behalf of Dante Ionata, Co-Director of the Governor's Energy Office in Rhode Island. My name is Richard Goldfine and I serve as Principal Planner with that agency.

My purpose here today is to testify in favor of the conversion of Brayton Point Generating Station Units 1, 2 and 3 from oil to coal. Our support is based on three major considerations.

First of all, the conversion of Brayton Point will contribute significantly to and reducing New England's dependence upon foreign petroleum. As one of the largest consumers of foreign residual oil in the nation, Brayton Point is now consuming about 15,000,000 barrels of petroleum annually. We believe that it is significant that after conversion, yearly petroleum consumption at Brayton Point will be reduced to only 3,000,000 barrels yearly. This represents a reduction in consumption of eighty (80%) percent.

Secondly, this reduction in foreign petroleum consumption will result in economic benefits both nationally and locally. From a national standpoint, money that would otherwise be spent on the purchase of foreign oil would be spent on the purchase of domestic coal and thus impact favorably on the nation's balance of payments. At the local level, it has been estimated that the net savings for each of the first five years of conversion would be $10,000,000. This translates into an annual savings of about $2,500,000 for Rhode Island rate payers.

Last, but certainly not least, we believe that under the coal conversion plan, Rhode Island's physical environment will be adequately protected.

We, therefore, reiterate our strong support for the conversion of Brayton Point from oil to coal. Thank you for giving us this opportunity to testify.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Administration
STATEWIDE PLANNING PROGRAM
265 Melrose Street
Providence, Rhode Island 02907

November 22, 1978

Mr. Steve A. Frank, Chief
Environmental Evaluations Branch
Division of Coal Utilization
Department of Energy
Room 7202
2000 M Street, N. W.
Washington, D.C. 20461

Dear Mr. Frank:

In accordance with OMB Circular No. A-95, Part II, this clearinghouse has completed its review of the:

DRAFT ENVIRONMENTAL IMPACT STATEMENT: COAL CONVERSION PROGRAM, NEW ENGLAND POWER COMPANY, BRAYTON POINT GENERATING STATION, PLANTS 1,2, AND 3

Comments on this draft E.I.S were solicited from the following agencies:

R.I. Department of Environmental Management
R.I. Coastal Resources Management Council
R.I. Public Utilities Commission
Governor's Energy Office

To-date the only comments received have been those of the Governor's Energy Office. These comments are attached for your consideration in the preparation of the final E.I.S. Any additional comments will be forwarded to your attention upon receipt.

Thank you for the opportunity to review this document.

Yours very truly,

Daniel W. Varin

Encl.
cc: D. Ionata

The Governor's Energy Office has reviewed the Draft Environmental Impact Statement on the New England Power Company's Coal conversion program for units 1, 2 and 3 of the Brayton Point Generating Station. Our comments are as follows:

1) P. XII, Line 9 - the correct name of the airport referred to is Theodore Francis Green State Airport and it is located in Warwick. Subsequent references to this airport should also be corrected.

2) P. 2-16, last paragraph - Quartz and feldspar are minerals, not rocks.

3) P. 2-17, last paragraph - It is premature at this point to say that significant amounts of anthracite underlie the Narragansett Basin. Significant amounts may underlie the Basin, but more exploration is needed before a definitive statement can be made. Also, the United States Bureau of Mines is conducting a several hundred thousand dollar geological assessment, not a multi-million dollar one.

4) P. 3-2, second paragraph - Meta-coal is considered to be an imprecise geological term. The term "anthracite" should be used instead.

5) P. 5-1 - The last paragraph states that the runoff from an active pile of unwashed coal may contribute to deteriorated water quality in Mount Hope Bay. To mitigate this impact, we strongly urge that either the coal pile runoff be collected and treated or that washed coal be used.

Previous comments notwithstanding, the Governor's Energy Office vigorously supports the conversion of units 1, 2 and 3 at Brayton Point from oil to coal. Our support is based on three considerations.

For one thing, we are satisfied that if the coal pile runoff issue is addressed as we have suggested, the environment will be adequately protected. We support the

1) The text has been revised.

2) The text has been revised.

3) The text has been revised.

4) The text has been revised.

5) See Section 10.1.2.

exemption under the Energy Supply and Environmental Coordination Act from having to install scrubbers because we believe that what might be gained in air quality by installing scrubbers would be lost in other ways. Specifically, the scrubbers would be costly to install, costly to operate and would produce the environmental problem of having to dispose of the limestone sludge by-product.

Secondly, the conversion of Brayton Point will go a long way toward reducing the New England region's dependence upon foreign petroleum. As one of the largest consumers of foreign residual oil in the nation, Brayton Point is now consuming about 15,000,000 barrels of petroleum yearly. The conversion of units 1, 2 and 3 will reduce consumption to only about 3,000,000 barrels per year.

Finally, the conversion will result in economic benefits both nationally and locally. From a national standpoint, money that otherwise would be spent on the purchase of foreign oil would be spent on the purchase of domestic coal and thus impact favorably on the nation's balance of payments. At the local level, it has been conservatively estimated that the net savings for each of the first five years of conversion would be $10,000,000. Approximately twenty-five (25%) percent of this annual savings or $2,500,000 would go to Rhode Island rate payers.

' STANLEY BERNSTEIN
DIRECTOR

578007

VINCENT A. CIANCI, JR.
MAYOR

DEPARTMENT OF PLANNING AND URBAN DEVELOPMENT
40 FOUNTAIN ST., - PROVIDENCE, R. I. 02903 - TEL. 401-831-6550

November 29, 1978

Office of Public Hearing Management
Department of Energy
Box V U, Room 2313
2000 M Street, N.W.
Washington, D.C. 20461

RE: Draft E I S Brayton Point Generating Station

The following comments are in response to the letter dated October 16, 1978, from Barton R. House of the Office of Fuels Regulation to Mayor Vincent A. Cianci, Jr. of the City of Providence. The Mayor has referred this matter, including a copy of the Draft Environmental Impact Statement for the Coal Conversion Program for Brayton Point Generating Station, to this Department for response.

Of the three comments presented here, only the first is directly related to the possible programmatic impact upon the City of Providence. The other two relate to matters, of local interest in the vicinity of the fly ash disposal site, which we believe have not been addressed to adequate extent in the draft E I S, and in which we would be more directly interested if that locality were within or near our municipality or its water resources.

Comment No. 1:

Coal conversion evidently will be accompanied by a substantial increase by 1982 in the capacity factors for Units 1 and 2, and a much greater increase for Unit 3, according to Table 2-2 on Page 2-13 of the report. It is not clear whether conversion would be a causitive change, or whether NEPCO's projections may simply follow upon their demand projections, taking up some of the present slack in their base load demand which is inferred from recent statements to the effect that NEPCO has for some years had excess generating capacity. When several projected hydro peaking power sources become available within New England or importable to New England, will those developments let the oil-fired Unit 4 of Brayton Point become a base load facility so as to allow an earlier retirement of the remaining peaking generators in the South Street and Manchester Street Stations in Providence ? We understand the letter

1. The main reason why the unit utilization rates for Units 1, 2, and 3 increase after coal conversion is because once the units are capable of burning coal, it is less expensive to generate electricity in coal-fired units than in oil-fired units. The utility attempts to minimize their costs of generating electricity. Therefore, they will utilize Units 1, 2, and 3 as much as possible. A lot of different factors determine when a Unit is retired. However, the oldest, least efficient, and most costly units to operate are generally the first units to be retired from a system. Unit 4 was never designed to burn coal and could not be converted to do so economically. Units 1, 2, and 3 at Brayton Point were designed to burn coal.

are relatively inefficient facilities in the energy sense and occupy only some portions of the two NEPCO properties here, sending most of their expensive product power into interstate transmission lines. In case coal conversion is conducive to capacity factor improvement, was the cost of converting Unit 4 calculated before its inclusion was rejected ? Would converting Unit 4 be additionally justified by, and add to the justification for the earlier retirement of the two Providence stations ?

Comment No. 2

The alternative hauling routes or pipeline routes for transporting fly ash from Brayton Point to the disposal site in Freetown are nowhere shown or evaluated in the E I S volume. Freetown (see Page 3-21) is not a listed post office, and the report does not locate this Massachusetts municipality or describe any villages which might exist near the site. A reference on Page 3-21 to "Payne's Cove, a part of Assonet Bay" is not defined as fresh water or tidewater, nor does any map appear to show that location, topography or groundwater flow relationship, despite some specific descriptions of groundwater depth as 3 feet below the old grand pit floor, and of the "extremely low permeability of the compacted ash relative to the host material" at the unlocateable disposal site (Page 3-25). It is stated that the site itself was approved for this use by the Massachusetts Department of Environmental Quality based on a separate E I S prepared by the Thompson and Lichtner Company (engineers), but where some aspects of those impacts are nevertheless dealt with within this coal conversion E I S report , they should be recounted in full detail; and the justification for the site should be accompanied fully by considerations of haulage routes individually compared for their impacts.

Comment No. 3

On Page 3-21, a statement appears to exclude the possibility of ground water mounding at the disposal site, based first on the 6 foot depth of the present ground water table below the lowest point of excavation, and second on the low hydraulic permeability of compacted coal ash relative to the Freetown host material. The typical permeability of compacted fly ash is given on Page 3-22 as 10^{-}[illegible] to 10^{-}[illegible] feet per minute. In more understandable language, this means that the rate of penetration for rainfall would range from 0.526 feet <u>per year</u> to 52.6 feet <u>per year</u>. This rate is indeed so extremely low that in fact a perched water table would be established on top of the fill, so that visible impounding will result with attendant low-point runoff of the contaminated water including leachates from erodable high points. Nowhere in the report are these effects defined or evaluated. Evaporation would not solve such a problem, and the rain water would not otherwise disappear. Any monitoring of the site groundwater will give one result if limited to the lowered water table under the almost impermeable fill; but a much different effect of fly ash leachate will be measureable in the trapped upper level water standing upon the fly ash, as well as in the combined leachates and surface runoff water leaving the edges of the perched water table at many scattered points and descendin into the Cove and to the other downslope sections of the natural water table beyond those edges. The final paragraph on page 3-26 indicates to the too-casual reader that there is

2. Ash will be hauled along the following route from the station: Brayton Point Avenue to Wilbur Avenue to I-195 eastbound, to Route 24 northbound, to interchange 36. The Freetown ash disposal site is served by an access road from South Main Street near interchange 36. This particular route minimizes community impacts as most of it is limited access highway. Freetown is the town immediately north of Fall River, landfill site is about 8 miles northeast of the Brayton Point Station (about 12 road miles). The analyses of the Freetown site was expanded for the final EIS. See pages 3-26 through 3-34.

