The site consists of 70 percent wooded or brush covered uplands with hilly topography; the average elevation is 225 feet above Mean Sea Level, with extreme elevations occurring in the west central area (350 feet) and in the northeast wetland areas (150 feet). The valleys are U-shaped and isolated, occupied in many places by bogs and swamps.

A major feature relative to the site is the presence of the adjoining Copicut Swamp and Copicut Reservoir in the south central portion of the site. The on-going geologic and hydrologic investigations indicate that the natural topographic features, when taken together with site sediment structure and hydrology, can be used effectively to guard against off-site water contamination.

The NEEP site was rezoned to permit heavy industry by Fall River municipal officials in May, 1980.

7.4.2 Utilities and Auxiliary Service

The location of existing powerlines, pipelines, and railroads is shown in Figure 7-2. A powerline right-of-way crosses in an east-west direction at the middle of the site, and a pipeline right-of-way crosses in a north-south direction.

Road access to the site is limited, with most roads on site being unpaved. Several paved secondary roads exist around the periphery of the site. Figure 7-3 shows existing highways, roads, and trails on and near NEEP site. The area is serviced by three major highways -- Routes 24, I95, and I40 -- and several other roads and highways, including U.S. 6. Interstate I95 runs in an east-west direction south of the site, while State Routes 24 and I40 run generally north-south and pass west and

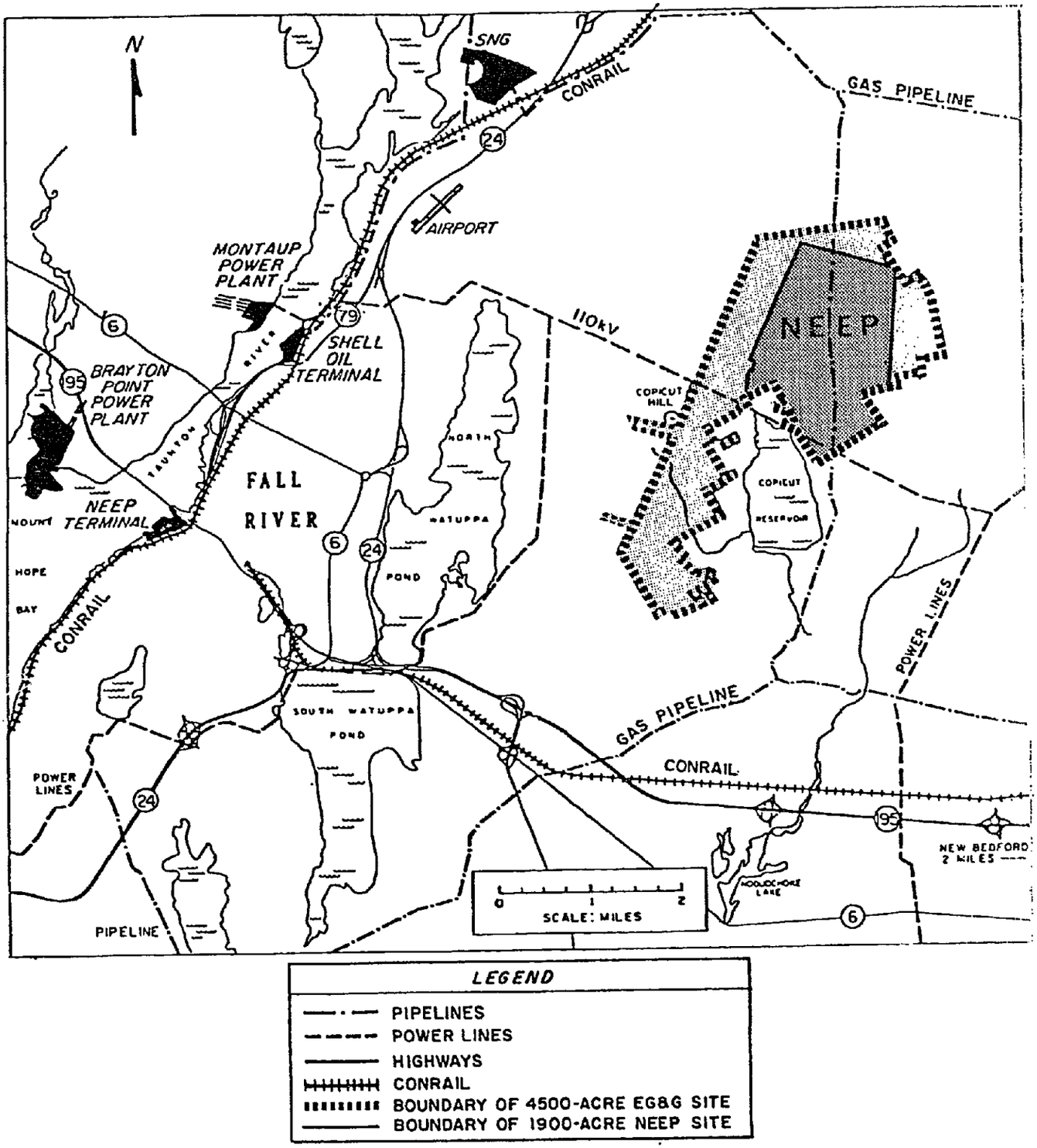
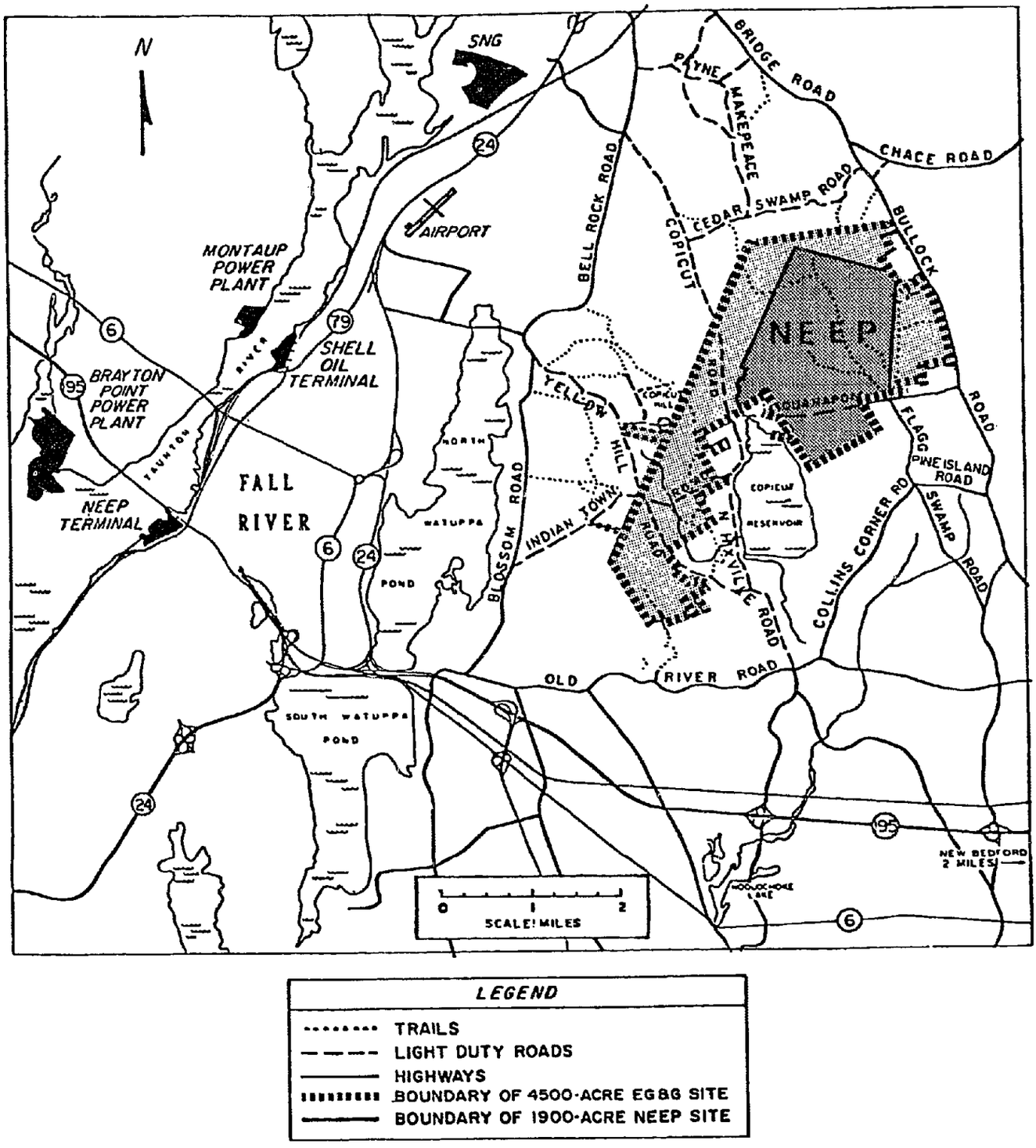


Figure 7-2

NEW ENGLAND ENERGY PARK SITE - EXISTING GAS PIPELINES, POWERLINES, AND RAILROADS



LEGEND

- TRAILS
- LIGHT DUTY ROADS
- HIGHWAYS
- BOUNDARY OF 4500-ACRE EG&G SITE
- BOUNDARY OF 1900-ACRE NEEP SITE

Figure 7-3

NEW ENGLAND ENERGY PARK SITE - TRAILS, ROADS, AND HIGHWAYS

east of the site, respectively. These highways provide ready access to the Fall River area from Boston, Providence, New Bedford, and other major metropolitan areas.

7.4.3 Railroads, Ports, and Harbors

The Fall River area offers a deepwater harbor area and an existing rail system. The Taunton River entering Mt. Hope Bay has an existing channel depth of 35 feet. Vessels of considerable size service the existing terminals and power plants in the area on a regular basis. There are no serious navigational problems caused by fog or ice, except in unusual circumstances. In severely cold weather, normal vessel traffic tends to keep the channels open.

The entire Fall River waterfront area is served by a rail line, operated by Conrail, called the Newport Line. Conrail has identified the Newport Line as one it may abandon in Massachusetts, although a recent development indicates that Conrail may continue to service this line. EG&G has a purchase agreement for this line. This will assure the availability of the rail line for the project.

The rail extension to the site will utilize seven miles of the existing Conrail line and five miles of new rail from the Newport line to the site. This "transportation corridor" will provide access for piping and industrial truck traffic and is shown in Figure 7-4.

The rail branch line portion of the "transportation corridor" requires the State of Massachusetts Legislature to approve an easement through the Fall River-Freetown State Forest. Legislation for the easement has been submitted by area legislators and has received initial approval in both the House of Representatives and the Senate. Final approval is expected in the near future.