3. The portion of the EIS dealing with ash landfilling has been extensively rewritten. The potential problem of mounding does not appear to be of serious concern. If infiltration should occur on any given day, water will interact with the ash and be bound up resulting in a hardened solid material. A more serious problem would result if cover material were omitted, allowing the erosion of ash. The proposed slope for the ash and cover is appropriate for allowing rainfall to run off without being so steep as to lead to significant erosion. If material were worked unevenly, constant slopes would not be obtained, and the possibility exists that erosion would occur with a given precipitation event. The proposed berm around the landfill area, if constructed would prevent eroded material from entering surface waters. Erosion should not be a problem if proper care in daily operation is taken by the operator of the landfill.

no problem but it will nevertheless be closely watched by some experts. Such lenguage does not by itself prevent the problem from happening as described above. In this same connection, the map (3-1) of the Mount Hope Bay Estuary showing both clean and polluted shellfish beds is cut off at some point far downstream of Assonet Bay and Payne's Cove (which may, despite this report's deficiencies, be discovered by researching other sources of mapped information). By even and careful reading of this report the reader is left uninformed of the tidewater relationships between the fly ash landfill and the benthic populations in the nearby and downstream reaches of that upper tributary to Mount Hope Bay.

We would appreciate receiving for review a copy of the Final EIS when it is issued.

Sincerely yours,

John R. Kellam

John R. Kellam
Supervisor of Long Range Planning

CC: Mayor Vincent A. Cianci, Jr.
Save the Bay, Inc.

THE ENERGY EXCHANGE
142 Pleasant Street
Brookline, Ma. 02146

U.S. Department of Energy
Office of Public Hearing Management
Box V.U.
Rm. 2313
2000 M Street
Washington, D.C. 20461
Attention Mr. Steven Frank

November 28, 1978

RE: Brayton Point Draft EIS

Dear Mr. Frank,

I was pleased to have the opportunity to present to your office my views on the Draft Environmental Impact Statement for Conversion from oil to coal of the Brayton Point Generating Station, Units 1, 2, and 3 during the recent public hearing in Somerset, Mass. I am writing to provide additional material and comments for the record.

In general, I want to congratulate you and your staff on a job well done. The statement is a through and very useful document.

As you know, I have participated with your Department, the EPA, the Commonwealth of Massachusetts and New England Power Company, in a coordinated effort to plan for conversion to coal at this plant so that it might occur in an economic and environmentally acceptable fashion. The outcome of our efforts is described in our final report to the New England Energy Task Force entitled "Conversion to Coal at Brayton Point." A copy is enclosed and I would like to have it included in the record. It explains the important decisions and agreements reached by this group and, in particular, explains why it is appropriate for the statement to examine the environmental impacts of conversion under the new State Implementation Plan (SIP) emmission limits proposed for this facility by the Massachusetts Department of Environmental Quality Engineering.

With respect to the document itself, I recommend the discussion of the
1. existing and proposed emission limits (presented in Table 3-6) which begins on page 3-30 be given a seperate heading such as "Emission Limits Applicable to Brayton Point" to highlight the importance of the proposed new limits. Furthermore, to avoid confusion I recommend that the columns listing impacts under these different emissions limits presented in Tables 3-10 through 3-14 be renamed according to the sulfur content of the fuel under consideration. A revised set of headings might appear as follows:

1. The tables have been revised and now reflect the fact that the proposed SIP revision has been accepted by EPA.

Marny Frantz
(617)429-6532

David O'Connor
(617)566-7238

Without NOE: OIL		With NOE: COAL	
Existing SIP (with Temporary Revision)	Existing SIP	Existing SIP	Proposed SIP
Sulfur in fuel (lbs/mbtu) 1.21	0.55	0.44	1.21

2) I am unable to determine whether the sulfur limit used in Tables 3-10 through 3-14 for modelling 3 hour and 24 hour impacts is the monthly allowed average of 1.21 lbs./Mbt or the daily allowed maximum of 2.31 lbs./Mbt . An explanatory note would be helpful.

3) Finally, I am aware that projected maximum sulfur and TSP emissions in Table 3-11 differ considerably from both monitored data and modelling results obtained by the Massachusetts DEQE and provided to EPA in support of the proposed new SIP emission limits for this facility (See Table 1, page17 of the Work Group Report). I recommend these Tables be re-examined and the discrepancies explained or resolved.

4) I would find it helpful to know what rates of growth in the emission levels of other or new stationary sources in the vicinity of Brayton Point were assumed in preparing Table 3-9. A more detailed discussion on page 3-36 would seem to be warranted.

With these comments, I repeat my commendations for a job well done. If you have any questions, please contact me at 617-742-1580.

Sincerely Yours,

David O'Connor

David O'Connor

Enclosures

cc. Barton House
Susan Phillips
Harold Keohane
Duane Day
J. F. Kaslow
T. Cortese

2) The 24-hour maximum sulfur content was used for both the 3-hour and 24-hour average predictions because insufficient information was available on the sulfur content in coal distribution to estimate a 3-hour average sulfur content.

3) Modeling results can differ due to choice of emission rates, background concentrations, and worst-case meteorology. However, all conclusions are the same, i.e., coal conversion will not have a significant adverse air quality impact.

4) No rate of growth was assumed, background levels were assumed constant.

VOE massachusetts voice of energy

Statement by Charles W. Aley, Massachusetts Voice of Energy

Department of Energy Public Hearing
Somerset, Massachusetts
November 21/22, 1978

Good afternoon. My name is Charles W. Aley. I am president of the Massachusetts Voice of Energy (MVOE). MVOE is a group of concerned citizens including engineers, organized labor, educators, students, and most of all energy consumers. Though in existence only since early 1978, MVOE can boast a membership approaching 1000. Many of us have years of experience in the energy field and believe that decisions on our energy future must be based on a rational use of the facts. We intend to work actively, through the established political process, in encouraging our elected representatives and governmental agencies to support legislation and programs consistent with our beliefs. Therefore, we welcomed the opportunity to speak today on the proposed Brayton Point Oil to Coal Conversion.

MVOE wholeheartedly supports the proposed conversion of Brayton Point Units 1, 2 and 3 from oil to coal firing. For the modest impact on the environment is far outweighed by the reduction of our dependence on foreign oil. MVOE cannot stress enough the need to complete this conversion in all possible haste. The diversion of $150 million annually to OPEC nations for fuel will continue until the job is done. We would suggest that all necessary steps be taken by the regulatory agencies and the utilities to ensure the most timely completion of the project. We ask that the beginning not be held up by the search for the ultimate solution to any particular problem. Several issues with potential for delay in our view include final treatment of coal pile runoff, specific issues in regards to ash handling, and dredging for channel maintenance. Prompt approvals and issuance of appropriate licenses must not be held up by pending minor changes to specific plant design.

The draft report points out that the utility has not entered into any long term supply agreements for the needed coal. Considering the balance of trade considerations we would further suggest a committment from New England Power to buy only domestic coal for these units. Though temporary economics may indicate foreign coal to be in the best interest of the consumer, we now are painfully aware of the trap of dependence. Though we recommend this as a general policy, it should not be so binding as to preclude purchase of foreign coal in emergency situations.

We were happy to note the identification of certain benefits to the community namely the increased employment to be derived from the modifications to the plant and the ultimate increase in plant staff. This aspect does not go unnoticed by many NVOE members who are members of the building trade unions in Massachusetts nor I'm sure by local businessmen who will also benefit from the changes.

Certainly the reduction in oil shipments by tanker and barge must be welcomed especially in light of recent oil spills in southern New England waters.

Overall, we believe this conversion represents only a minor impact on the regional environment while the benefits to New England's economy and security will be major.

The Massachusetts Voice of Energy advocates realistic regulations governing emissions, environmental effects and safety of all energy uses. We also support reason, fact and consistency in development and application of these regulations and oppose unfair tactics for influencing the public. We support evenhanded and rational licensing procedures for needed energy facilities which reduce our dependence on foreign oil, provide economic benefit to the consumer and insure its adequate supply. Energy to support the lifestyles that New Englanders have come to enjoy and wish for their children's future. We believe that the proposed conversion was arrived at through such a process. We believe that the parties have demonstrated a reasoned resolution to a difficult problem. They should be congratulated for their efforts and they should in turn be used as the model for all future conversions.

In closing, I would like to remind you that it is our belief insufficient energy has its own hazards to health, employment, quality of life, as well as to world social and political stability and our national strength. There are no perfect solutions to our energy dilema, only intelligent choices.

Testimony in Support of the Conversion of Brayton Point from Oil to Coal

By
Irving Sacks
Chairman, New England Energy Task Force Coal
Working Group
and President, Massachusetts Technology Development
Corporation

The conversion of Brayton Point from oil to coal has been undertaken through the sponsorship of the Coal Working Group of the New England Energy Task Force. The Working Group had as its mandate the accomplishment of the conversion as expeditiously as possible without the sacrifice of either economy or of air quality. The Work Group involved in the conversion of Brayton Point included representatives of the New England Power Company, the Air Branch of the Environmental Protection Agency, the Department of Energy Regional office, the Commonwealth's Division of Air and Hazardous Materials, and the Massachusetts Energy Office. After 14 months of careful negotiations under the leadership of a mediator, Mr. David O'Connor at the Center for Energy Policy, I believe that the group has accomplished its objective, namely:

1) Cost

The overall cost to consumers will be less than their present cost for electricity production based on oil consumption.

2) Air Quality

Emissions will be within Federal Ambient Air Quality Standards.