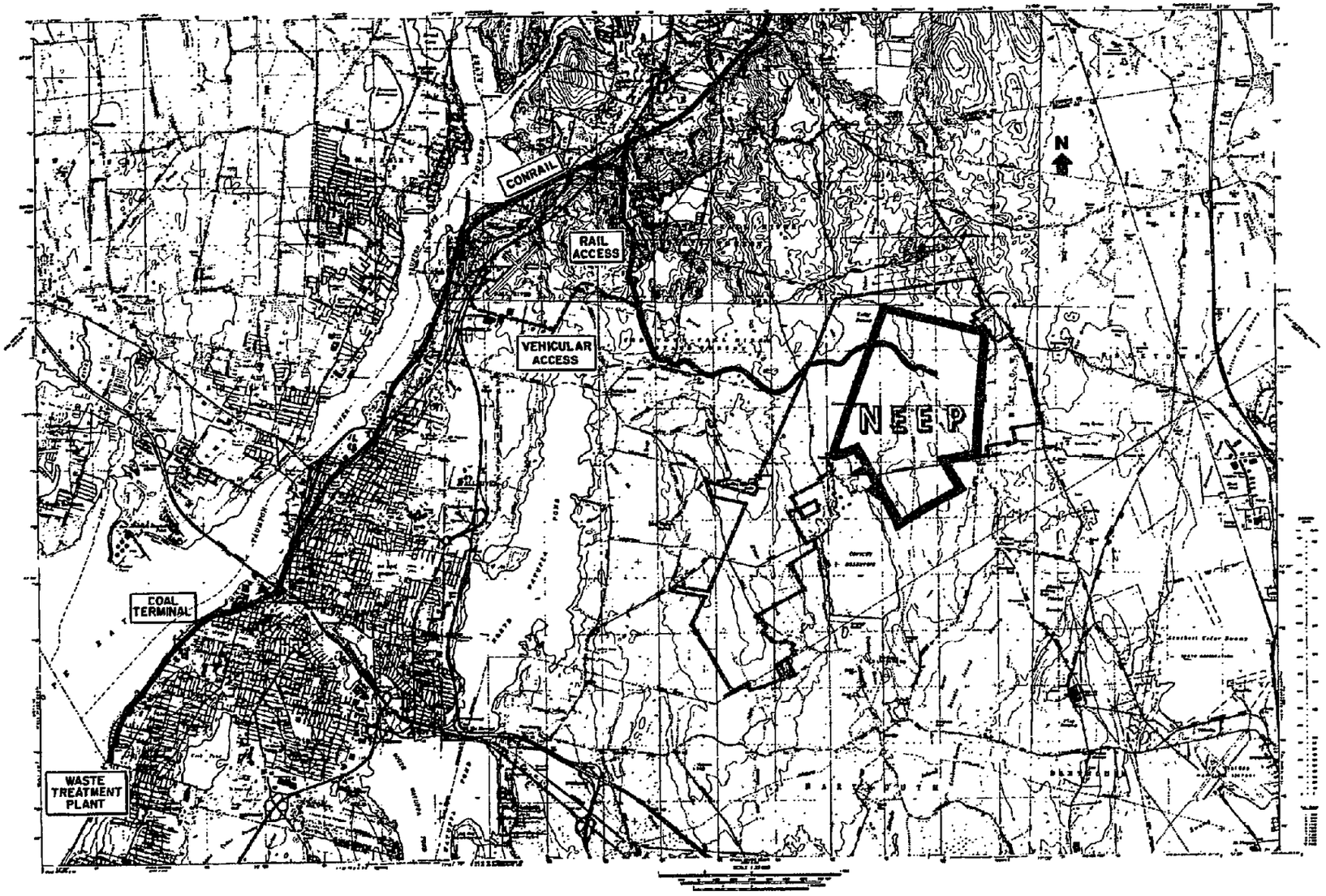


Figure 7-4

NEW ENGLAND ENERGY PARK PROPOSED ACCESS CORRIDORS

All state and local agencies have been contacted and have participated in discussions concerning the proposed route. They are all supportive on the condition that the corridor be developed in a manner that minimizes the impact on the environment and that the State receives adequate compensation. The details of the design and compensation are now being worked out.

7.4.4 Hydrological Features

Copicut Reservoir, presently a reserve reservoir of drinking water for Fall River, and the wetlands within the site area are important aspects that are being considered during facility design. Review of existing geologic and hydrologic information suggests that the natural topographic features and the underground rock and sediment structure and hydrology can be used effectively in the design to prevent reservoir contamination. Judicious placement of key plant components, a proper engineering design, and use of physical barriers and runoff collection techniques will direct runoff away from the Copicut drainage system. The soils adjacent to the reservoir are comprised mainly of compact glacial till having low permeability; this till allows very little infiltration of surface water into the ground and inhibits the flow of groundwater already present.

8. ENVIRONMENTAL AND PERMITTING

8.1 INTRODUCTION AND STATUS

Environmental and permitting programs have been designed and implemented to accomplish the following: 1) facilitate development of baseline information for environmental reviews and potential impact assessment analysis, 2) facilitate permit acquisition and licensing through thorough and extensive analysis of regulatory requirements specific to the NEEP project siting. The baseline data collection program is nearing completion, and final data analysis and impact projections are progressing on schedule. To date, no environmental issues have surfaced that should pose a serious constraint on the development of the NEEP project. A thorough analysis of regulatory requirements specific to the NEEP project and site indicates that the project should be permitted and licensed with no undue delays. Proposed designation of the Corps of Engineers to prepare an Environmental Impact Statement and serve as Federal Lead Agency is nearing decision. Initiatives have been taken to ensure that the project will receive expedited licensing and regulatory review by Massachusetts and federal agencies.

The NEEP project sought early involvement of the cognizant regulatory bodies; environmental considerations have been factored into the design process in order to produce a model facility. The State of Massachusetts has cooperated fully in expediting the regulatory process. Community support activities have also been emphasized, resulting in a high level of local acceptance.

Various local, state, and federal regulatory agencies were actively involved in designing field programs to ensure that regulatory issues and requirements were adequately addressed. Essential issues addressed include facility designing and siting; siting, designing and routing rail, utility and road corridors; siting and designing the

marine terminal, pier and ocean outfall. Data acquisition and analyses have been essentially completed. To date, no environmental issues or regulatory requirements have surfaced which would pose serious constraints or delays in the Energy Park project. The Governor of Massachusetts has provided a mechanism to expedite all regulatory licensing, and related government agency activities related to NEEP through the Massachusetts Energy Facilities Siting Council. Federal agency input to the state MEPA process is being coordinated by the U.S. Corps of Engineers. Both federal and state agencies have agreed to the use of a single EIS/EIR document, which will provide for an efficient regulatory review of the project.

8.1.1 Program Overview

The following subsections provide a brief overview of environmental and permitting programs, and discuss their current status. Detailed information and discussion of each program is covered in Section 8.2, ENVIRONMENTAL BASELINE.

(a) Air Quality

The NEEP aerometric monitoring program has two components: a Prevention of Significant Deterioration (PSD) baseline monitoring program that completed continuous operation for over one year in March 1982, and an air quality and meteorological modeling and data analysis program to assess potential ambient impacts. The variables of primary PSD concern are sulfur dioxide (SO_2) and total suspended particulates (TSP). In addition, nitrogen oxides (NO_x) and carbon monoxide (CO) have been measured close to the plant site. Meteorological parameters such as wind direction and turbulence, ambient temperature, rainfall, and vertical temperature differences were also measured continuously.

The PSD monitoring and modeling results were submitted to Region I EPA in February, 1982. The meteorological monitoring and data analysis final report covering all aerometric data, quality assurance result and air quality standards compliance supplemental analysis, was submitted during April, 1982. The application was determined "complete" on March 8, 1982, and EPA comments through mid-June indicate no problem in meeting all PSD requirements well within the required guidelines.

(b) Geohydrology

The geohydrology program has assisted the siting of plant facilities by characterizing the quantity, quality, and flow dynamics of surface and groundwater on and adjacent to the NEEP site. Additionally, samples of soil and rock were analyzed for structural foundation support characteristics. Permeability of soil and rock was determined in the field during the exploration program. Data from rainfall, surface water flow, and groundwater measurements are being integrated with an estimated evapo-transpiration factor to develop a water balance budget for the area. Engineering analysis of geohydrology data now available suggests no problems in siting the project while protecting local water supplies.

(c) Water Quality/Aquatic Ecology

The NEEP site is within the Westport River and Taunton River drainage basins, which contain several freshwater bodies. In order to obtain baseline data needed to position plant facilities, Stafford Pond, Copicut Reservoir, Copicut River, Miller Brook, Shingle Island River, Pine Island Pond, North Watuppa Pond, and a small stream in the southwest corner of the site were sampled for parameters

adopted for Massachusetts water bodies. These data allowed an evaluation of: ecosystem viability; review of the application of the Clean Water Act; and consideration of phenomena that could be indicative of activities associated with the construction or operation of the NEEP facility. Additionally, phytoplankton, zooplankton, and benthos were sampled. Fish were sampled in the Copicut Reservoir, North Watuppa Pond, and Stafford Pond.

North Watuppa Pond and Copicut Reservoir were given particular attention, since they are, respectively, Fall River's principal and backup drinking water sources. Environmental and engineering analysis to date indicate no significant problems in protecting and maintaining the integrity of these water supplies.

(d) Terrestrial Ecology/Wetlands

To locate any important or unique habitats on the site, an extensive wildlife and vegetation survey has been conducted. No unique habitats exist in the area. There are, however, several areas considered as "important" and the environmental data gathered has been used to assist the engineering and design effort in ensuring the protection of these areas, particularly wetlands. No threatened or endangered species have been found on or around the NEEP site and letters from state and federal agencies indicate that none are to be expected.

(e) Noise

A noise program has been designed to assess and demonstrate compliance with state, federal, and local guidelines and regulations. The NEEP noise impact evaluation will be con-

ducted during the fall of 1982, to assess the ambient baseline measurement, sound level criteria, predicted noise levels from modeling efforts, and community response to intruding noise. The evaluation will include all noise-sensitive land uses in the vicinity of NEEP.

(f) Cultural Sciences

A background archaeological study identified historic sites using maps, primary documents, aerial photographs, and informant interviews. The locations of possible cultural resources were also predicted based on locational geography. A field archaeology program will be conducted during the fall months of this year to identify and characterize potential archaeological sites where construction is scheduled to occur.

(g) Marine Terminal

The coal required for NEEP will be conveyed to Fall River by water transport (barges or colliers). Therefore, a marine terminal is necessary for the unloading and transshipment of coal to the NEEP site. The terminal will also be used for movement of other products to and from the NEEP site. Existing environmental information pertaining to the Taunton River-Mount Hope Bay area and the regulatory issues likely to be involved in the construction and operation of a marine facility have been reviewed. In addition, permit requirements have been reviewed with the intention of designing environmental field studies to provide the information and data that are necessary to apply for the required permits.

(h) Access Corridor

The delivery of resources to and the shipment of products from NEEP will require that an access route be provided for several modes of transportation. The major considerations relate to the delivery of coal and other materials to the NEEP facility from its anticipated unloading terminal in the Fall River region and the shipment of products from the site. Other important issues pertain to vehicular access during plant construction and operation, a pipeline corridor for delivery of process water and transport of liquid waste, and right-of-way for utility lines.

The objectives of the access corridor task were:

- To determine, through interaction with federal and state regulatory officials, the scope of environmental investigations required to obtain a right-of-way (ROW) through the Freetown-Fall River State Forest (this right-of-way has economic and engineering advantages over other potential corridors considered);

- To develop study plans to satisfy the information needs of the regulatory agencies;

- To implement and document the studies (e.g., prepare an Environmental Impact Report (EIR) for state review); and

- To assess the environmental acceptability of alternative access corridors.

The principal focus of this task was to provide environmental information to support efforts to otain a ROW through

the Freetown-Fall River State Forest. This ROW requires legislative approval by the Commonwealth of Massachusetts, which is largely dependent on the recommendations of state regulatory agencies, notably the Departments of Environmental Quality Engineering and Environmental Management (DEQE and DEM).

The movement of materials to and from the site has been examined during the feasibility study, primarily focusing on coal transport via "best route" rail connection. Proposed legislation to provide easements for the proposed transportation and access corridor to the Energy Park was filed on December 4, 1981 (House Bill 5792). Following a public hearing in Fall River, Massachusetts, the easement bill was favorably reported out of committee and passed the House in mid-June, 1982. Passage on this legislation is expected within the next few weeks.

8.2 REGULATORY COMPLIANCE AND PERMITTING

8.2.1 Introduction

The New England Energy Park and its individual components are now undergoing a thorough environmental review by numerous federal, state, and local agencies and officials before construction and operations can begin. Although the total number of project permits is large, only a few complex, critical permits are required.

Present regulatory requirements for the New England Energy Park are identified; the introduction of new government regulations and final engineering design changes are being closely followed. The environmental field programs were designed with the aid of local, state, and federal regulatory agencies to ensure

meeting permit and enviromental review requirements. The Environmental Notification sessions to determine the content of the Environmental Impact Report were held on May 4. The technical information needed to support most permit applications and required as input into the Massachusetts Environmental Policy Act (MEPA) Environmental Impact Report, and the NEPA Environmental Impact Statement (if required) has already been collected. The permitting schedule has been reviewed with principal regulatory agencies.

The discussion in the following subsectins summarizes applicable federal, state, and local environmental regulatory and permitting requirements. An additional discussion has been included to summarize the current status of permitting requirements.

8.2.2 Federal Requirements

The construction and operation of any major energy facility are subject to a wide range of federal regulations as mandated by the following laws:

- National Environmental Policy Act (NEPA)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Rivers and Harbors Act (RHA)
- Safe Drinking Water Act (SDWA)
- Resource Conservation and Recovery Act (RCRA)
- Marine Protection, Research, and Sanctuaries Act
- Occupational Safety and Health Act (OSHA)
- Federal Aviation Administration Permits (FAA)
- Other Federal Environmental Laws

(a) National Environmental Policy Act (NEPA)

NEPA serves as the nation's basic charter for the protection of the environment. It sets government goals on environmental policy and established a means for implementing this policy. NEPA requires consideration of the potential environmental effects of any major federal action before implementation of that action.

Normally in the development of a project a federal agency is designated as the lead agency and is required to prepare an Environmental Impact Statement (EIS) that thoroughly analyzes the potential impacts of the proposed project on the environment and the effects of alternatives to the proposed action. Federal EIS's may be required for major projects that involve federal funding, federal land, or major federal permits.

The analysis contained in an EIS is not limited to the scope of the review of the responsible lead agency. It must cover the total scope of the project, including significant environmental issues and reasonable alternatives, even though they might be outside of the agency's permitting jurisdiction.

The NEPA process requires consultation, review, and input from all federal and state agencies with jurisdiction over any aspect of the project. Opportunity is also provided for public involvement in the process.

The EPA and the Department of Energy have made a determination that an EIS is not required to be prepared by either agency for the NEEP project. However, other federal agencies, notably the Corps of Engineers, must also grant per-

mits. If such permits are determined by the issuing agency to constitute a major federal action, then an EIS would be required. On March 26, 1982, NEEP filed a Letter of Intent to file for a permit from the Corps of Engineers. The permit required from the COE is mandated by the Clean Water Act (Section 404) and the Rivers and Harbors Act (Section 10).

The Letter of Intent which has been sent to the COE will require an official determination as to the applicability of NEPA. The letter has been forwarded to COE Headquarters in Washington for decision by the Corps and the President's Council on Environmental Quality. Assuming that an EIS is required, the Corps would act as Lead Federal Agency unless the CEQ exercises its authority to designate another agency, possibly the EPA.

(b) Clean Air Act (CAA)

The Clean Air Act provides the basic framework under which federal and state agencies control air pollution. Under the Clean Air Act, the U.S. EPA set National Ambient Air Quality Standards (NAAQS) for major criteria air pollutants.* The standards are enforced by each state through its State Implementation Plan (SIP). The EPA is required to set and periodically review New Source Performance Standards (NSPS) for specific major new point sources of air pollution to ensure that new major pollutant emitting facilities use the best pollution control technology that has been demonstrated for the particular industry.

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* NAAQS have been set for the following pollutants: particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, hydrocarbons, photochemical oxidants (such as ozone), and lead.

The EPA also sets National Emissions Standards for Hazardous Air Pollutants (NESHAPS) to protect the public from air pollutants for which no ambient standard has been set but which may cause an increase in mortality or serious illness.** Two major policies in Prevention of Significant Deterioration (PSD) and Offset for non-attainment areas, were formally incorporated into the 1977 amendments to the Clean Air Act.

(1) Prevention of Significant Deterioration (PSD)

The PSD policy applies in areas where the air quality is cleaner than the national standard for a given criteria pollutant. The policy sets a limit on the allowable increase in ambient concentrations of a pollutant due to the operation of a new major facility. The allowable increments vary according to the classification of the area. In a Class I area, only very small increases in ambient concentrations are allowed; in Class II areas, more moderate increases are allowed; and in Class III areas, even greater increases are allowed. However, in no case can ambient concentrations be allowed to exceed NAAQS. The applicant is required to prove to the permitting agency, through the submission of air quality monitoring data and atmospheric dispersion modeling, that the proposed facility will not cause or contribute to a violation of NAAQS or a violation of the appropriate PSD increment. The applicant is also required to use Best Available Control Technology (BACT) to ensure that the latest and best designs and technologies

** NESHAPS have been set for asbestos, beryllium, mercury, and vinyl chloride.

are used to minimize the emissions of a given pollutant with the framework of PSD.

The PSD program applicable to the NEEP project covers only two criteria pollutants, particulate matter and sulfur dioxide. EPA will eventually develop a PSD program for the other criteria pollutants, but the timing of the Set II PSD program is uncertain.

The Fall River area has been classified as an attainment area for sulfur dioxide, meaning it meets the NAAQS for SO_2. The City of Fall River has been designated as non-attainment for total suspended particulates (based on the secondary standard), although the designation has been challenged by the state because of the non-representativeness of the monitoring sites that showed violations. The entire Commonwealth of Massachusetts has been designated as non-attainment for ozone. The area cannot be classified with respect to carbon monoxide and nitrogen dioxide, partially because few field measurements are available for analysis. Thus, the NEEP project will be subject to the EPA PSD permit process for sulfur dioxide emissions and probably for particulate emissions (depending on how the TSP exceedance issue is resolved). The NEEP project will also be subject to the state New Source Review. As a result, extensive monitoring data and emissions modeling information are required by both the Massachusetts DEQE and the U.S. EPA Region I office.

The time required for obtaining the necessary PSD air quality permit is difficult to determine. Total time required is dependent upon (a) required monitoring time to obtain background data (b) length of time required for agency

review and resolution of disputes. Estimates for the length of time required to complete the entire process from initiation of the monitoring program to permit approval range from 1.5 to 3.5 years. Close interaction between the NEEP developers and EPA and DEQE should help minimize the time required to obtain the required permits. The application has been under review for more than four months and no disputes have developed.

(2) Emission Offset Policy

The Emission Offset Policy applies in areas where ambient air quality concentrations exceed NAAQS (non-attainment areas). States are required to develop plans that will bring non-attainment areas into compliance with the NAAQS within a reasonable period of time.

The Offset Policy allows the state to permit a new facility to locate in a non-attainment area if it meets certain strict conditions. First, the source must reduce its emissions to the lowest achievable emission rate (LAER); second, the applicant must certify that all other sources in the state which it operates or controls are in compliance with all applicable State Implementation Plan (SIP) requirements or in compliance with an approved timetable for compliance; third, the new source must obtain legally enforceable reductions in emissions from existing sources greater than the proposed increase in emissions from the proposed source; and fourth, the applicant must show that there will be a net improvement in air quality in the affected area.

The EPA requires that the Emission Offset Policy be incorporated into the revisions to the SIP's that were required

by the 1977 Amendments to the Clean Air Act. Thus, the states are responsible for New Source Review and for issuing permits to facilities planned to be built in non-attainment areas.

(3) New Source Performance Standards.

New Source Performance Standards (NSPS) have not yet been issued by the EPA for synthetic fuels facilities. However, parts of the NEEP project may be covered by existing NSPS. The power plant portion of NEEP may be subject to the NSPS that were issued in June 1979; the steam plant may be covered by the NSPS for fossil-fired steam generators (Industrial Boilers) that were issued in December 1971. Revised NSPS for industrial boilers are presently under consideration. Although it is not certain when they will be promulgated and what level of control will be required, they may be issued before the construction of the NEEP project. The EPA will also develop NSPS for the gasification process; it is possible that they might be promulgated in time to apply to the NEEP project. In addition, NSPS are likely to be developed eventually for methanol plants.

(4) National Emissions Standards for Hazardous Air Pollutants (NESHAPS).

Several pollutants have been regulated by the EPA under NESHAPS, and other pollutants are under consideration for inclusion, some of which may be applicable to the NEEP. These include polycyclic organic matter (POM) and benzene. Further study will be required to determine the extent to which potential NESHAPS regulations might affect the NEEP.

(c) Clean Water Act (CWA)

The Clean Water Act provides the basic framework under which federal and state agencies control water pollution. The purpose of the Act is to restore and maintain the quality of the nation's surface waters. The Act prohibits the discharge of pollutants into any public waterway without a permit and sets strict pollution control requirements in each permit. The permit system, called the National Pollutant Discharge Elimination System (NPDES), applies to existing and new point sources of water pollution.

The CWA required EPA to set technology-based effluent control limits for all industries discharging wastes into U.S. waters. All industries were required to install Best Practical Control Technology by 1977. More strict limits are required by 1984 when industries will be required to provide Best Available Technology Economically Achievable (BAT) treatment for toxic and nonconventional pollutants and Best Conventional Technology (BCT) for conventional pollutants. Specific emission limitations are developed by EPA for each industry. In addition, EPA is required to develop New Source Performance Standards (NSPS) for specific industries that have a high potential for affecting water quality.

Under the Clean Water Act, the states are required to develop water quality standards based on federal criteria. States have classified stream segments and other water bodies according to desired uses and set different water quality standards for the different classifications. The state water quality standards and the EPA effluent limitations and new source performance standards are the basis for issuing NPDES permits. Permits must require that the

more stringent of the two sets of standards be applied to a facility.

The NPDES program is administered by EPA, or by state agencies that have qualified for delegation of authority by EPA. In Massachusetts, the program is jointly administered by the Massachusetts DEQE and the EPA.

NPDES permits are issued for a period of up to five years. The permit identifies all of the responsibilities and requirements of the permittee and usually includes a monitoring program. As long as a permittee is in compliance with all of the terms and conditions of the permit, it is protected from EPA enforcement actions. However, terms and conditions can be modified or revoked during the permit period. The permits may also include provisions for controlling non-point sources of pollution at the facility, such as runoff from material storage areas (e.g. coal piles) and construction activities.

Permits may be denied if: terms and conditions do not comply with appropriate guidelines or regulations; terms and conditions do not ensure compliance with appropriate state water quality standards; navigation is substantially impaired by the issuance of the permit; the discharge includes radioactive wastes; the discharge is inconsistent with an approved 208 plan; or if the facility will cause or contribute to the violation of water quality standards or will exceed the total pollutant load allocation to which it is entitled.

The length of time required to obtain an NPDES permit is highly variable. Construction of the NEEP project will not be allowed until the entire NPDES process has been complet-

ed. This will include the Massachusetts Environmental Policy Act (MEPA) process and possibly the federal NEPA process. It is likely to take one to two years from the date of permit application.

Under Section 311 of the Clean Water Act, Owners and Operators of facilities that could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or on the navigable waters of the United States or adjoining shorelines, must prepare a Spill Prevention Control and Countermeasure Plan (SPCC plan). NEEP may be required to prepare an SPCC plan if storage of oil above or below ground is planned.

The U.S. Army Corps of Engineers is responsible for administering a permit program for the dredging or filling of materials in navigable waters and wetlands. The program is authorized under the authority of Section 404 of the Clean Water Act. The Act requires close interaction between the Corps and EPA. The Corps reviews and makes decisions on the permits based on EPA regulations. EPA has a review over the issuance of the permit and may hold public hearings.

Authority for issuing Corps 404 permits can be delegated to the states if state programs are approved which meet all the requirements of the Act. In Massachusetts, the state has not been delegated the authority to manage the 404 permit program.

The Corps 404 permit program is usually coordinated with the Corps permit required for constructing facilities in navigable waters or wetlands where construction activities involve dredge and fill activities. The construction of

discharge outfalls associated with NPDES permits generally requires a permit from the Corps under the Rivers and Harbors Act, Section 10. In addition, the construction of docks, piers, and marine terminals also requires permits under the Rivers and Harbors Act.

(d) Rivers and Harbors Act (RHA)

The Rivers and Harbors Act of 1899 requires that construction of facilities in navigable waters of the U.S. and dredge and fill activities in wetlands be preceded by approval from the U.S. Army Corps of Engineers. The Act prohibits the deposit of refuse in navigable waters and on the banks of navigable waterways.

The Corps of Engineers must work closely with the EPA in issuing water-related permits, which cannot be issued unless the appropriate states certify that the applicable water quality standards will not be violated as a result of the proposed action. In Massachusetts, state agencies have jurisdiction over the construction of facilities and dredging and filling operations in state waters. In cases where there is an overlap of jurisdiction between the Corps and state agencies, the Corps will generally wait until the state has taken action before it makes a final decision on issuing its permit.

(e) Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act requires the EPA to establish federal standards for drinking water, to protect underground sources of drinking water, and to establish a joint federal-state system for ensuring compliance with the resulting regulations. EPA's National Interim Primary Drink-

ing Water standards became effective on June 24, 1977. The drinking water standards are implemented through the states where state programs are adequate to meet the federal requirements; Massachusetts has been granted primacy under the Safe Drinking Water Act.