3) Stability

The conversion of Brayton Point will reduce the New England region's oil consumption by New England utilities by 17% a savings of 12 million barrels of oil annually.

4) Efficiency

The mediator cut short the process involved in carrying out the negotiation, and has served as a model to be employed by other parts of the region.

The New England Energy Task Force is a creature of the Federal Regional Council, a conference of major government agencies represented in the New England region. Its purpose is to bring to bear in a coordinated manner the resources of each of these agencies to respond to the energy crisis that began in 1973. You will have heard from other speakers about the extent to which New England is especially vulnerable to a future oil crisis because of the region's greater-than-average dependence on imported oil. This conversion of the Brayton Point power facility to coal is a necessary step toward reducing that dependence.

The Coal Working Group, of which I am Chairman, coordinates the activities of the Energy Task Force with respect to the development of coal as an alternative fuel in New England. It may be useful to understand the context within which the group operates by describing the group's other related activities:

1) The Narragansett Basin coal exploration program to develop the coal resource in the 900 square mile Basin that lies in Massachusetts and Rhode Island.

2) The establishment of a University Coal Research Laboratory in the region. We have a 10-university consortium actively developing a program and working relationship in all areas of coal research, ranging from new methods of energy conversion to studies of potential hazards.

Support for my participation with the Coal Working Group is provided by the Massachusetts Technology Development Corporation of which I am President. MTDC is a newly-created instrument of public policy, enacted by the State Legislature during this last session. Our mission is the creation of jobs through business formation and technology development. We do this by providing direct management, financial, and technical assistance to new businesses with a technological product or process. MTDC intends to accelerate the development of one of the Commonwealth's greatest resources, its technological community. We have through our universities and our industry an excellent capability for the development of innovative and alternative technology for dealing with our energy and environmental problems. MTDC sees the conversion of Brayton Point as an outstanding example of the utilization of these technologies to both strengthen our energy posture and to maintain environmental and health standards.

578006

Massachusetts Technology Development Corporation

November 30, 1978

Mr. Steve Frank
Department of Energy
Economic Regulatory Administration
Division of Coal Utilization
Room 7202
2000 M Street, N.W.
Washington, D.C. 20461

Dear Mr. Frank:

I am writing to you in amplification of my remarks made at the public hearing on the draft Environmental Impact Statement dealing with the conversion of Units 1, 2 and 3 at the Brayton Point generating station of the New England Power Company from oil to coal.

In answer to questions from both you and Mr. House, I took exception to the use of a background level of TSP of $180 \mu g/m^3$. I pointed out then that such a figure did not appear in the technical analyses performed by the power company and by the Commonwealth of Massachusetts, Division of Air and Hazardous Materials.

I have since made inquiries, leading to the following determination:

1. The procedure followed in the preparation of the Department of Energy Environmental Impact Statement is in strict accordance with the Environmental Protection Agency's guidelines on modeling for air quality. The background level of $180 \mu g/m^3$ was indeed measured at one time at the monitoring station located on North Main Street in Fall River in the period January-September, 1977. To that was added arithmetically the worst case emissions from Brayton Point. This procedure is correct if the worst meteorological condition and the highest possible sulfur content in coal are both realized at the same time.

2. The technical analysis performed last spring in support of the voluntary conversion activity was done statistically. The results obtained would indicate that the probability of realizing the extreme conditions predicted in DOE's EIS is very small, less

than one occurrence per year. The analysis recognizes that the occurrence of sulfur in coal is a variable, unlike oil, implying the need for a statistical approach.

3. The procedure employed in the earlier technical analysis was based upon a model which predicted hourly over the course of a year the TSP from all sources including point sources such as Montaup Electric, which have been burning 2.2% sulfur oil. Superimposed upon each discrete interval was the frequency distribution of sulfur in the coal combusted at Brayton Point. We believe that this technique, while not a standard procedure, accurately reflects the heterogeneous nature of coal, and paints a truer picture of the probability of degradation of air quality in the region due to the proposed conversion.

I want to express my appreciation to you and the staff of the Economic Regulatory Administration for the openness with which you conducted the hearing and for your cooperation in helping us to expedite the steps towards conversion.

Sincerely,

Irving Sacks
Chairman
Coal Working Group, New England Energy Task Force

IS/el

cc: H. Keohane, DOE Region I
D. Day, DOE Region I
K. Hagg, Mass. D.A.H.M.
D. O'Connor

LAKESIDE OFFICE PARK WAKEFIELD, MASSACHUSETTS 01880

Statement by John F. Kaslow, New England Power Company

Dept. of Energy Public Hearing - Somerset, Mass. - Nov. 21/22, 1978

My name is John F. Kaslow. I am Vice President in charge of Engineering and Production for New England Power Company.

I appreciate this opportunity to comment on the Department of Energy (DOE) Draft Environmental Impact Statement (DEIS) on behalf of New England Power Company - the owner and operator of the Brayton Point Generating Station.

New England Power Company recognizes that a great deal of time and effort have been expended by the Department of Energy in preparing the Draft Environmental Impact Statement concerning the proposed Brayton Point coal conversion. We have studied the document and its conclusions thoroughly and are submitting, for the record, a number of specific comments which we believe will assist the Department in preparing the final EIS document.

In the interest of time I will confine my remarks to our general comments on the Draft EIS report

With respect to air quality impacts, we share DOE's conclusion that under the proposed State Implementation Plan (SIP) conditions, there should be no violation of air quality standards as a result of the burning of coal at Brayton Point. Since the Draft EIS does not contain details concerning techniques and methodologies employed to evaluate air quality impacts, we have relied on extensive modeling and monitoring performed by our Company and its contractor to substantiate DOE's positive conclusion.

We would point out - as we have in recent public hearings related to coal conversion, that the proposed coal burning SIP should result in sulfur dioxide and particulate emissions comparable to those experienced (1) burning 2.2% sulfur oil over the past ten months at Brayton Point. As a result, we believe the statement in the Draft EIS summary - "Projected emissions will increase....." is misleading.

Item 4 in the report summary states that "Ambient concentrations of air pollutants emitted from stacks will increase on days when atmospheric conditions inhibit dispersion of pollutants. These increases will not cause violations of National Ambient Air Quality Standards".

While this statement is correct, I think it only fair to point (2) out that the same statement applies to oil as well as coal firing.

(3) Concerning water quality impacts, we do not agree with the DOE assessment of the potential adverse effects of coal pile runoff. Coal is not a new fuel at Brayton Point - since from 1963 to 1969 and from 1974 to the present, there has been a considerable quantity of coal in storage at the station. We feel that the potential adverse water quality effects indicated in the report are based on standards which are either inapplicable or incorrectly applied to Mount Hope Bay. Since 1970 New England Power Company has been conducting marine ecological studies in Mount Hope Bay. During much of this time a significant amount of coal has been stored within

1) Some short-terms emissions will increase under coal conversion.

2) This statement has been deleted.

3) The water quality impact section has been revised. See text and section 10.1.

plant boundaries. These ecological studies have included monitoring of phytoplankton, zooplankton, benthic and finfish populations as well as water quality and chemistry evaluations. These studies, which are detailed in over 30 reports, document that the various populations within Mount Hope Bay have not been adversely impacted by the operation of the Brayton Point Station. Our data suggest that Mount Hope Bay is a viable diverse and highly productive ecosystem and there is no evidence that runoff from existing or past coal piles has had the deleterious effects postulated by DOE in the Draft EIS.

In order to implement an environmentally acceptable coal conversion program at the Brayton Point Station, many physical modifications to the plant and to the site will be required. In previous submittals to the DOE, we have identified and described the modifications and possible options to the degree that our preliminary engineering analysis permitted.

Some of these options have been depicted in the Draft EIS as firm or near firm decisions, and I would like to clarify the following points:

Coal Handling - A new docking facility is improbable at this point. 4) Therefore, dredging associated with a new dock is unlikely. The channel to the existing dock will be dredged in the near future as part of a periodic maintenance dredging program initiated by the Corps of Engineers. The maintenance dredging planned by the Corps will encompass more than the Brayton channel and is independent of coal conversion.

4) The text has been revised.

Ash Collection - Installation of additional precipitator capacity and attendant ash collection from existing and new precipitator ash hoppers is firm. However, while we are leaning toward a dry ash collection system, this decision is not yet final. 5)

5) The text has been revised accordingly.

Ash Disposal - Trucking of fly ash to an offsite disposal or resource use site appears to be the only viable alternative. The pneumatic pipeline/ depot consideration discussed in the Draft EIS does not appear to be feasible and it is unlikely that it will be pursued further. 6)

6) The text has been revised accordingly.

While the Draft EIS does not suggest that these matters are the most relevant factors involved, I believe it is important to convey our current position on these points.

In conclusion, let me say that drafting a comprehensive and responsive EIS for a complex project is a challenging task. We believe that DOE has arrived at the general conclusion that Brayton Point coal conversion under the proposed coal conversion plan can be accomplished in an environmentally acceptable manner - and we agree with this conclusion.

We continue to support a conversion to coal that is both economic and environmentally sound and hope that DOE's environmental impact analysis will bring us another step closer to achieving that goal.

New England Power

New England Power Company
20 Turnpike Road
Westborough, Massachusetts 01581
Tel (617) 366-9011

John F. Kaslow
Vice President

November 27, 1978

Mr. Barton R. House, Assistant Administrator
Office of Fuels Regulations
Economic Regulatory Administration
2000 M Street, N.W.
Washington, D. C. 20461

Dear Mr. House:

At the hearing on the Draft Environmental Impact Statement for Coal Conversion at Brayton Point Station on November 21, I offered written comments on the Environmental Impact Statement.

We have made a few revisions for the purpose of clarification and would request that these be substituted for the original document. These revisions are found on Page 4, comment 29, and in Appendix A, Pages 1 through 3.

We appreciate the opportunity to enter this material into the record and look forward to receiving your Final Environmental Impact Statement when it is available.

Sincerely yours,

J. F. Kaslow

J. F. Kaslow
Vice President

cc: Z. D. Alford
D. J. Beattie
J. T. Bok
E. A. Brown
L. H. Clare
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D. W. Lawrence
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J. E. Tribble
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R. H. Johnson, Bingham, Dana & Gould

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P. S. C.