The SDWA requires states to develop underground injection control (UIC) programs that regulate the injection of liquids, including liquid toxic materials, into or near underground water-bearing strata. In the absence of an approved state program that meets the federal requirements, the EPA reviews and issues permits under the UIC program.

The Massachusetts DEQE will be the agency responsible for ensuring that the NEEP project will not cause a violation of the drinking water standards in the Fall River area. Since the NEEP site is close to the Copicut Reservoir, which is used for public drinking water, a very thorough investigation of water quality impacts from the project will be required. NEEP developers will have to demonstrate to DEQE that there will be no significant adverse effect on the quality of water in the Fall River municipal water supply system as a result of the NEEP project. The NEEP project will not require a UIC permit since no underground injection of any fluids is planned.

(f) Resource Conservation and Recovery Act (RCRA).

The Resource Conservation and Recovery Act (passed in 1976) is the government's primary tool for controlling hazardous wastes and protecting the public's health from their effects. When fully implemented, RCRA will provide "cradle-to-grave" control of hazardous wastes.

Under RCRA, each state is required to develop a hazardous waste program that meets the federal requirements. The EPA will manage the hazardous waste programs for states that fail to develop satisfactory programs. The EPA's RCRA regulations provide criteria for identifying hazardous wastes, create a manifest system to tag wastes and track them through final disposal, and provide performance and management standards for waste treatment storage and management facilities.

All generators of solid wastes are required to determine whether their wastes are hazardous based on EPA regulations. If a waste is tested according to specific protocols and shows specific characteristics such as ignitability, corrosivity, reactivity, or toxicity, it is considered a hazardous waste. The toxicity test is most likely to be appropriate for synthetic fuel facilities. If a waste is classified as hazardous, it must be disposed of in an approved hazardous waste management facility.
Preliminary investigations of coal gasification wastes inidicate that the gasifier slag is not likely to be classified as hazardous under the toxicity protocol (TVA, 1980). The EPA is presently studying the environmental effects of disposing of coal ash and slag from utility power plants to determine what types of regulations, if any, are needed. In the interim, utility coal wastes are not covered under RCRA. The EPA is scheduled to make a final decision on utility wastes before construction begins on the NEEP project.

(g) Marine Protection, Research, and Sanctuaries Act.

The Marine Protection, Research, and Sanctuaries Act, Section 103 (passed in 1972) protects ocean waters from unreg-

ulated dumping operations. The Act required EPA to develop criteria for the regulation of ocean dumping that are used to evaluate permit applications. The Act also provides authority to the Secretary of Commerce to designate marine sanctuaries in order to preserve and restore an area's conservation, recreational, ecological, and aesthetic values. The Act also mandates a comprehensive and continuing research program on the effects of pollution, overfishing, and other human activity-induced ecological effects on the marine environment.

Regulations under the Act are implemented by the Corps of Engineers and EPA. If ocean disposal of dredged materials is planned as a result of constructing a coal unloading facility for the NEEP project, the criteria for ocean dumping (contained in 40 CFR 227) would be applied.

(h) Toxic Substances Control Act (TSCA).

The Toxic Substances Control Act (passed in 1976) is designed to control toxic substances that are not controlled under other existing environmental laws. The Act authorizes the EPA to secure information on all new and existing chemical substances and to control those substances determined to cause any unreasonable risk to public health or the environment.

The products of synthetic fuel facilities may fall into the category of "new chemical substances" and therefore may be subject to the premanufacture notification requirement of TSCA. An ruling has been requested from the EPA to determine the applicability of TSCA to the NEEP project.

(i) Coastal Zone Management Act (CZM).

The Coastal Zone Management Act provides a review mechanism for states that have federally approved Coastal Zone Management (CZM) plans, as is the case in Massachusetts. Once a state's plan has been approved, all federal decisions (including federal permit decisions for private facilities) must be consistent with the state plan and policies. State coastal zone officials conduct a consistency review which is a part of the state environmental review process.

(j) Occupational Safety and Health Act (OSHA)

The purpose of the Occupational Safety and Health Act is to ensure safe and healthful working conditions by protecting workers from hazards of the workplace. The Act created the Occupational Safety and Health Administration (OSHA) to manage the worker safety and health program and the National Institute for Occupational Safety and Health (NIOSH) to make recommendations for regulatory standards.

Under OSHA, safety and health regulations have been issued. The regulations include requirements for written plans and procedures, record keeping, permissible exposure limits of chemicals in workplace air, and, in some instances, design criteria. OSHA requirements will have to be incorporated into the design and operation procedures of the NEEP project.

(k) Federal Aviation Administration (FAA) Permits.

Regulations of the FAA require that notification be made and a permit obtained if any structure of the proposed project is greater than 200 feet high or within 3.8 miles

of a qualifying airport. The Fall River and New Bedford airports are approximately 4.9 and 4.7 miles, respectively, from the center of the NEEP site.

The FAA notification is required at least 30 days prior to application for a construction permit. The FAA may require markings on storage tanks regardless of height. It also may waive or modify marking and lighting requirements for structures greater than 200 feet in height if it is determined that the structures do not constitute a hazard.

(l) Other Federal Environmental Laws.

There are a number of federal environmental laws which require review of environmental impacts of proposed projects by specific agencies. For the most part, these reviews are conducted concurrently with the federal NEPA process. Special reviews are required by the Secretaries of Interior and Commerce under the Endangered Species Act; the Advisory Council on Historic Preservation under the National Historic Preservation Act; and the Fish and Wildlife Service of the Department of the Interior under the Fish and Wildlife Coordination Act. In addition, all federal agencies are required to take actions to minimize the effects of proposed actions on Floodplains and Wetlands under Executive Orders 11988 and 11990, respectively.

8.2.3 State Requirements

(a) Massachusetts Environmental Policy Act (MEPA).

The Massachusetts Environmental Policy Act established an environmental review process at the state level similar to the federal environmental review process established by the

National Environmental Policy Act. The MEPA process applies to activities which are conducted by state agencies, receive financial assistance from state agencies, or require permits from state agencies. No state agency can complete action on a permit application until the entire MEPA process has been completed.

The initial step in the MEPA process is the publishing of an intent to submit an Environmental Notification Form (ENF) in a newspaper of local circulation in each community likely to be impacted by the proposed project. NEEP published its notice in four local newspapers in April, 1982. The ENF is then submitted to the Executive Office of Environmental Affairs (EOEA), and all participating state agencies and other groups as specified in the MEPA regulations. The public was notified of ENF filing through publication of a notice in the Environmental Monitor and The Secretary of Environmental Affairs has determined the need for an Environmental Impact Report (EIR). Public scoping meetings were held in Boston and Fall River on May 4, 1982.

The scope of work for the EIR will be developed through consultation among affected state agencies, project sponsors, or other agencies having jurisdiction or expertise in project-related matters. The scope is scheduled to be finalized on June 25, 1982.

There are two major differences between the federal NEPA process and the state MEPA process. First, the scope of review under NEPA is broad and can include analysis beyond the purview of the various permitting agencies, while the MEPA review, although broad, is usually limited to the scope of the authority of the permitting agencies. Second, under NEPA the EIS is prepared by the agency making the

decision based on information provided by the applicant. Under MEPA, the EIR is prepared by the applicant.

Filing of the Draft Environmental Impact Report (DEIR) will be accompanied by a public notice in the Environmental Monitor. Review and comment periods are provided similar to the procedure for submittal of the ENF.

Special provisions may also be developed for "major and complicated projects". The Secretary, project sponsors, and participating agencies have agreed to this designation for NEEP and a project-specific procedure for evaluation and review of environmental impacts will be established. Also, for a "major and complicated project," the Secretary may establish a Citizens Advisory Committee to participate in the review and evaluation of the project's environmental impacts. The Committee is appointed by the Secretary based on nominations solicited through the Environmental Monitor. This process is underway.

The time required to complete the MEPA process varies significantly from project to project, depending on its complexity. Complex projects such as NEEP could take between one and two years to complete the process. Once the final EIR is published, all permitting agencies must act on permit applications with 90 days.

(b) Energy Facilities Siting Council (EFSC)

The Massachusetts Energy Facilities Siting Council has statutory authority to review proposals for specific major energy facilities to determine if such facilities are consistent with the state policy of providing for a necessary supply of energy at the lowest possible cost with a minimum

adverse impact on the environment. In addition to its statutory authority, the EFSC has been selected by the Governor as the lead agency in coordinating and streamlining the state's permitting and licensing efforts dealing with the construction of critical energy facilities.

The Siting Council has specific statutory authority over the review of major electric generating and transmission facilities, gas producing and transmission facilities, and oil refineries and pipelines. In the case of electric and gas facilities, all utilities are required to submit periodic long-range forecasts of the demand for their products and supply plans. Before any major electric or gas facility can be constructed, it must be approved by the Siting Council as part of a long-range forecast. The statutory authority of the Siting Council over the NEEP project is not clear and is awaiting determination. Since the NEEP project has qualified as a cogenerator (July, 1981) under the Public Utilities Regulatory Policy Act (PURPA), additional regulatory control may be transferred from the state to the federal level.

The Siting Council has additional statutory authority to issue Certificates of Environmental Impact and Public Need. The developer of any facility subject to the Siting Council's jurisdiction can apply to the Council for a Certificate of Environmental Impact and Public Need if it is denied a local or state permit required to construct the facility.

The Siting Council must make a decision on a long-range forecast within one year of the submission by a gas or electric utility. In the case of a petition for a Certificate of Environmental Impact and Public Need, the Council

must make a decision within six months of the filing of a complete petition.

A substantial amount of information is required for each of the different types of filings required by the Siting Council. In the case of electric and gas utilities, forecasts must include future demand estimates by class of customer; this generally requires econometric modeling. The supply plans must identify what new facilities are required to meet the projected demand and must provide an analysis of the potential environmental impacts of a proposed facility. The level of detail for the environmental analysis is not as great as the level required under MEPA, but a substantial amount of information must be provided on the proposed facility and site, along with information on an alternative site. Petitions for Certificates of Environmental Impact and Public Need essentially must include the complete record to date, including copies of the approved forecast or NOI, a full record of agency decisions, the status of all applicable permits, and copies of any environmental reports prepared on the facility.

(c) Consistency Certification - Massachusetts Coastal Zone Management Program (MCZMP)

The Massachusetts Coastal Zone Management Office is responsible for the administration of federal consistency determinations under the federal Coastal Zone Management Act. The Massachusetts Coastal Zone Management Program has been approved by the U.S. Department of Commerce. Activities conducted or supported by any federal agency, or activities requiring a federal license or permit and which may affect the coastal zone, must be consistent with policies of the MCZMP. The consistency determination is not a permitting

process, but a procedure for project review. In the case of a private party applying for a federal permit or license, the applicant must submit a consistency determination to the CZM office if the activity is determined to have significant effects on the coastal zone. Significance is presumed when the proposed activities are subject to MEPA review, or when they are subject to an Order of Conditions from the local conservation commission. For activities subject to MEPA review, the applicant must furnish the CZM office results of the MEPA review procedures.

A CZM office decision on the consistency determination is generally made within three months of commencement of its review process, although a six-month period is allowed. CZM must notify the applicant and the federal agency if more than three months will be needed. If no decision is announced within six months, concurrence with the consistency agreement can be presumed.

(d) Wetlands Order of Conditions.

Any project that involves the dredging, filling, or altering of any fresh- or saltwater wetland which borders on a water body is subject to the Wetlands Protection Act and requires a Wetlands Order of Conditions from the local Conservation Commission.

Construction of a facility that may affect a wetland cannot begin until a Wetlands Order of Conditions is received. The Conservation Commission is required to begin a public hearing on the project and must make a determination as to whether or not the proposed action is significant in terms of the Wetlands Protection Act. If so, the Commission may impose conditions on the project which will protect the

public's interest in the wetlands. If the Commission does not meet the time requirements or if the applicant, any abutter, ten citizens of the town, or any aggrieved person appeals the Commission's decision within ten days, the case is referred to the DEQE. The DEQE then reviews the case and may issue a Superseding Order of Conditions.

After the completion of all work, the applicant may request a Certificate of Compliance. The applicant requests a final inspection from the permitting agency (either the Conservation Commission or DEQE). The agency must inspect the project within three weeks of the request and must issue or refuse a certification within ten days of the inspection.

(e) Dredging and Disposal of Dredged Material Permit.

Any person planning to dredge or dispose of any dredge material in the tidewaters of the state must have a permit from the Division of Land and Water within DEQE. The permit program is designed to protect water quality and navigational safety.

An applicant must have filed a Notice of Intent under the Wetlands Protection Act before filing for a dredge and fill permit and must have received a Wetlands Order of Conditions before receiving the permit. In addition, the MEPA review process must be completed before a permit can be granted. The applicant must submit plans and specifications prepared by an engineer and other information required by the Department. Before a permit can be issued, a water quality certification from the Division of Water Pollution Control is required. The certification procedure is initiated by the Department. The state dredge and fill

permit is closely associated with the section 404 permit required by the U.S. Army Corps of Engineers. Generally, the 404 Corps permit is not issued until after the state dredge and fill permit is issued.

(f) Chapter 91 Waterways License

Construction of a structure seaward of the high tide line in tidal areas, in or over any great pond, or in or over any river or stream on which there have been government expenditures, must receive a license from the Division of Land and Water Use. The purpose of the permit program is to protect the public's interest in navigation and flood control.

An applicant must file a Notice of Intent under the Wetlands Protection Act before filing for a waterways license, and must have received a Wetlands Order of Conditions before receiving the license. A water quality certification from the Division of Water Pollution Control is required and the MEPA review process must also be completed before a waterways license can be granted.

(g) Water Quality (401) Certification

Any project that involves a state or federal license or permit which may result in discharges to water must obtain state certification before the license or permit may be issued. The certification procedure is designed to ensure that projects are consistent with state water quality standards and related requirements. The process is initiated by the applicant's applying for another water quality related permit; the permitting agency refers the certification to the Division of Water Pollution Control.

(h) Industrial Waste Treatment Facilities Permit

All new or significant modifications to industrial wastewater treatment facilities require a permit from the Division of Water Pollution Control. The permit program is designed to protect water quality from pollution by industrial waste. An applicant submits an engineering report and/or final plans to the Division of Water Pollution Control which makes a technical review to determine whether the proposed treatment will meet water quality standards, effluent limitations, and other applicable regulations. The permit is generally issued in conjunction with either a NPDES permit for discharging wastes to a water body or a sewer extension permit for discharging wastes to a sewer system.

(i) National Pollutant Discharge Elimination System Permit (NPDES)

Any discharge of pollutants into public waters by a point source requires a NPDES permit under the Federal Clean Water Act. In Massachusetts, NPDES permits are issued jointly by the State Division of Water Pollution Control and the U.S. Environmental Protection Agency. The purpose of the permit is to protect water quality by requiring dischargers to control the amount of pollution in their discharge to meet federal effluent emission limitations or state water quality standards, whichever requires more stringent controls.

The permitting process requires that the applicant complete a New Source Environmental Questionnaire which is used by the agencies to determine if the facility is a new source (covered by New Source Performance Standards) or a new dis-

charge (covered by effluent limitations). A draft permit is issued by the agencies and reviewed by the applicant. A revised draft permit is published and is subject to a public hearing if there is sufficient public interest. A final decision on the permit is issued after the conclusion of the hearing.

(j) Approval of Sewer Extension and/or Connection.

Any extension of an existing sewer line or any connection of an industrial discharge to an existing sewer system requires a permit from the Division of Water Pollution Control. The permit is designed to ensure that downstream sewer lines and treatment facilities are adequate to carry and treat the additional flow and that the terms and conditions of the NPDES permit for the treatment facility will not be violated.

An applicant begins the process by requesting the approval of the owner of the sewage treatment system for the extension and/or connection. The application is filed with the Division of Water Pollution Control along with construction plans and specifications. The Division makes an initial determination to issue or deny the permit, or issue the permit subject to conditions. The permit becomes final after the adjudicatory hearing or after a 30-day period if no adjudicatory hearing is requested.

(k) Solid Waste Disposal Facility.

Any solid waste disposal facility (including hazardous and non-hazardous wastes) must be permitted by the state. The purpose of the permit is to protect the public against improper disposal of waste material which could harm public health or the environment.

The applicant must apply to the local Board of Health for assignment (approval) of the proposed disposal site. An assignment decision can be appealed to the Division of Hazardous Wastes of DEQE within 60 days. If the Board refuses to assign the site, the applicant may appeal directly to the courts.

After the site has been assigned by the local Board of Health, the applicant must submit plans and specifications to the Department's Regional Engineer for approval. Private operators are required to post a performance bond to ensure that they will operate in accordance with all applicable regulations.

(1) Hazardous Waste License

Collection, transportation, storage, treatment, or disposal of hazardous wastes requires a license from the Division of Hazardous Wastes. The purpose of this program is to protect the public health, safety, and the environment against the improper disposal of hazardous wastes.

Massachusetts is presently developing its hazardous waste program. A state law was passed in November 1979 (MGL 21C; 21D and 150B) under which regulations are being developed. New federal regulations took effect in November 1980, which set minimum requirements for state hazardous waste programs and for hazardous waste management facilities. Hazardous Waste Management permits will be handled jointly by the Massachusetts DEQE and the EPA until such time as the state hazardous waste management program has been approved by the EPA.

(m) Approval to Construct a New Source of Air Contaminants.

Construction of a new or modified major source of air pollutants (covered by the federal Clean Air Act) requires a permit from the Division of Air Quality Control within DEQE. The permit program is part of the State's Implementation Plan (SIP) required under the Clean Air Act and is designed to protect public health; achieve, maintain, and enhance air quality in the Commonwealth; and comply with the requirements of the Clean Air Act. If the proposed facility is located in an attainment area for a pollutant which it will emit, a PSD permit from the EPA will be required.

The applicant must submit plans, specifications, proposed standard operating procedures, and proposed maintenance procedures for new and modified stationary sources. The DEQE reviews the application to determine whether or not the facility will comply with applicable federal and state regulations such as the SIP emission limits, federal New Source Performance Standards, National and State Ambient Air Quality Standards, and National Emission Standards for Hazardous Air Pollutants.

(n) Cross-Connection Permit.

A connection between a potable and non-potable water supply requires a cross-connection permit from the Division of Water Supply within DEQE. This includes facilities that have water systems for fire protection, and boiler-feed and process water. The purpose of the permit is to prevent contamination of potable water supplies.

Plans and specifications must be submitted by the applicant to the regional environmental engineer and approved prior

to construction and installation. The plumbing at the facility must comply with the state plumbing code. Permits must be renewed every year.

8.2.4 Local Permits

There are several types of controls and permitting activities carried out by local governments that affect the development of major energy facilities such as NEEP. The major controls include local zoning, wetlands review and waste disposal site reviews under state laws, and building permits.

(a) Zoning

The NEEP site is located in a portion of Fall River that has been zoned as a Heavy Industrial District, in which major energy facilities such as gasification facilities and electric power plants (except for nuclear power plants) are permitted to be built. This designation was made, at NEEP's request, in December, 1980. As long as the facility complies with the specific requirements of the ordinance, no other zoning changes or reviews for the Energy Park project will be required.

(b) Wetlands

The local Conservation Commission has initial review over the project's impact on wetlands. If the project would affect wetlands in neighboring towns, their Conservation Commissions would also become involved in the review. The Conservation Commissions' authority comes from the state's Wetlands Protection Act. NEEP has been working closely with the Commissions of Fall River and Freetown, attending monthly meetings to brief the members.

(c) Solid Waste Disposal Site Assignment

The local board of health has initial review over applications for the siting of solid waste disposal facilities. The local board's authority comes from the state's solid waste law.

After an applicant files for assignment of a site, the Board of Health holds a public hearing. If the Board determines that the site can be used without harm to the public health, comfort, or convenience, it assigns (approves) the site. The assignment can be appealed to the state DEQE within 60 days; if the Board refuses to assign a site, the applicant can appeal to the court.

After a site has been assigned by the local board, the applicant must submit plans and specifications to the state DEQE for its approval. If approved, the site must be inspected by the DEQE after construction to determine if all necessary requirements were met.

(d) Building Permit.

A building permit is the last of the local permits required before construction can begin. Before the permit can be issued, several things must be in order. The proposed land use must be consistent with the zoning ordinance; a detailed plot plan, certified by a registered engineer, must be submitted; adequate plans for provision of utilities to the site must be made (sewer, water, and electricity); and there must be provision for adequate access and egress. Several other permits must be obtained before the issuance of the building permit. These include local curb cut permits from the Traffic Commission, a permit for electrical

work from the Department of Public Works, a permit for plumbing from the Board of Health, and the submission of a fire protection plan for the site.

8.2.5 Status of Permitting Program

Extensive contacts are being persued with the agencies responsible for issuing specific permits as well as agency interactions for each permit and regulatory issue. The regulatory and permitting program is on its original schedule. No developments have occurred to date which have caused permitting and construction schedules to be altered.

The air quality monitoring program has been completed and impact analysis performed. The PSD application (the PSD permit is the longest lead time permit) has been submitted to EPA Region I. NEEP emissions of SO_2 (full increment available), NO_2, and CO meet all applicable National Ambient Air Quality Standards.

Field baseline investigations have been completed for geohydrology, water quality, and terrestial ecology and wetlands. A noise level analysis for the access corridor has been completed.

The Environmental Protection Agency (Region I) has made an initial assessment which concluded that an Environmental Impact Statement will not be required. A Letter of Intent to file for a Section 404 permit from the U.S. Army Corps of Engineers has been sent. This letter will require an official determination as to the applicability of NEPA with regard to anticipated Corps of Engineers action. The Corps has referred the matter to their Washington headquarters and to the President's Council of Environmental Quality for a decision on whether an EIS will

be required, and if required, which federal agency will be the lead. The Massachusetts Environmental Policy Act (MEPA) process was initiated at the end of March, 1982. The status of major permits including identification of reviews and approvals is addressed in detail in Tables 8-1, 8-2, and 8-3.

The Governor of Massachusetts has provided a mechanism to expedite all regulatory licensing, and related government agency activities related to NEEP through the Massachusetts Energy Facility Siting Council. Federal agency input to the state MEPA process is being coordinated by the U.S. Corps of Engineers. Both federal and state agencies have agreed to use of a single EIS/SIR document, which will provide for an efficient regulatory review of the project. Streamlining efforts that have been initiated will provide considerable efficiency in the permitting and licensing procedures. The State of Massachusetts has in place no fewer than seven initiatives which will result in dramatic expediting of state environmental permitting and licensing.

8.3 ENVIRONMENTAL BASELINE

Environmental and permitting programs have been implemented to ensure that all regulatory and permitting requirements have received thorough consideration. This section provides program elements and data base descriptions for the programs discussed in Section 8.1

8.3.1 Air Quality

The NEEP Aerometric Program contains two main components: 1) baseline monitoring, and 2) air quality and meteorological modeling and data analysis. The two components of the program complement each other to provide spatial and temporal continu-

Table 8-1

MAJOR FEDERAL ENVIRONMENTAL

REVIEWS, PERMITS, AND APPROVALS FOR NEEP

Subject	Review/Permit/Approval	Submission Date
Environmental Review	PC National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS):	
	Draft EIS	January 1983
	Final EIS	November 1983
Air Quality	PC Prevention of Significant Deterioration (PSD) Permit/ Nonattainment Offset	January 1982
Water Quality	PO National Pollutant Discharge Elimination System (NPDES) Permit (joint federal/state); Pretreatment wastewater approval* (joint federal/state)	December 1982 February 1983
Wetlands	PC Section 404 of Clean Water Act Dredge and Fill Permit (nationwide or individual applicability to be determined)	April 1983
Navigable Waterways	PO Section 10 of Rivers and Harbor Act Deepwater Port Permit*	February 1983
Hazardous Waste	PO Resource Conservation and Recovery Act (RCRA)*	June 1983
Toxic Substances	PO Toxic Substances Control Act (TSCA)* Review	90 days prior to production

*If applicable.

PC = Preconstruction approval necessary.
PO = Preoperation approval necessary.