NEW ENGLAND POWER COMPANY'S COMMENTS ON

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

COAL CONVERSION PROGRAM

NEW ENGLAND POWER COMPANY

Brayton Point Generating Station
Plants 1, 2 and 3

Somerset, Bristol County, Massachusetts

October 1978

U.S. DEPARTMENT OF ENERGY

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New England Power Company (NEPCo.) recognizes that a great deal of time and effort has been expended by the Department of Energy (DOE) and its consultant in preparing the Draft Environmental Impact Statement (DEIS) which is currently under review. We are also aware that in order to reach the stated objective in reducing the length of the EIS while still producing an accurate and complete report which is logically arranged and easily read, much of the background information used to develop the EIS has not been shown. Some of our comments, therefore, have addressed only the conclusions reached in the report. We have been unable to address the techniques and methodologies used to reach these conclusions, because they are not obvious.

1. In order to accommodate an environmentally acceptable coal conversion program at the Brayton Point Station, many physical modifications to the plant and to the site will be required. In previous submittals to the DOE, we have identified the areas where these modifications will be necessary and have proposed the specific improvements which will be implemented. In several instances, however, we have proposed options which would be explored and would only be implemented if found to be economically and environmentally suitable and technically and operationally necessary. Unfortunately, some of these options have been presented in the DEIS as definite modifications. The following statements will attempt to clarify the misunderstanding which apparently exists concerning some of these proposed modifications.

   A. Dredging--The Brayton Point shipping channel will probably be dredged in the near future as part of a periodic maintenance program initiated by the Corps of Engineers. This dredging should not be associated with coal conversion.

   B. Coal Handling--A new docking facility is unlikely at this writing. Therefore, dredging associated with an additional berth is also unlikely.

      There is still a possibility that a second coal unloading tower will be installed. However, a firm decision has not been made at this time.

      The installation of new pulverizers is not yet a certainty, but this issue has no relevance to environmental considerations.

   C. Ash Collection--Installation of additional precipitator capacity is firm. However, it has not yet been decided to install a pneumatic system for collecting ash in a dry state.

   D. Ash Disposal--Trucking of fly ash to an offsite disposal area appears to be the only viable alternative. As a result, the implementation of the pneumatic pipeline/depot plan or construction of an alternate access road for ash transfer does not seem feasible. The use of Brayton Point Road for trucking fly ash still remains the most practical option.

2. Page 2-1, Second Paragraph, Line 11--Based on the present rail system, it is impossible to transport coal by rail to Brayton Point. Ocean transportation of coal could be by barge, collier or other ocean going vessel.

1A. The text has been revised to indicate that dredging will not be related to coal conversion. See Section 10.1.4 also.

B. The text has been revised to indicate the uncertainty of a second coal tower and new pulverizers.

C. The text has been revised accordingly.

D. The text has been revised accordingly.

2. The text has been revised accordingly.

3. Page 2-1, Second Paragraph, Line 12--Coal conversion will be completed within 60 months after the issuance of a Notice of Effectiveness (NOE), not 36 months; downtime for Unit No. 1 will be four months, not three.

3. The text has been revised accordingly.

4. Page 2-8, Figure 2-4--Plan view is inaccurate. Unit No. 4 uses the whole spray canal system; Units No. 1, 2 and 3 discharge into the Bay via the discharge channel; intake bridge no longer exists.

4. The figure has been changed.

5. Page 2-9, Table 2-1--Unit No. 3 exit gas temperatures should be 250-270°F, not 246°F; stack velocities and flue gas rates should be the same for Units No. 1 and No. 2; 70 ft./sec. is a more accurate velocity for both units; flue gas rate should be 718,000 ft.^{3}/min. for both units.

5. The text has been revised accordingly.

6. Page 2-10, Last Paragraph--Description of cooling water systems is incorrect. Units No. 1, 2 and 3 do not discharge to the cooling ponds; the system was not designed for a 20 degree temperature reduction; the spray ponds were not in service prior to Unit No. 4 operation. We suggest that this entire paragraph be rewritten as follows:

   Condenser cooling for Turbines 1, 2 and 3 is accomplished by a once-through system that withdraws saltwater from the Taunton River. The intake is equipped with trash racks and revolving screen. The condenser cooling discharge is released to the cooling canal as shown in Figure 2-5. However, since 1976, unlike the arrangement shown in Figure 2-4, the entire canal, including that portion which is shown to be utilized by Units No. 1, 2 and 3, is dedicated to Unit No. 4. Addition of freshwater makeup for over two years has reduced the salinity of the cooling water from 25,000 ppm to between 5,000 and 10,000 ppm.

   Total withdrawal of saltwater for cooling from the Taunton River is 922 million gallons per day (MGD).

6. The text has been revised accordingly.

7. Page 2-11, Second Paragraph--This paragraph, as written, is confusing and misleading. We suggest that it be rewritten as follows:

   The transport water and other plant wastewater streams are treated for dissolved and suspended solids removal by lime precipitation and sedimentation in three sequential settling basins. The annual accumulation of sludge in the basins is estimated at 10,000 cubic yards. This would decrease if Units No. 1, 2 and 3 were converted to coal.

7. The text has been revised accordingly.

8. Page 2-12, First Paragraph--See Comment No. 1.

8. See 1.

9. Page 2-12, Third Paragraph--See Comment No. 3.

9. See 3.

10. Page 2-13, Table 2-2--The heat rate units which are used are incorrect--should be Btu/KW-Hr; the annual output units should be MW-Hrs.

10. The text has been revised accordingly.

11. Page 2-14, Line 6 and Line 1 of Third Paragraph--See Comment No. 1B and 1D.

11. See 1B and 1D.

12. Page 2-16, First Paragraph--See Comment No. 1D.

12. See 1D.

13. Page 2-16, Second Paragraph--See Comment No. 1C.

13. See 1C.

14. Page 2-19--We suggest that the last sentence be rewritten as follows:

Mount Hope Bay contains productive shellfish habitat, but industrial and municipal wastes have closed all except a segment of the Cole River to direct harvesting.

14. The text has been revised accordingly.

15. Page 3-4, Last Paragraph--The reference to cooling towers is irrelevant and should be deleted.

15. Reference has been deleted.

16. Page 3-5, Last Paragraph--The SB classification for the Taunton River and Mount Hope Bay is a goal to be met, but not an assessment of current water quality. The SB classification does not include limitations for suspended solids nor heavy metals.

If violations of the State SB ratings occurred, they were not due to Brayton Point influence.

16. The text has been revised accordingly.

17. Page 3-6, Second Paragraph--Bathing beaches exist on the Lee River and the O'Dell Road section bordering Mount Hope Bay. NEPCo. maintains a boat launching facility near the entrance to the power plant. Water contact recreation has not been prevented, nor has boating been severely limited in the Bay.

17. The text has been revised accordingly.

18. Page 3-6, Third Paragraph--See Comment No. 1B and 1D.

18. See 1B and 1D.

19. Page 3-6, Last Paragraph--The sulfur content of the coal in the existing pile is well within the limits of the proposed State Implementation Plan (SIP). Additional precipitator capacity and adoption of the proposed SIP may make it possible to burn this coal.

19. The reference has been deleted from the text.

20. Page 3-8, Third Paragraph, Last Line--Oysters are not found in commercial or recreational abundance in Mount Hope Bay and, therefore, should not be used as a susceptible species for the suspended solids criteria.

20. References relating to dredging have been deleted.

21. Page 3-9, Third Paragraph--This paragraph should be changed to include information from the Corps of Engineers' report on Fall River Harbor Improvement Dredging Project, February 1976. Pages 2-17, 2-18 and 2-19 include sediment analyses that show organic silt clay. The surface sediment was deposited since the last maintenance dredging. The deeper material is glacial-fluvial outwash. Sediment contaminants (including heavy metals) in 1971 were considered low in the Brayton Point segment. The 1972 samples show that consistently higher values are found in the Taunton River than in the rest of Mount Hope Bay.

21. References related to dredging have been deleted.

22. Page 3-10, Third Paragraph, Last Line--This sentence should be rewritten as follows:

Effluent discharge limitations established by the joint EPA NPDES and State permit are shown in Table 3-1.

22. The text has been revised accordingly.

23. Page 3-11, Table 3-1--This table shows NPDES effluent limitations only for the wastewater treatment system discharge (004) which includes ash sluicewater, system blowdown, equipment washwater, etc., as indicated in the text following the table.

23. The text and table have been revised.

24. Page 3-11, Second Paragraph Effluent guidelines for rainfall runoff at existing sources 40 CFR 423.40-423.41 have been remanded to EPA by the Fourth Circuit Court of Appeals on July 16, 1976 (Appalachian Power Company vs. Train). To date, these regulations have not been reissued, but they may fall under the requirement for Best Management Practices (BMP) for Ancillary Industrial Activities. The authority to require BMP's results from 1977 Amendments to the Clean Water Act and proposed rules were published September 1, 1978. The proposed rules do not include effluent limitations for iron, manganese or selenium. When standards are promulgated in final form, NEPCo. will take steps to meet the regulations.

24. Refer to section 10.1.1 for a discussion of standards.

25. Page 3-11, Table 3-2 Conclusions related to the possible effects of coal pile runoff and the need for treatment are based largely on the data given in Tables 3-2. Some of this data and the way it is used is of questionable accuracy. A lengthy discussion of these tables is attached as Appendix A.

25. Refer to section 10.1.2 for a discussion of coal pile runoff.

26. Page 3-27, Second Paragraph "Particulate emissions from the generating station stacks would increase as much as 12 times when the station converts to coal." Based on the values given in Tables 3-10 and 3-11, this statement is not correct.

In addition, it is our opinion that there will be no significant increase in particulate emissions when coal is burned. The present SIP limits the emissions of particulates from Units No. 1, 2 and 3 to 0.12 lbs./MMBtu. The proposed SIP will limit emissions to 0.08 lbs./MMBtu. In order to meet the new emission limit, additional precipitator capacity, designed to limit emissions to 0.06 lb./MMBtu, will be installed. We feel that this additional capacity, together with an increase in the allowable sulfur content of the fuel and a corresponding reduction in ash resistivity, will keep particulate emissions at present levels.