Table 8-2

MAJOR STATE ENVIRONMENTAL REVIEWS, PERMITS, AND APPROVALS FOR NEEP

Subject	Review/Permit/Approval	Submission Date
Environmental Review	PC Massachusetts Environmental Protection Act (MEPA). Environmental Impact Review (EIR):	
	Draft EIR	January 1983
	Final EIR	October 1983
Siting Review	PC Energy Facilities Siting Council (EFSC) Review*	*
Air Quality	PC Approval to construct new source of air contaminants	March 1982
Water Quality	PO NPDES (joint federal/state)	December 1982
	Pretreatment (wastewater) approval* (joint federal/state)	
	Water Quality Certification	February 1983
	Public Water System Permit	April 1983
Navigable Waterways	PO Chapter 91 Waterways/Dredge and Fill*	February 1983
Coastal Zone Management	PC Coastal Zone Management Consistency Review*	*
Hazardous Waste	PO Hazardous Waste License*	June 1983
Flammable Material	PO Flammable Material/Tanks Approval	November 1983

*If applicable.

PC = Preconstruction approval necessary.
PO = Preoperation approval necessary.

Table 8-3
MAJOR LOCAL ENVIRONMENTAL
REVIEWS, PERMITS, AND APPROVALS FOR NEEP

Subject	Review/Permit/Approval	Submission Date
Land Use	PC Heavy Industrial Zoning	Complete
Wetlands	PC Wetlands Order of Conditions, Notice of Intent	January 1983
Solid Waste	PO Solid Waste Disposal Site Assignment	October 1982
Sewer	PC Sewer Extension/Connection Permit	February 1983
Construction	PC Building Permit Earth Removal Approval	November 1982 November 1982
Curb Cuts	PC	November 1982

*If applicable.

PC = Preconstruction approval necessary.
PO = Preoperation approval necessary.

ity of the air quality data in the NEEP region. Figure 8-1 provides an overview of the Aerometric Program.

The overall objective of the program is to establish an integrated data base so that the Prevention of Significant Deterioration (PSD) review and permit application will have an empirical foundation. The purpose of the PSD program is to ensure that air quality in clean air areas is not significantly reduced, while maintaining a margin for industrial growth.

Data analysis and modeling conducted for the PSD permit application indicate that the full increment for sulfur dioxide (SO_2) is available. This conclusion is supported by the field measurements obtained over the region of influence of NEEP. Further, it has been found that the baseline air quality for SO_2, TSP, NO_2, and CO is in compliance with National Ambient Air Quality Standards (NAAQS) by large margins.

For H_2S and COS, for which ambient standards do not exist, emissions are significantly less than OSHA ceiling concentrations. The calculated ambient maximum total SO_2 concentrations consume only a small fraction of the available Class II increments. PSD Baseline Concentration Constraints and National Ambient Air Quality Standards are shown in Table 8-4.

The air quality regulatory constraints for the NEEP project are the National Ambient Air Quality Standards (NAAQS) and the PSD concentration increments. For the NEEP analysis, the baseline constraint is the difference between the applicable NAAQS and the PSD Class II increments as listed in Table 8-4. If the baseline concentrations for various averaging times are less than those listed in Table 8-4, the full PSD increments are available for emission growth. The contributions due to the applicant facilities must be less than the PSD increments.

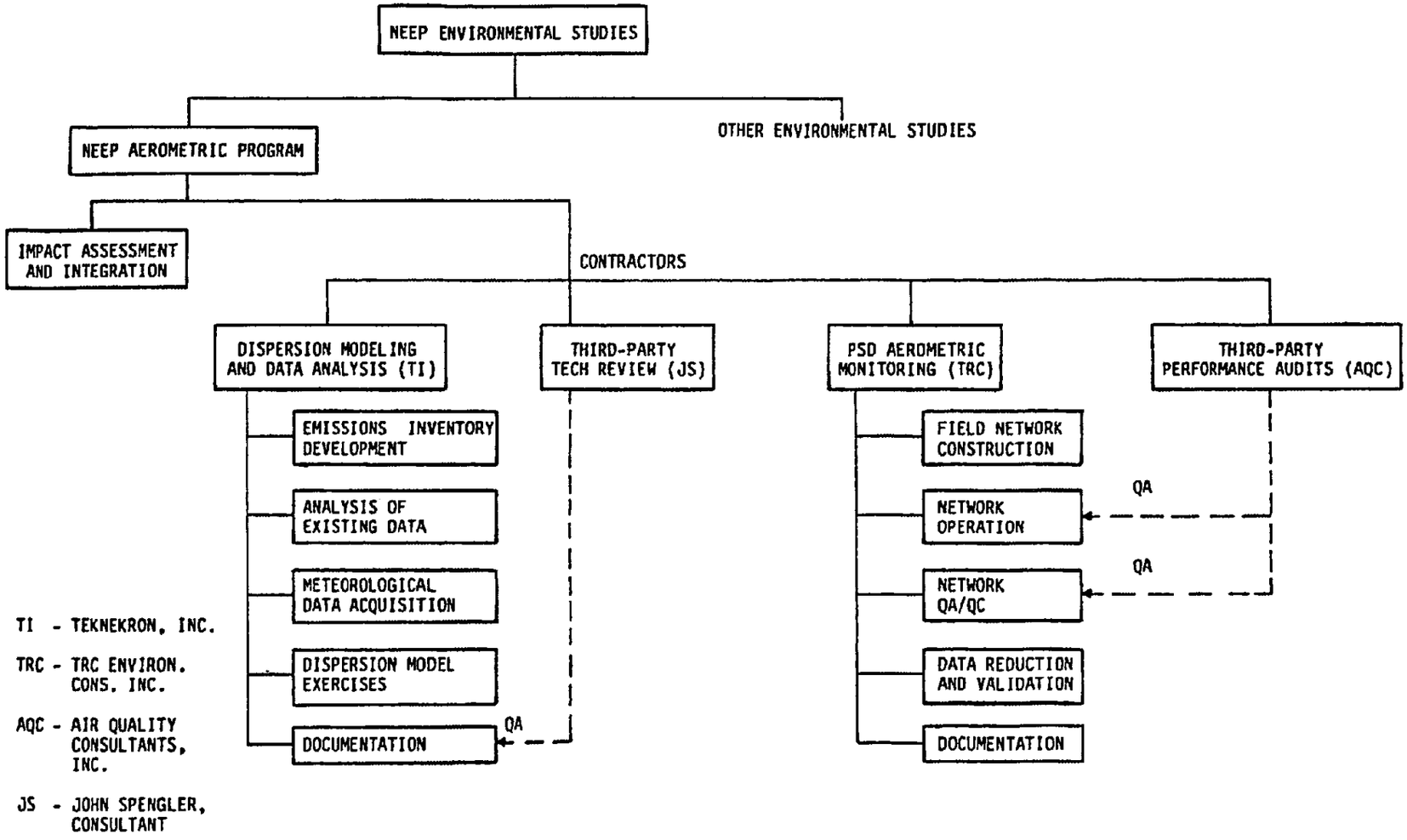


Figure 8-1

NEEP AEROMETRIC PROGRAM DIAGRAM

Table 8-4

PSD BASELINE CONCENTRATION CONSTRAINTS* AND NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutants	Averaging Time	Class II PSD Increment (ug/m^3)	NAAQS (ug/m^3)	NAAQS Minus PSD Increment (ug/M^3)
PSD Pollutants:				
SO_2	Annual	20	80	60
	24-hour	91	365	274
	3-hour	512	(1,300)	788
TSP	Annual	19	75(60)	56
	24-hour	37	260(15)	223
Other Clean Air Act Pollutants:				
NO_2	Annual	---	100	---
CO	8-hour	---	10,000	---
	1-hour	---	40,000	---

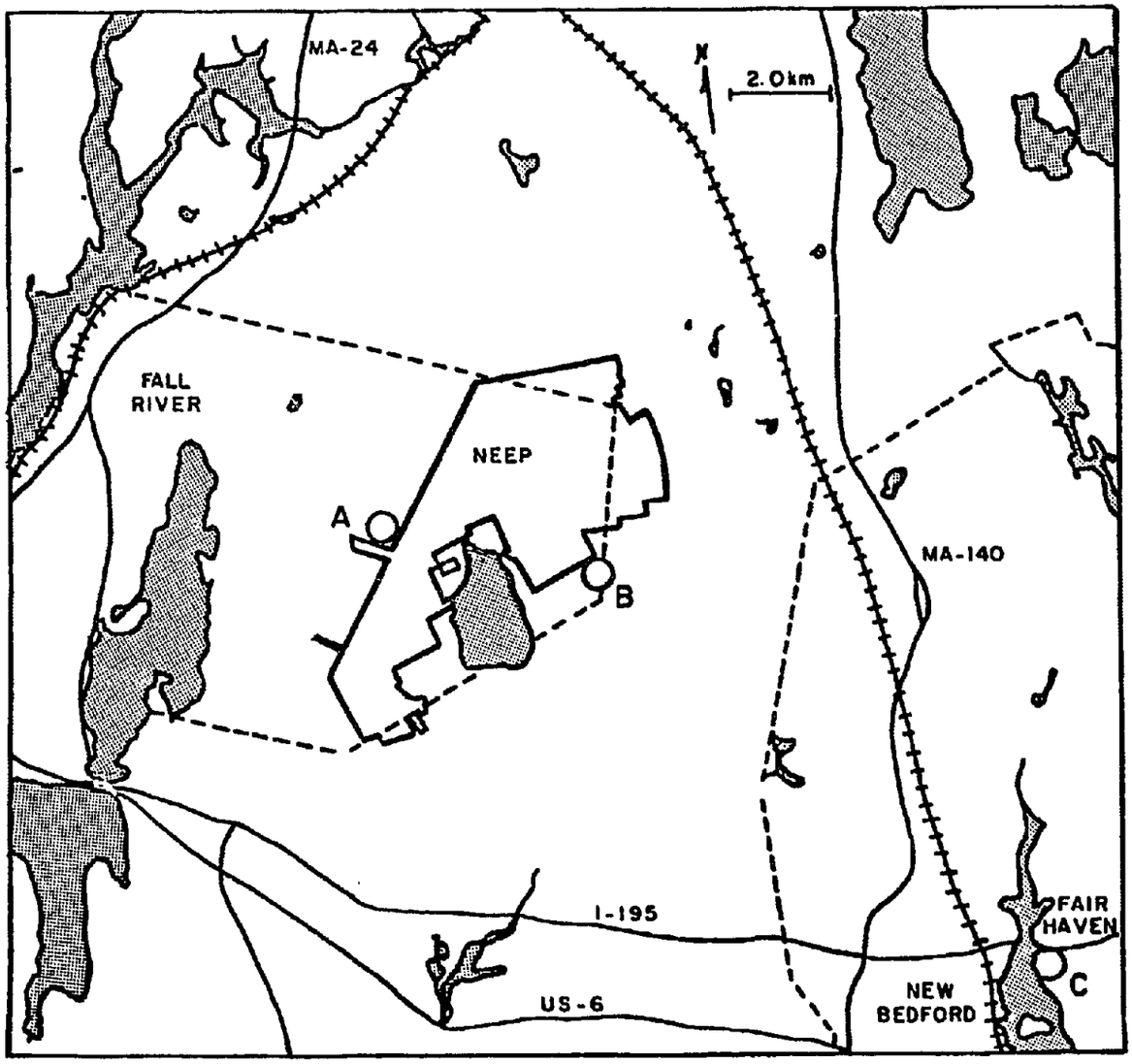
Note: Numbers in parentheses are secondary standards.

*The regulatory constraints are those specified in the PSD regulations.

As a result of the comprehensive aerometric Program, the following data bases will become available in support of the MEPA, NEPA, and PSD proceedings:

. Ambient Monitoring

The monitoring station locations and the parameters inventoried are given in Figure 8-2. As specified by the PSD guidelines, all continuous air quality and meteorological parameters are reported as hourly averages; TSP is reported as 24-hour values. The data were compiled monthly in hard copies, and quarterly on magnetic tapes.