26. Refer to section 10.2.1 for a discussion of emissions rates. In addition, the text has been revised.

27. Page 3-27, Third Paragraph--"Sulfur dioxide emissions could increase as much as three times when the Station burns coal permitted under the proposed SIP." Under the present SIP, with the short-term revision, the sulfur content of fuel is limited to 1.21 lbs./MMBtu. Under the proposed SIP, the sulfur content of fuel, based on a 30 day average, is limited to 1.21 lbs./MMBtu. Therefore, we do not expect any increase in SO_2 emissions and perhaps a reduction due to some sulfur capture by the ash.

27. Total emissions over the year will decrease.

28. Page 3-12, Third Paragraph--The effect of PSD requirements on the proposed conversion is presently unclear. EPA has previously indicated that emissions resulting from the conversion would not consume PSD increments, but final action by EPA on this interpretation is still pending. The duration of any exemption from PSD requirements is also not clear at this time.

28. PSD does not apply.

29. Page 3-41, Table 3-10 --The TSP emission rates listed for Units No. 1 and No. 2, without ROE, should be the same. In addition, we question the accuracy of the listed emission rates.

29. TSP emission rates based on stack tests show that emission rates are slightly different. See section 10.2.1.

30. Page 3-40, Bottom, and Page 3-41, Top--Statements on aerodynamic or building downwash are inaccurate and are more consistent with stack tip downwash.

30. We have assumed that aerodynamic downwash includes both buildings and stack downwash.

31. Page 3-46, Table 3-14--The maximum "existing background level" for TSP is shown as 183 ug/m^3. According to Table 3-8 (Page 3-18), this value was recorded at the North Main Street monitor in 1977.

One of the conclusions reached in an EPA report, "Evaluation and Validation of Total Suspended Particulate NAAQS Exceedences in Fall River, Massachusetts, 1975-1976" by Allen Oi, et al, (which, incidentally, is incorrectly referenced in the DEIS bibliography), states as follows: "The most probable causes for the secondary TSP violations at the North Main Street site are the construction activities related to Route 79 in the vicinity of the site..."

We feel, therefore, that the high values measured at this site are not representative and should not be used to reflect existing background levels.

Further, due to studies currently in progress, we feel that evidence of road dust and sand contamination will lead the DEQE and EPA to a conclusion that all TSP measurements in Fall River above secondary standards are not representative of ambient levels to which the public can potentially be exposed. We believe that Fall River will be declared an attainment area for TSP and that coal conversion at Brayton Point Station will not contribute even slightly (as indicated in Table 3-14 of DEIS) to a violation of the secondary TSP standard.

31. See Section 10.2.

32. Page 3-47, Second Paragraph--Particulate emissions are determined by the ash content and chemical constituents, sulfur and carbon in the fly ash which is caused by large particle size/low volatility, flame instability, moisture, etc.

32. The text has been modified.

33. Page 3-47, Fourth Paragraph--"The highest concentrations (of TSP) were recorded at the Plymouth Avenue site in 1976." This statement is true. But it should be remembered that the hi-vol sampler at this site was located at a 12-foot elevation within 25 feet of a major four-lane surface street. Appendix E of EPA's recently proposed regulations on Air Quality Surveillance and Data Reporting (August 7, 1978) suggests that monitors so located are not representative of 24-hour population exposure.

33. See section 10.2.

34. Page 3-48, Second Paragraph, Last Line--The meaning of this sentence is unclear and should be rewritten.

34. Comment noted, however, no change has been made to text.

35. Page 3-53, Mitigation--We suggest that this section be rewritten as follows:

"Use of coal with a sulfur content of 1.57% or less, based on a 30-day average, will ensure compliance with standards." This revision would recognize the variability of the sulfur in the coal under the proposed SIP.

35. The text has been modified.

Comment	Response
36. Page 3-56, Mitigation--There is no definitive reference to what is possible at Brayton Point.	36. No data is available.
37. Page 3-61, First Paragraph--The statement on winter flounder entrainment is totally irrelevant to the discussion.	37. The statement has been deleted.
38. Page 3-61, First Paragraph--Any conclusions based on the calculated effect of coal pile runoff are inappropriate. (See Appendix A.)	38. See section 10.1.2 for a discussion of the revised coal pile runoff model.
39. Page 3-62, Last Paragraph, First Line--See Comment No. 1D.	39. See 1D.
40. Page 3-67, Second Paragraph--We cannot understand the relevance of this marbled salamander statement if it no longer exists in Bristol County. This paragraph should be deleted.	40. The paragraph has been deleted.
41. Page 3-67, Last Paragraph--The entrainment of winter flounder is not altered by coal conversion. We suggest that the paragraph be rewritten as follows: "Conversion from oil to coal will not alter the design or operation of the circulating water system. Therefore, the operation of Brayton Point Generating Station will have the same aquatic impacts that presently exist. Because the winter flounder is considered a resident fish, it has received the most attention in studies. Certain modifications undertaken at the Brayton Point Station that included widening the intake channel and redirecting the screen wash sluiceway system to ambient water have improved the impact on the adult population. Because larval winter flounder are seasonally entrained into the plant cooling system, New England Power Company is funding studies to determine the importance of this impact on winter flounder populations in Mount Hope Bay. These studies are scheduled for completion in 1979."	41. The text has been revised accordingly.
42. Page 3-68, First Paragraph--See Comment No. 1A and 1B.	42. See 1A and 1B.
43. Page 3-68 and 3-69--The impact caused by high levels of iron, manganese and selenium is based on inaccurate data and calculations. The requirement for special treatment for selenium is unfounded. (See Appendix A.)	43. Refer to section 10.1.2 for a discussion of coal site runoff.
44. Page 3-73, First Paragraph, Line 8--See Comment No. 1C.	44. See 1C.
45. Page 3-73, Last Line on Page--It may be possible to dig, catalog and preserve artifacts, instead of selecting an alternative site.	45. The text has been revised accordingly.
46. Page 3-81, First Paragraph--On the basis of Comment No. 27, we don't feel an increase in acid rain conditions should be expected.	46. Comment noted.
47. Page 3-83, Second Paragraph--"Because the proposed conversion of the Brayton Point Generating Station does not involve the selection of a new site, policies developed by the Massachusetts Coastal Zone Management Program do not apply." This statement is only partially true. Because Brayton Point is an existing site, new permits and some permit renewals may be subject to Coastal Zone Management review.	47. The text has been revised accordingly.

48. Page 3-88, First Paragraph - On May 25, 1976, an amendment to the Massachusetts General Laws became effective which designated coal ash as a raw material and removed it from the requirements of "Regulations for the Disposal of Solid Wastes by Sanitary Landfill." (See Appendix B.)

49. Page 3-104, First Paragraph - See Comment No. 1B and 1D.

50. Page 4-2, Third Paragraph, Line 2 - See Comment No. 1D.

51. Pages 6-7, Early Retirement, Line 2 - 1,157 MW is 25.7% of NEES capacity in 1978, not 5.6%.

52. Pages 6-7, Early Retirement, Line 4 - NEES is scheduled to have an additional 114 MW of nuclear capacity by 1982, not 2020 MW. The additional capacity will be from NEES' share of Seabrook No. 1.

53. Pages 6-8, First Paragraph, Last Line - In passing ESECA, Congress indicated its preference for coal over oil, not coal over nuclear.

54. Pages 6-9, Second Paragraph - Use of coal at Brayton Point may not require extensive dredging and dock modification (see Comment No. 1A).

48. The text has been revised.

49. See 1B and 1D.

50. See 1D.

51. The text has been revised accordingly.

52. The text has been revised accordingly.

53. The line has been deleted.

54. See 1A.

JJH:gv
11/16/78

APPENDIX A

1. Table 3-2

Specific comments on Table 3-2 are given for each column of data:

Column 1

Three references are cited for data on untreated coal pile runoff. The references, Brookman, et al (1977), and Cox, et al (1977), are studies of coal pile runoff from field measurements at steam-electric generating plants. The plants are in Pennsylvania and Alabama and use coal from Pennsylvania, Alabama and eastern Kentucky. These reports provide field data.

The third reference, Wachter, et al (1977), is a lab study conducted for the Environmental Protection Agency (EPA) by the Monsanto Company. The data of Column 1 comes largely from the Wachter report. This is a mistake. Where field data is available, it should be used. The lab study allowed rainwater to leak through a pile of coal in a plastic tray and the leachate was analyzed. In practice, coal piles are graded and compacted so that most rain washes off, not through the coal. Field studies show that the highest concentration of pollutants in coal pile runoff, some of which are in the range of those shown in Column 1, occurs during the flush-out period. This lasts approximately one to two hours after the start of a rainfall event. Concentrations then drop off rapidly. Table 3-2 assumes that the concentrations shown last for a 24 hour rainfall event. This is unlikely.

Field measurements have the advantage of relating runoff analyses to the effects on receiving waters. Lab studies can't do that. For example, the Brookman study shows high levels of iron in coal pile runoff before and after a rainfall event (up to 21,500 mg/l during dry weather and 1,400 mg/l during the first flush rainfall event). The report concludes, however, that ,"The data for these two sites generally show no statistical difference in mean concentration of upstream versus downstream pollutant levels in either dry or wet conditions."

Field studies fail to confirm the presence of selenium in the levels given in the EIS. The Cox report gives selenium levels of no higher than 0.03 mg/l in actual coal pile runoff.

We feel that where field data exists, it should be used in preference to lab data.

Column 2

The levels of treatment indicated in this data result from a number of sources in addition to the referenced EPA Development Document for Steam Electric Power Plants. In general, the treatment levels are reasonably accurate. An exception is selenium. No credit is given for removal by primary treatment. Treatability data for selenium is limited, but doesn't support this assumption.

1) See section 10.1.2 for a discussion of coal pile runoff concerning comments on column 1.

2) Incorrectly reported selenium values in the source document led to undue emphasis on its potential hazard. See section 10.1.2 for further discussion.

The EPA Development Document of Steam Electric Power Plants points out that selenium was not selected as a pollutant parameter for that industrial category because it was not present in significant amounts. A report prepared by Fred C. Hart Associates, Inc., for the Electric Power Research Institute, "The Impact of RCRA on Utility Solid Wastes, August 1978, indicates that measured selenium levels in ash pond overflows range from 0.001 to 0.015 mg/l. Ash pond treatment, pH control, precipitation and sedimentation, is the kind of treatment most likely to be given to coal pile runoff.

Selenium may absorb onto an iron hydroxide floc in a wastewater treatment process. This treatment is now under study at other coal burning power plants. At this time, there is insufficient and contradictory data regarding selenium levels in coal pile runoff and its treatability. It is too soon to recommend an expensive chemical treatment process for its control.

Column 3

Federal standards for coal pile runoff do not exist either as effluent standards or water quality standards. Effluent standards are covered in item 24 of the comments.

The references cited for Federal standards are EPA Quality Criteria for Water (1976) and Water Quality Criteria (1972). The 1972 Document was proposed criteria only. When issued in final form, it became the 1976 Document. Only one reference should be cited here and that is the 1976 Quality Criteria for Water.

Federal water quality criteria are not standards. They are only guidelines for use by the states. The states have the responsibility and the only authority to establish water quality standards under the 1972 Federal Water Pollution Control Act.

In evaluating the standards shown in Column 3, it is important to remember that coal pile runoff at the Brayton Point Station will be to Mount Hope Bay, a saltwater aquatic environment. The following is an item-by-item assessment of the standards given in Column 3:

1. Aluminum--1.5 mg/l--There is no criteria given for aluminum.

2. Arsenic--0.05 mg/l--A drinking water criteria. None given for marine waters.

3. Cadmium--0.05 mg/l--The marine criteria is 0.005 mg/l.

4. Chromium--0.1 mg/l--A freshwater criteria. None given for marine waters.

5. Copper--0.05 mg/l--Drinking water criteria is 1.0 mg/l. Marine criteria is 0.01 times 96-hour LC_{50} using a sensitive aquatic resident species.

6. DO-6.0 mg/l--Freshwater aquatic criteria is 5.0 mg/l. None for marine waters.

3) See Section 10.1.1 for a discussion of standards and criteria.

7. Iron--0.3 mg/l--A drinking water criteria. Freshwater criteria is 1.0 mg/l. No marine criteria given.

8. Mercury--0.0001 mg/l--This is correct.

9. Manganese--0.01 mg/l--Drinking water criteria is 0.05 mg/l. Marine criteria is 0.1 mg/l.

10. Total Nitrogen--0.38 mg/l--There is no criteria for total nitrogen

11. Nickel--0.1 mg/l--Criteria is 0.01 times 96-hour LC_{50}.

12. Phosphorous--0.1 mg/l--For elemental phosphorous, the marine criteria is 0.0001 mg/l.

13. Lead--0.05 mg/l--A drinking water criteria. Freshwater criteria is 0.01 times 96 hour LC_{50} of sensitive resident species.

14. pH--6-9--Marine criteria is 6.5-8.5.

15. Phenol--0.001 mg/l--This is a criteria for drinking water and to prevent fish flesh tainting.

16. Selenium--0.01 mg/l--A drinking water criteria. Marine criteria is 0.01 times 96-hour LC_{50} using a sensitive resident species.

Summary

Of the 16 standards given in Column 3, only one (mercury) is accurate. This column should be rewritten using the correct reference with criteria appropriately applied.

Column 4

Massachusetts Water Quality Standards have recently been revised. Class SB standards are now:

Do	--	6.0 mg/l
Oil and Grease	--	omitted
pH	--	6.5-8.5

Column 5

This column shows the results of a calculation which relates the untreated coal pile runoff of Column 1 with Federal standards of Column 3. It makes assumptions about the coal pile area, Mount Hope Bay tidal exchange volumes, and mixing zone size which are acceptable for a rough approximation of potential impact.

4) Corrections have been made.

5) See sections 10.1.1, 10.1.2, and 10.1.3 for responses related to columns 5 and 6.

It also assumes, however, that the data in Columns 1 and 3 are accurate and representative of the Brayton Point site. This is questionable as shown in the comments above for Columns 1 and 3.

Column 6

This column shows the results of a comparison of Columns 2 and 4. It suffers from the same weaknesses as Column 5, particularly with regard to selenium for which no treatment credit is allowed.

11. Impacts Pages 4-68, 4-69

The EIS concludes that an iron hydroxide floc from untreated coal pile runoff may smother fish eggs or interfere with respiration of fish and shellfish. It suggests that manganese and selenium may be concentrated by shellfish many thousand fold and passed up the food chain. The result is chronic sublethal toxicity to wildlife. (6)

Brayton Point Station was operated as a coal-fired plant beginning in 1963. Except for the years 1970-1974, there has always been a coal pile at the site. Ecological studies have been ongoing in Mount Hope Bay since 1970. A clam transplant program which removes approximately 1,200 bushels per year of shellfish per year from an area opposite the coal pile, has been in effect since 1975. A study of metal concentations in hard clams, including iron and manganese, has also been conducted.

There has been no instance of fish or shellfish suffocation due to iron hydroxide. The difference in metal concentrations in hard clams between the plant discharge and a reference station further down the Bay has shown only a slight concentration near the plant, not the thousand-fold increase refer to in the EIS.

At Brayton Point, there is substantial site specific evidence to show that the potential impact of coal pile runoff has never occurred. The EIS should focus on existing data, rather than speculation of potential impacts.

6) Assessments of impact on marine life are based on the best available data at the time of writing. See section 10.1.1 for a justification of the use of values for criteria. Additional information may be available as EPA publishes its remaining draft criteria.

I Alfred Dupont
Was not muied if Newland
Power burnt coal.
I live at 461 Kathleen ave
Somerset Mass.

8 IV A

Mr. Barton House
Dept. of Energy
Box VU, Room 2313
2000 M Street N.W.
Washington, D.C. 20461

Dear Sir:

I have no objection to the New England Power Company burning coal at the Brayton Point Generating Station, as a nearby neighbor.

Eugene J. Kosinski
112 Cory St.
Somerset, Ma.

DEPT. OF ENERGY
BOX VII RM. 2313
2000 M. ST. N.W.
WASH. D.C. 20461
ATT: MR. BARTON HOUSE

DEAR MR. HOUSE,

AS A LONGTIME RESIDENT OF THE BRAYTON PT. AREA IN SOMERSET I AM IN FAVOR OF BURNING COAL AS PROPOSED AT NEW ENGLAND POWER STATION.

Albert Renny
54 O'Neil Rd
Somerset Mass
02726

8 IV C

Dept. of Energy
Box VU, Room 2313
2000 M Street N.W.
Washington, D.C. 20461

Dear Mr. House

As a nearby neighbor, I have no objections to New England Power Co. burning coal at the Brayton Point Generating Station.

Charles M. Schofield
69 [illegible] Ave.
Somerset, Ma.

8 IV D

Dept of Energy
Box VU Room 2313
2000 M. Street
N.W.
Washington D.C. 20461

att.

Mr. Barton House.

Dear Sir, as a neighbor of New-Eng power the past has shown that coal has never been a problem any more than oil. I approve coal burning at Brayton Pt.

Joseph Silva
66 Perkins ave
Somerset Mass

8 IV E

November 21, 1978

To: The Department of Energy
Somerset Public Library

From: Rudolph St. Pierre, Age 71, Retired, Residence, 6 Ripley St., Somerset, Mass., 02725, Situated about 3000 feet east of New England Power Co. Plant.

Subject: Proposed Coal Conversion at the Brayton Point Plant of N. E. Power Co.

Sirs:

It seems that much investigative work and statistical modeling has been done by the Dept. of Engrgy, Dept of Enrironmental Quality Engineering and New England Power Co., to assure that air pollution standards will be met if coal burning at Brayton Point Station becomes a reality.

However, we must be assured that these ambient air quality standards do protect the population, particularly residents living within 1-2 mile radius surrounding the N. E. Power Plant, who are most likely affected by air pollution emitted and dispersed from the plant.

Sulfur oxides and particulates are the pollutants of major concern with coal burning. It is known that substantial concentrations of sulfur dioxide were and are common.

Electrostatic precipitators are mentioned as being employed to control particulates. If the performance and effectiveness of Electrosatic Precipitator currently being used now by N. E. Power Co. to control particulates, etc., are to be used as a criteria, as evidence of their effectiveness, there is evidence that they are lacking in that regard. We have substantial evidence of this fact. They have proven to be inadequate.

If N. E. Power is to burn coal, in the future it should make every effort possible to protect the public health and prevent damage to property from the many hazards known, and unknown, of particulates and sulfur dioxides.

N. E. Power relies mainly on the force and velocity of the wind to successfully disperse into the atmosphere air pollutants emitted from its stacks, etc. However, nature and the atmosphere does not always cooperate in this regard. Hence, conditions conducive to nuisance problems may occur whithin the area proximate to the plant where I reside.

During the past 2 weeks I have reviewed publication "DOE /E 18-0036D," Draft Environment Impact Statement, Coal Converstition Program, New England Power Co,,Brayton Point Generation Station, Dated October 1978.

In general, it is a frank statement involving expectations throughout the period of conversion to coal, etc.

During the last past year I also have familiarized myself with the following publications, among others, namely:

#1 E P A --450/2-75-007, Dated Sept. 1975
"Position Paper on Regulation of Atmospheric Sulfates."

#2 E P A--600/9-77-044, Dated December, 1977

3--National Air Pollution Control Administration Publication No. A.P. 50, Air Criteria for Sulfur Oxides "H E W , April, 1970.

4 650/1-74, Dated May 1974. "Health Consequences of Sulfur Oxides. A Report from C H E S S, 1970-1971.

Thank you.

R. St. Pierre

11/21/78

Dept. of Energy
Box VU, Room 2513
2000 M. St. N.W.
Washington, D.C. 20461

Dear Mr. Barton House

As a resident of Somerset, Mass. I have no objection to burning coal at the Brayton Point Station of New England Electric System.