Station	SO_2	TSP	CO	NO_x	WD/WS	$\sigma\theta$	σW	T	ΔT	Rain
A Copicut	X	X			X	X		X		
B Cunningham	X	X	X	X	X	X	X	X	X	X
C Fairhaven	X									

Figure 8-2
LOCATIONS OF NEEP AEROMETRIC MONITORING STATIONS

. Aerometric Modeling

Dispersion modeling for PSD and other air impact assessments is relatively data-intensive. Input data consists of two main parts: five years of hourly meteorological observations; and a detailed inventory of emissions, including source strengths and emission geometries.

The meteorological data bases are comprised of two parts. The first part is the five years of hourly surface observations of wind direction, wind speed, sky cover, and ceiling heights. The second part of this meteorological data base is the upper-air radiosonde data taken at the National Weather Service station located at Chatham, Massachusetts, which is the nearest available upper-air station to the Fall River area. Radar-tracked balloons are released twice daily to provide data from which mixing depth data are calculated. This data base has been obtained, compiled, and archived on magnetic tape for direct input to the meteorological preprocessor. The modeling procedures formulated for NEEP are contained in a document entitled Air Quality Modeling Plan for the New England Energy Park (NEEP) Prevention of Significant Deterioration (PSD) Application, which was approved by EPA Region I in 1980. Over the urban areas of Fall River and Swansea, monitoring data have been collected over a period of several years, and should provide a good basis for assessing current air quality over urban areas. Data for SO_2, TSP, wind direction, and wind speed for 1978, 1979, and 1980 have been otained from the DEQE. DEQE monitoring sites are shown in Figure 8-3.

. TSP (Non-NEEP Data)

This effort will determine whether the designation of non-attainment of NAAQS for TSP over the entire corporate area of

Figure 8-3

DEQE MONITOR SITES IN THE FALL RIVER AREA

Fall River is valid. TSP monitoring data from six monitoring sites will be used to delineate the areas where non-attainment can actually be demonstrated; and possible causes for high observed concentrations will be investigated. Table 8-5 lists a statistical summary of 24-hour average TSP Concentration data. Comparison of the 24-hour data with corresponding meteorological conditions did not establish any statistical trend for values exceeding maximum concentrations.

. NEEP Data

NEEP on-site data have been processed for the period from December 1980 through May 1981. The highest pollutant concentrations for the months of December 1980-May 1981 are tabulated and compared to the applicable NAAQS shown in Table 8-6.

. Data for PSD Working Increment

One of the early questions on the feasibility of the NEEP project was "What is the working PSD increment for the NEEP development?". To answer this question, a set of modeling procedures was applied with input data available in early 1981. The intent was to apply some conservative estimates of input parameters and refine the results at a later data as better data became available. Preliminary determinations of available PSD working increments have been completed. Two data bases have been compiled as input to this task: (1) an inventory of background emissions within 50 km of NEEP, and (2) five years of hourly meteorological observations from the nearest representative weather station.

A detailed source compilation has been computerized in a format for performing modeling parametric studies. The data tape is

Table 8-5

STATISTICAL SUMMARY OF 24-HOUR AVERAGE TSP CONCENTRATION DATA

Site	Year	Number of Observations	Highest Measured Concentration ($\mu g/m^3$)	Second Highest Measured Concentration ($\mu g/m^3$)	Geometric Mean ($\mu g/m^3$)	Geometric Standard Deviation ($\mu g/m^3$)
01F	1979	49	118	113	56.40	1.48
	1980	57	145	110	64.69	1.44
07J	1979	48	234	141	52.27	1.68
09J	1979	64	108	80	45.81	1.39
	1980	175	319	228	61.50	1.59
12J	1978	3	73	33	41.65	1.63
	1979	60	98	81	34.73	1.55
	1980	55	105	81	42.51	1.52
	1981	5	73	62	44.85	1.55
36J	1979	18	66	45	30.40	1.41
	1980	191	118	117	38.02	1.71
01J	1979	77	185	73	32.03	1.56
	1980	160	100	95	33.65	1.55

Note: Contravention of standard is indicated by underline (24-hour secondary standard = $150 \mu g/m^3$; annual standard = $60 \mu g/m^3$).

Table 8-6

SUMMARY OF PEAK CONCENTRATIONS DECEMBER 1980-MAY 1981. CONCENTRATIONS REPORTED AS FRACTION OF NAAQS EXCEPT FOR NO_2 (IN PPM).

Station	Pollution	Averaging Time (Hr)(4)	December	January	February	March	April	May	NAAQS (ppm)
Copicut	SO_2	3	(0.17)	(0.14)	(0.23)	(0.20)	(0.11)	(0.12)	(0.50)
		24	0.29	0.28	0.19	0.20	0.11	0.09	0.14
	TSP(3)	24	0.20 (0.39)	0.20 (0.35)	0.20 (0.35)	0.23 (0.39)	0.28 (0.49)	0.42 (0.73)	260 (150)
	CO	8	0.15	0.17	0.14	---	---	---	9.00
	NO_2(1)	Month	0.016	0.016 0.067	0.009	---	---	---	See (1)
Cunningham	SO_2	3	---	---	(0.03)	(0.14)	(0.04)	(0.09)	(0.50)
		24	---	---	0.05	0.12	0.05	0.06	0.14
	TSP(3)	24	---	---	0.17	0.21	0.26	0.36	260
					(0.29)	(0.37)	(0.45)	(0.62)	(150)
	CO	8	---	---	0.10	0.07	0.08	0.07	9.00
	NO_2(1)	Month	---	---	0.002	0.005	0.004	0.003	See (1)
Fairhaven	SO_2	3	---	---	(0.08)	(0.13)	(0.07)	(0.10)	(0.50)
		24	---	---	0.13	0.19	0.12	0.08	0.14

Notes

(1) NO_2 has only an annual standard of 0.05 ppm; NO_2 concentrations reported above are in ppm and not as fraction of the NAAQS.

(2) Numbers in parentheses refer to secondary standard.

(3) TSP NAAQS are in micrograms/cubic meter.

(4) Concentrations for SO_2 and CO are calculated as running means from hourly average values.

on file. Meteorological data for the parametric studies were compiled over a five year period from 1980-1974 (hourly observations). This data base is also on file for future reference.

Development of a modeling strategy for the present PSD application is, by its regulatory nature, an evolving process. The input data bases will be reviewed with the EPA and DEQE as they become available. The general modeling guidelines as they are presently understood call for a process of refinement, iteration, and mitigation. It is intended that a hierarchy of model exercises will be followed. For the projected NEEP emissions, the first effort will be to use the screening model procedures with very conservative assumptions on background pollutant concentrations. If such screening results show compliance with PSD increments, no additional modeling would be required. Otherwise, the impact assessment will use the "similar-day" modeling analysis to demonstrate compliance, representing the next level of refinement. Failing this test, the PSD application would then be further refined by the use of one year's on-site meteorological data. For the next refinement of the PSD increment calculations, it has been agreed by the EPA Region I that the inventory of emissions needs to encompass only a radius of 20 km.

This study demonstrates that full Prevention of Significant Deterioration (PSD) increments are available for emissions growth in the vicinity of the New England Energy Park. Although calculations of available air quality resources for short-term averaging periods were based on only one year's meteorological data, the results are quite conclusive because 1) the second highest baseline concentrations in the near vicinity of NEEP are, in each case, less than half the concentration which would still ensure that the full PSD increment is

available; and 2) highest-second-highest concentrations from the only other non-NEEP increment-consuming source in the area (the Rochester Incinerator) are less than half of de minimis levels. The modeling results also suggest that essentially full PSD increments may be available with a 15-km radius surrounding NEEP, especially when the next refinement of the calculations will use an emissions inventory within 20 km, rather than 50 km of the NEEP site. An exception to this conclusion, however, is the immediate Fall River urban area, which has been designated as non-attainment for particulate matter because of localized area sources.

8.3.2 Geology/Geohydrology

The Geology/Geohydrology program consists of two main components: site hydrology and site geology. Site hydrology includes characterization of the quantity, quality, and flow dynamics of surface and groundwater on and adjacent to NEEP. Site geology is a physical description of the surficial and bedrock geology of the site including a description of historical geological events that led to the morphology present at the site today.

The overall objective of the Geology/Geohydrology program is to provide information of the engineering design of facilities to ensure structural stability and to provide for protection of quantity and quality of surface and groundwater, both on and off the site.

A series of wells and test pits have been drilled at the NEEP site. Figure 8-4 shows locations of test and observation wells. Stream Flow measurement stations are also given. Flow measurements began during February 1981 and are continuing on a regular basis. Measurements are recorded on hydrographs for each well. Test pit results compiled to provide data on depth

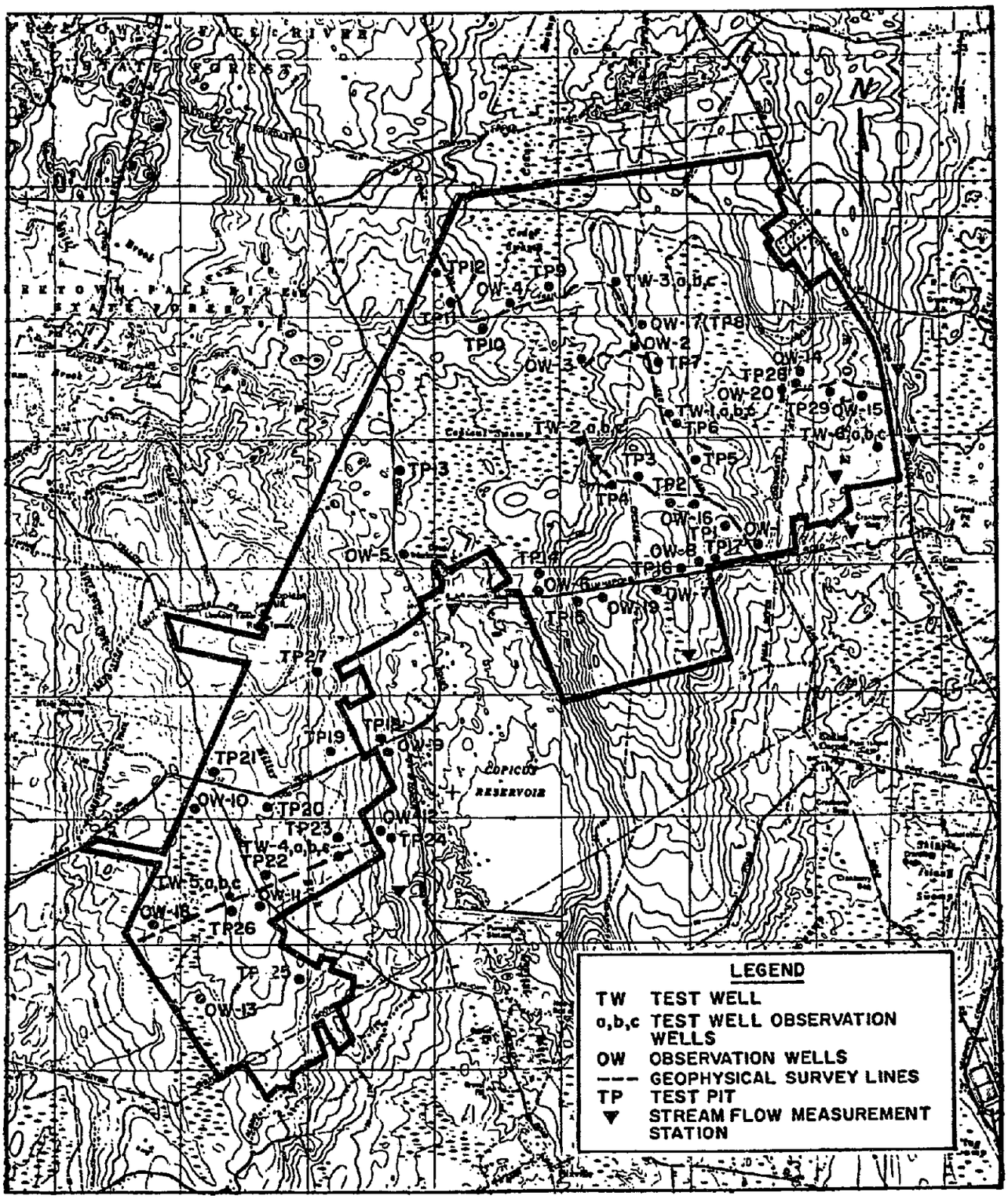


Figure 8-4

LOCATION OF TEST AND OBSERVATION WELLS AND STREAM-FLOW MEASUREMENTS SITES ON THE NEW ENGLAND ENERGY PARK SITE.

to rock, top of rock elevation, depth to water and water table elevation.