Henry E. Vuillemenot, Jr.
30 Cypress Rd.
Somerset, Mass. 02726

8 IV G

9. BIBLIOGRAPHY

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10. AGENCIES AND GROUPS CONTACTED IN THE COURSE OF PREPARING THIS DOCUMENT

Federal Agencies

Army Corps of Engineers, New England Division, Waltham, Massachusetts
Atmospheric Turbulence and Diffusion Lab., Oak Ridge, Tennessee
Department of Agriculture, Soil Conservation Service, Amherst, Massachusetts
Department of Commerce, National Oceanic and Atmospheric Administration, Providence, Rhode Island
Department of Energy, Boston, Massachusetts
Department of Interior
- Fish and Wildlife Service, Biological Services Program, Newton Corner, Massachusetts
- U.S. Geological Survey

Environmental Protection Agency, Region I, Boston, Massachusetts
- Air Section Surveillance and Analysis Division
- National Pollution Discharge Elimination System, Permits Division
- Solid Waste Division

Environmental Protection Agency, Research Triangle Park, North Carolina

State Agencies

Commonwealth of Massachusetts
- Department of Employment Security
- Department of Environmental Management
  - Parks and Recreation Department
  - Solid Waste Department
  - Water Resources Department
- Department of Environmental Quality Engineering
  - Air and Hazardous Materials Division
  - Division of Water Pollution Control
  - Planning and Standards Division
  - Division of Fisheries and Wildlife, Westboro, Massachusetts
  - Division of Marine Fisheries and Wildlife, Boston, Massachusetts
- Executive Office of Environmental Affairs, Coastal Zone Management, Boston, Massachusetts
- Historical Commission, Boston, Massachusetts
- Metropolitan District Commission, Construction Engineering Division, Boston, Massachusetts

Rhode Island Division of Air Pollution, Providence, Rhode Island

Local Agencies

City of Fall River, Massachusetts
- City Clerk
- Fire Department
- Health Department
- Police Department
- Sanitary Engineering Department

Southeastern Massachusetts Air Pollution Control District
Southeastern Regional Planning and Economic Development District (SRPEDD), Marion, Massachusetts
Town of Somerset, Massachusetts
- Fire Department
- Health Department
- Police Department
- Town Clerk
- Town Engineer
- Zoning Agent

Town of Swansea, Massachusetts
- Town Clerk
- Town Engineer

Institutions

Boston College, Weston Observatory, Weston, Massachusetts
Massachusetts, University of,
- College of Food and Natural Resources, Suburban Experiment Station, Waltham, Massachusetts
- Department of Forestry and Wildlife Management, Amherst, Massachusetts

Private Organizations

Combustion Equipment Associates, New York, New York
EUA Service Corp., Lincoln, Rhode Island
Green Mountain Power Company, Montpelier, Vermont
Massachusetts Audubon Society, Lincoln, Massachusetts
New England Electric System (NEES), Westborough, Massachusetts
New England Power Company (NEPCo)
- Brayton Point Station, Somerset, Massachusetts
- Environmental Affairs Department, Westborough, Massachusetts

PEDCo Environmental, Inc., Cincinnati, Ohio
Preservation Partnership, Natick, Massachusetts
Radian Corp., Austin, Texas
Southeastern Regional Transit Authority, Fall River, Massachusetts

11. GLOSSARY

Alewife - _Pomolobus pseudoharengus_ a food fish of the herring family very abundant on the Atlantic coast

Alluvium - Geologic materials deposited by moving water

Anticline - A fold of geologic strata whose axis was originally the crest of the fold

Anoxic - A condition of low dissolved oxygen levels, typically found in unmixed, eutrophic streams and lake bottoms and waters

Aquifer - A water bearing formation composed of rock, sand, gravel and combinations thereof

Ash - That proportion of a coal which remains in solid form after combustion and does not contribute to the heating value of the coal

Ash Ponds - Constructed or natural basins into which a slurry of ash and water is pumped where, by gravity sedimentation, the ash settles to the bottom allowing the clarified water to be removed by pumping

Background Concentration - The concentration of a pollutant attributable to natural sources and unidentified anthropogenic sources.

Benthic - Pertaining to the aggregate of organisms living on or at the bottom of a body of water

Biochemical Oxygen Demand (BOD) - Rate of consumption of oxygen by organic material in water; used as an indicator of mass of organic material in water

Boiler Blowdown - Removal of a portion of boiler water for the purpose of reducing concentrations of salts and corrosion products. Makeup water is added to keep system water volumes constant

Boiler Makeup - High purity water added to boiler feed to compensate for that lost through exhaust, blowdown and leakage

Bottom Ash - The ash which collects on the sides and bottoms of furnaces used for coal combustion and which is periodically removed

Brecciated - A type of rock composed of angular fragments of older rocks melded together

Cation Exchange Capacity - A measure of the ability of a solid contained in a liquid to adsorb positively charged species, milliequivalents adsorbed per amount of solid (meq/gm)

Channelization - Creation of a channel in a stream or river bed for flood control or navigational purposes

Class A - Fresh water suitable for primary contact, i.e., swimming, water skiing, skin diving

Class B - Fresh water suitable for secondary contact: recreation (fishing, wading, boating), for public water supply with treatment and disinfection, and fish and wildlife habitat

Class SB - Salt water suitable for bathing and recreational purposes including water contact sports, and industrial cooling, have good aesthetic value, are excellent fish habitats and are suitable for certain shell fisheries with depuration

Class SC - Salt water suitable for aesthetic enjoyments, for recreational boating, as a habitat for wildlife and common food and game fishes indigenous to the region, and are suitable for certain industrial uses. etc.)

Crusher - Machine used to break coal into non-uniform pieces ranging from 1/4 to 1" in size

Depuration - The natural processes of self-cleansing which an organism undergoes when removed (by man) from a polluted environment to a "clean" environment

Dissolved Oxygen (DO) - Oxygen dissolved in water and utilized for aquatic life respiration

Downtime - Time during which the boiler and related equipment is not functional while necessary maintenance and/or construction may be undertaken

Dry Bottom Boiler - Boiler designed to burn coal of a quality that allows some proportion of the ash to fall to the bottom collection hopper in large pieces called clinker slag

Economizer - A heat exchanger which removes heat from the flue gas before it leaves the boiler and is used to further heat the boiler feed water as it recycles through the boiler

Effluent Limited - Classification of a stream segment where water quality is meeting applicable standards, or will meet standards after application of effluent limitations

Exceedance - Ambient concentration greater than air quality standard. Frequency of conditions associated with concentration is needed to determine violation

Fault - A break in the continuity of a body of rock or of a vein with dislocation along the plane of the fracture

Floodplain - Area subject to periodic inundation by flood waters

Flow Fork - A conditional branch in a schematic diagram

Fly Ash - The ash particles of sufficiently small diameter and light weight which are vented from the furnace with the stack gases

Groundwater - Water located beneath the ground surface and within the zone of saturation

Hardness - The total concentration of calcium, magnesium, other polyvalent metal ions, and ions expressed as calcium carbonate

Impulsive Noise - Single or multiple bursts of sound of short duration with rapid rise and decay of amplitude. A common technical definition is that the rise time from the average steady noise to the peak value by 35 milliseconds or less and that the duration to the time when the noise is 20 dB lower than the peak is not greater than 1/2 second

Inversion - An increase in the temperature of air with increasing altitude resulting in a stationary air mass above the ground

JTU - Jackson Turbidity Units - A measure of the relative opacity of water

L_1, L_{10} - The noise level in dB(B) exceeded for 1, 10, etc. percent of the measurement period

L_{eq} - The energy equivalent steady noise level for the stated measurement period which would contain the same total acoustical energy as the fluctuating noise level during the same period

Leachability - Degree of solubility of waste material constituents in water passing through the waste

Leachate - Water containing dissolved solids, chemicals or minerals which are derived from percolation through man-made or natural deposits of waste or minerals

Loess - A loamy deposit formed by wind usually yellowish and calcareous, common in the Mississippi Valley

Mean Mixing Layer Wind Speed - The average wind velocity measured in the mixing layer

Meter Response - Sound level meter displays have standardized response times including Fast, Slow, Impulse and Peak. In this study only the Fast and Peak responses are utilized. The actual amplitudes of rapidly changing noise levels comparable in response uses a hold circuit to display the maximum noise level regardless of its duration

Mixing Height (or depth) - Height above the ground surface through which relatively vigorous vertical mixing of air takes place

Mixing Zone - Area contiguous to a discharge where receiving water quality may meet neither all quality criteria, nor requirements otherwise applicable to the receiving water. As general guidelines the combined areas of all mixing zones of an estuary should not exceed 10% of the cross sectional area of the estuary

Modified Mercalli Scale - An arbitrary scale used to evaluate intensity of earthquakes for which only written descriptions exist since they occurred before the invention of the seismograph and associated Richter Scale. It is the scale adopted by the U.S. Geologic Survey

MW-Mega-Watt - One million watts. A watt is a unit of power equivalent at one joule per second or 1/746 horsepower per second

Noise level - The measured noise obtained with a sound level meter set to A-weighting, a filter characteristic specified by American National Standards Institute (ANSI) Standard s1.4 1971. The unit of measure is the dB(A), i.e., the A-weighted decibel. See Appendix C for examples of common noise levels

NPDES - National Pollutant Discharge Elimination System

Orthods - Soils of the spodosol group with a horizon containing accumulations of iron and aluminum compounds

Permeability - The measure of the ability of a medium (soil, rock, sand, etc.) to transmit fluids

Peroxyacetyl Nitrates (PAN) - A photochemical oxidant formed in the atmosphere by complex chemical reactions between nitrogen oxides and non-methane hydrocarbons

PL92-500 - Federal Water Pollution Control Act Amendments of 1972, which established national water quality goals and programs

Pneumatic Ash Handling System - a network of pipes that transports ash dry, using compressed air

Precipitator - Pollution control device which, through mechanical or electrical means, can remove up to 99% of the particulate matter included in stack effluent gases

Principal coal - Coal with specific characteristics (ash, sulfur and heat contents) whose emissions when fired do not exceed State Air Quality Implementation Plan emission standards

Pulverizer - A machine which grinds crushed coal into a fine dust

Pure Tone - A sound whose energy is concentrated at a fixed or slowly varying pitch, e.g., a hum, whistle, screech, howl, siren, etc. Overall sound level meter readings cannot distinguish the presence of a tone in a complex noise although the human hearing process incorporates excellent filtering capabilities making tones highly audible. Pure tone measurements require instruments that have at least octave band filtering capabilities and preferably one-third octave or narrower filters

Secondary Treatment - Biological wastewater treatment processes designed to reduce concentrations of organic materials through metabolism by microorganisms and clarification

Short-term Revision Standard - See SIP: Short-term Revision Standard

SIP Short-term Revision Standard - A revision to the State Implementation Plan (SIP) with a time limit

Underlying SIP Standard - The State Implementation Plan (SIP) regulations which are in effect if a short-term revision time limit expires

Sluice - To flush or cleanse with a rush of water (or air)

Syncline - A fold of geologic strata whose axis was originally the trough of the fold

Tidal Volume - The amount of air inhaled into the lungs

Till - An unconsolidated sediment containing all sizes of fragments from clay to boulders, deposited by glacial action.

Water Quality Limited - Classification of a stream segment where water quality does not meet applicable standards, and is not expected to meet standards after effluent limitation

Wet Bottom Boiler - Boiler designed to burn coal of a quality that allows some proportion of the ash to flow to the bottom collection hopper in molten (wet) form

Zero Discharge Stream - A stream into which no industrial or municipal wastewater discharges are permitted

201 Facility Plan - A plan which will allow the application of the "best practicable waste treatment technology before discharge into receiving water" in the construction or improvement of wastewater treatment facilities as established by Section 201 of the 1972 Amendments to the Federal Water Pollution Control Act

208 Water Quality Plan - A plan developed by regional organizations formed under the guidelines established in Section 208 of the 1972 Amendments to the Federal Water Pollution Control Act. The plan should cope with "substantial water quality problems" through control of "waste disposal, both land and subsurface, and salt water intrusion, agriculture, feed lots, forestry, mining and construction activities." Federal funding is available for planning grants and for public treatment works

APPENDIX A

MASSACHUSETTS WATER QUALITY STANDARDS (1978)

Classes for Coastal and Marine Waters

Class SA - Waters assigned to this class are designated for the uses of protection and propagation of fish, other aquatic life and wildlife; for primary and secondary contact recreation; and for shellfish harvesting without depuration in approved areas.

Class SB - Waters assigned to this class are designated for the uses of protection and propagation of fish, other aquatic life and wildlife; for primary and secondary contact recreation; and for shellfish harvesting with depuration (Restricted Shellfish Areas).

Class SC - Waters assigned to this class are designated for the protection and propagation of fish, other aquatic life and wildlife; and for secondary contact recreation.

Minimum Criteria. The following minimum criteria are adopted and shall be applicable to all waters of the Commonwealth.

These minimum criteria are applicable to all waters of the Commonwealth, unless criteria specified for individual classes are more stringent.

Parameter	Criteria
1. Aesthetics	All waters shall be free from pollutants in concentrations of combinations that: a) Settle to form objectionable deposits; b) Float as debris, scum or other matter to form nuisances; c) Produce objectionable odor, color, taste or turbidity; or d) Result in the dominance of nuisance species.
2. Radioactive Substances	Shall not exceed the recommended limits of the United States Environmntal Protection Agency's National Drinking Water Regulations.
3. Tainting Substances	Shall not be in concentrations or combinations that produce undesirable flavors in the edible portions of aquatic organisms.
4. Color, Turbidity, Total Suspended Solids	Shall not be in concentrations or combinations that would exceed the recommended limits on the most sensitive receiving water use.

5. Oil and Grease	The water surface shall be free from floating oils, grease and petrochemicals and any concentrations or combinations in the water column or sediments that are aesthetically objectionable or deleterious to the biota are prohibited. For oil and grease of petroleum origin the maximum allowable discharge concentration is 15 mg/l.
6. Nutrients	Shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication.
7. Other Constituents	Waters shall be free from pollutants in concentrations or combinations that a) Exceed the recommended limits on the most sensitive receiving water use; b) Injure, are toxic to, or produce adverse physiological or behavioral responses in humans or aquatic life; or c) Exceed site-specific safe exposure levels determined by bioassay using sensitive resident species.

Coastal and Marine Waters - the following additional minimum criteria are applicable to coastal and marine waters.

For Class SA waters:

Parameter	Criteria
1. Dissolved Oxygen	Shall be a minimum of 6.0 mg/l.
2. Temperature	None except where the increase will not exceed the recommended limits on the most sensitive water use.
3. pH	Shall be in the range of 6.5-8.5 standard units and not more than 0.2 units outside of the naturally occurring range.
4. Total Coliform Bacteria	Shall not exceed a median value of 70 MPN per 100 ml and not more than 10% of the samples shall exceed 230 MPN per 100 ml in any monthly sampling period.

For Class SB waters:

1. Dissolved Oxygen	Shall be a minimum of 6.0 mg/l.
2. Temperature	None except where the increase will not exceed the recommended limits on the most sensitive water use.

3. pH	Shall be in the range of 6.5-8.5 and not more than 0.2 units outside of the naturally occurring range.
4. Total Coliform Bacteria	Shall not exceed a median value of 700 MPN per 100 ml and not more than 20% of the samples shall exceed 1000 MPN per 100 ml during any monthly sampling period, except as provided in Regulation 2.1.

For Class SC waters:

Parameters	Criteria
1. Dissolved Oxygen	Shall be a minimum of 6.0 mg/l.
2. Temperature	None except where the increase will not exceed the recommended limits on the most sensitive water use.
3. pH	Shall be in the range of 6.5-8.5 standard units and not more than 0.2 units outside the naturally occuring range.
4. Fecal Coliform Bacteria	Shall not exceed a log mean for a set of samples of 1000 MPN per 100 ml, nor shall more than 10% of the total samples exceed 2500 MPN per 100 ml during any monthly sampling period, except as provided in Regulation 2.1.

APPENDIX B

CONVERSION TABLE

To convert from	To	Multiply by
	Length	
Inches (in)	Meter	2.540 000 E-02
Feet (ft)	Meter	3.048 000 E-01
Yards (yd)	Meter	9.144 000 E-01
	Area	
Square feet (ft^2)	Square meters (m^2)	9.290 304 E-02
Square yards (yd^2)	Square meters (m^2)	8.361 274 E-01
Acres	Square meters (m^2)	4.046 873 E+03
	Volume	
Liters	Cubic meters (m^3)	1.000 000 E-03
Gallon (U.S. Liquid)	Cubic meters (m^3)	3.785 412 E-03
Cubic feet (ft^3)	Cubic meters (m^3)	2.831 685 E-02
Cubic yards (yd^3)	Cubic meters (m^3)	7.645 549 E-01
Barrels (oil, 42 gal)	Cubic meters (m^3)	1.589 873 E-01
Acre-feet	Cubic meters (m^3)	1.233 486 E+03
	Mass	
Grams (g)	Kilogram (kg)	1.000 000 E-03
Ounces (oz)	Kilogram (kg)	2.834 952 E-02
Pounds (lb)	Kilogram (kg)	4.535 924 E-01
Tons (metric)	Kilogram (kg)	1.000 000 E+03
Tons (short)	Kilogram (kg)	9.071 847 E+02
	Energy	
BTUs (international)	Joule (j)	1.055 056 E+03
Calories (international)	Joule (j)	4.186 800 E+00
Ergs	Joule (j)	1.000 000 E-07
Kilocalories (international)	Joule (j)	4.186 800 E+03
	Energy/Mass	
BTU/LB	Joules/kilogram (j/kg)	2.326 000 E+03
BTU/Ton (short)	Joules/kilogram (j/kg)	1.163 000 E+00
	Power (Energy/Time)	
BTU/second (sec)	Joules/sec (watt)	1.055 056 E+03
BTU/minute (min)	Joules/sec (watt)	1.758 426 E+01
BTU/hour (hr)	Joules/sec (watt)	2.930 711 E-01
	Volume/Time	
Gal/second (sec)	Cubic meters (m^3)/sec	3.785 412 E-03
Gal/minute (min)	Cubic meters (m^3)/sec	6.309 020 E-05
Gal/hour (hr)	Cubic meters (m^3)/sec	1.051 503 E-08
Gal/day	Cubic meters (m^3)/sec	4.381 263 E-08
Barrels/day	Cubic meters (m^3)/sec	1.840 130 E-06

*Numerical values are expressed in scientific notation. Thus, "2.54 000 E-02" should be interpreted as "2.54 times 10^{-2}" or 0.0254.

APPENDIX C

INSTRUMENTATION

Spot noise level measurements were made with a General Radio Model 1933, S/N 2333, Precision Sound Level Meter-Octave Band Analyzer. This meter meets ANSI S1.4 1971 for Type 1 sound level meter.

Statistical noise level measurements were made with a General Radio Model 1945, S/N 278, Community Noise Analyzer. This meter is used with a General Radio Type 1971-19601 1 inch diameter piezoelectric microphone and a General Radio Type 1560-P40 Preamplifier.

Both of the above meters are calibrated in the field for each group of measurements using a General Radio 1562 A, S/N 641 calibrator.

All outdoor measurements are made with a windscreen over the microphone.

APPENDIX D

COMMON NOISE LEVELS

Rock and Roll Band (Indoors)	100-115 dB(A)
DC-9 Jet Plane at 6,000 Feet Before Landing	97 dB(A)
Tractor-Trailer Truck at 50 Feet, 55 mph, Steady Speed	85 dB(A)
Possibility of Permanent Hearing Loss, Eight Hours A Day or Equal	85 dB(A)
Automobile, At 50 Feet, 64 mph	73 dB(A)
Normal Conversation, At 3 Feet	60 dB(A)
Urban Daytime Ambient Noise, When There Are No Identifiable Loud Noises	40-50 dB(A)
Inside "Quiet" Home	35-40 dB(A)
Rural Area, When There Is Little Or No Wind	30-40 dB(A)
Threshold of Hearing (Varies with Age, Occupation, Etc.)	0-10 dB(A)