A geophysical survey of the NEEP site has been conducted. Seismic data were interpreted by correlating wave velocities with compositions of underlying bedrock. Data from 42 drilled boreholes provided confirmation for the subsurface data obtained by the test pit logging and seismic refraction surveys. Stream flow measurements have been taken since April 1981. Some streams flow only during storm events. As part of the geohydrology program, falling and constant head permeability tests in soils, packer tests in rock, and five well pumping tests were analyzed to determine transmissivity and storage properties of the till and bedrock at the NEEP site. A summary of findings is found in Table 8-7. Regional and site geological data have been cataloged and preliminary evaluations have been conducted. The NEEP site is located approximately four miles east of the Narraganset basin. The region is the easternmost expression of the Appalachian orogeny in New England as shown in Figure 8-5. Preliminary data analysis indicates underlayment of a granite basement with overlayment of unsorted till up to thicknesses of 100 feet.

Bedrock structure underlying the proposed site is shown in Figure 8-6. Table 8-7 shows site-related minerals and chemical compositions. Surficial geology of the site has been developed.

Results of subsurface investigations indicate that the surficial material is a dense till consisting of fine to coarse grained sand with some silt and trace amounts of clay particles. Granitic pebbles, cobbles, and boulders characterize the poorly sorted till. Distinct gravel lenses and discontinuous channels of fine grained sand occur locally within the till.

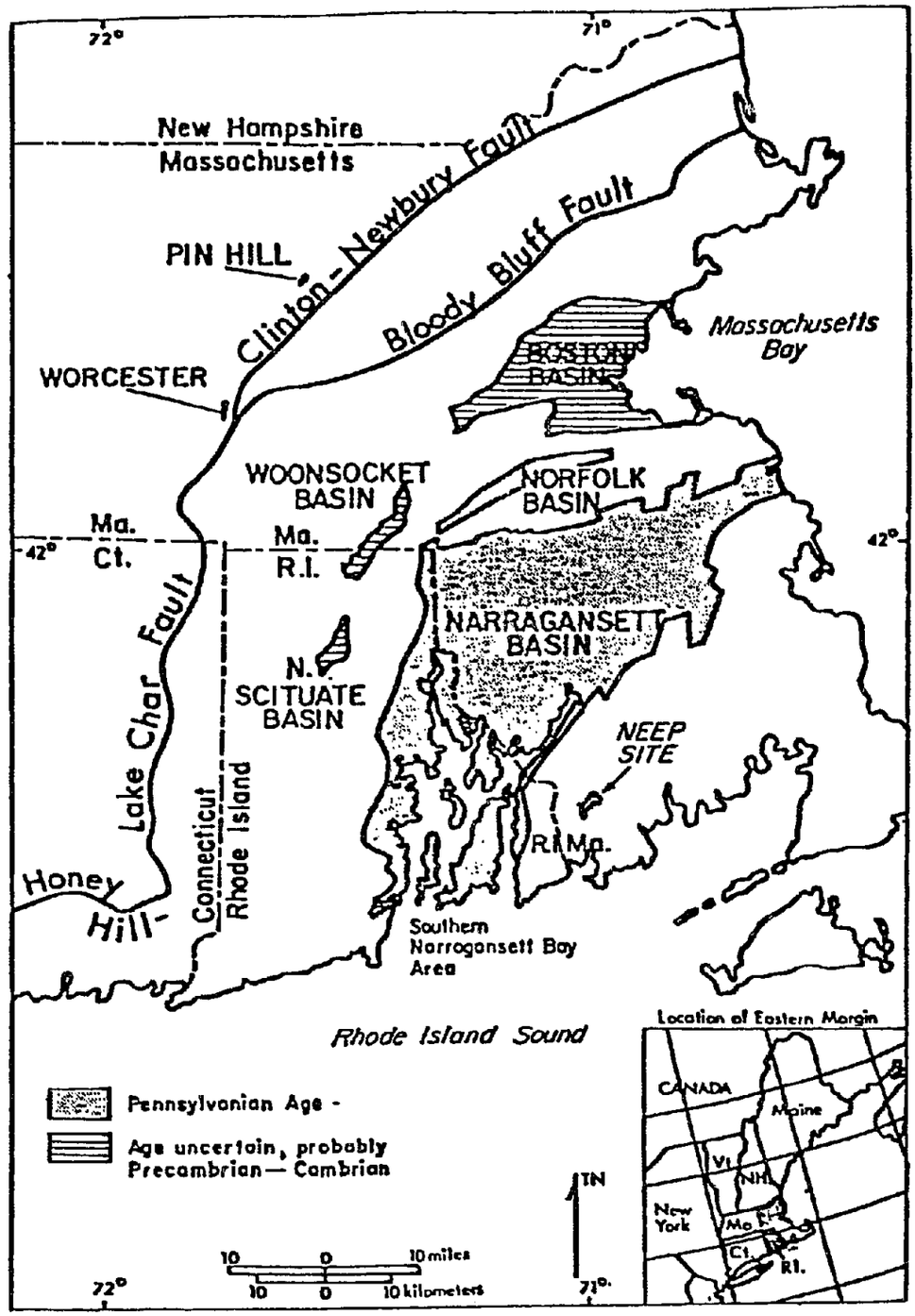


Figure 8-5
THE EASTERN MARGIN OF THE APPALACHIAN-CALEDONIDE OROGENY OF SOUTHEASTERN NEW ENGLAND. UNPATTERNED AREAS SOUTHEAST OF CLINTON-NEWBURY AND RELATED FAULTS ARE MAINLY LATE PRECAMBRIAN-CAMBRIAN BASEMENT TO THE BASINS OF PENNSYLVANIAN AGE. (AFTER MURRAY AND SKEHAN, 1979.)

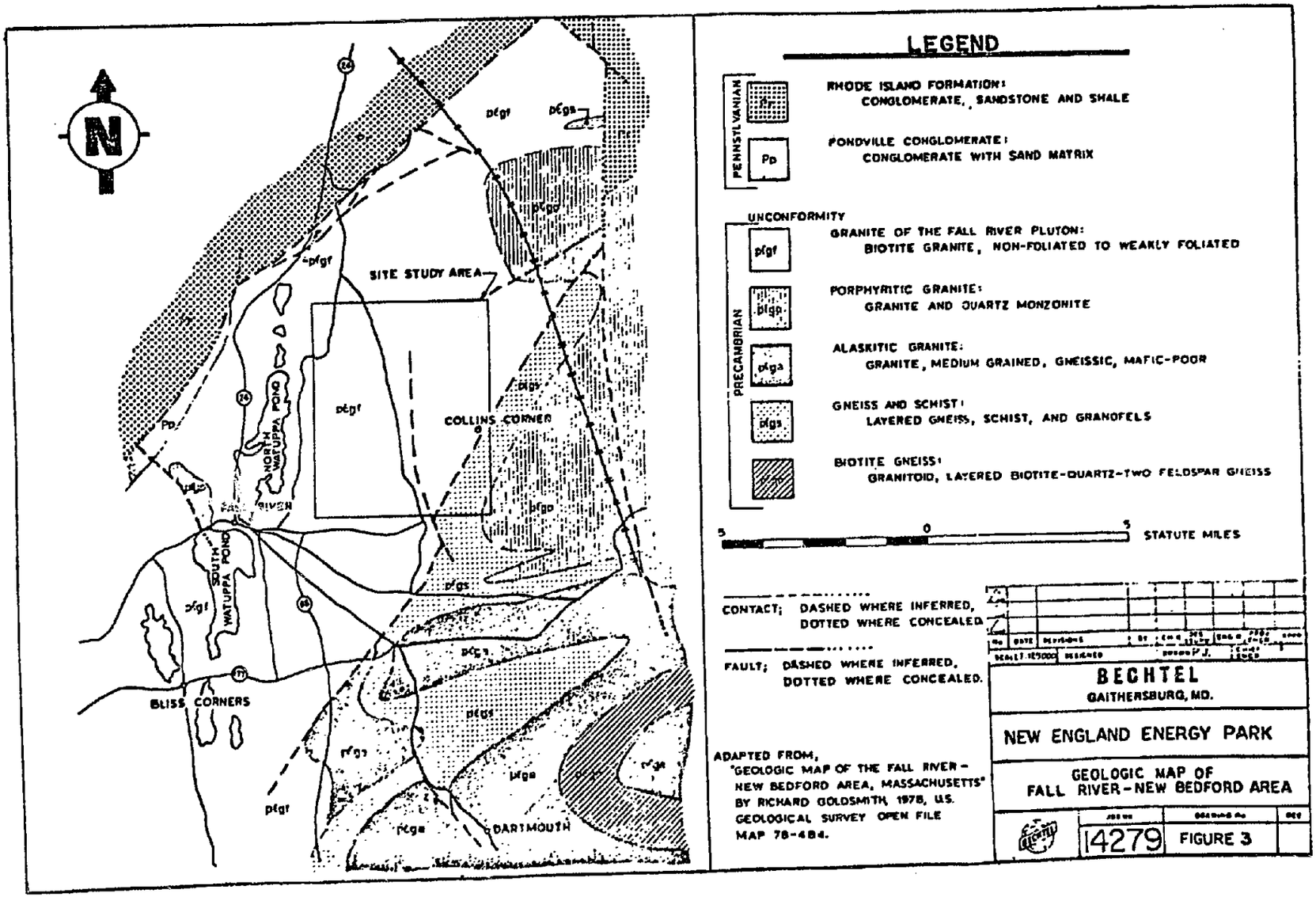


Figure 8-6

GEOLOGIC MAP OF FALL RIVER-NEW BEDFORD AREA

Table 8-7

NEW ENGLAND ENERGY PARK PERMEABILITY SUMMARY

Boring	Type of Test	Depth or Interval (ft from GS)	PERMEABILITY						Remarks
			Soil (Gravity)		Soil and Rock (Gravity)		Rock (Pressure)		
			ft/sec	cm/sec	ft/sec	cm/sec	ft/sec	cm/sec	
OW-1	Packer Response (R)	38.87 - 44.66 8.40 - 27.75			2.1×10^{-6}	6.3×10^{-5}	No water take		
OW-2	Packer Response (F)	27.8 - 22.0 8.2 - 27.7			1.6×10^{-5}	4.8×10^{-4}	No water take		
OW-3	Packer Packer	32.4 - 37.2 32.4 - 37.2					2.3×10^{-4} 3.1×10^{-4}	6.9×10^{-3} 9.4×10^{-3}	10 psi. 20 psi.
OW-4	Packer Response (R) Response (F)	29.0 - 34.8			5.99×10^{-5} 2.85×10^{-5}	1.82×10^{-3} 8.69×10^{4}	2.29×10^{-7}	7.0×10^{-3}	
OW-5	Packer Constant Head Falling Head	23.0 - 28.8 10.0 10.0	7.23×10^{-4} 1.22×10^{-4}	2.20×10^{-2} 3.7×10^{-3}			6.59×10^{-7}	2.01×10^{-2}	
OW-6	Constant Head	20.0	3.0×10^{-4}	9.2×10^{-3}					
OW-7	Response (R) Falling Head	9.7 - 29.0 15.0 - 16.5	1.26×10^{-5} 5.53×10^{-7}	3.83×10^{-4} 1.68×10^{-5}					Linear estimate of time lag.
OW-8A	Packer Packer Response (F) Falling Head Falling Head	46.0 - 61.0 46.0 - 61.0 7.4 - 37.0 23.15 38.6	4.5×10^{-6} 1.3×10^{-5} 5.89×10^{-5}	1.38×10^{-4} 4.0×10^{-4} 1.79×10^{-3}			6.8×10^{-7} 6.25×10^{-7}	2.1×10^{-5} 1.9×10^{-5}	20 psi. 30 psi. Test No. 1. Test No. 2.
OW-9	Packer	15.7 - 21.5					4.54×10^{-4}	1.38×10^{-2}	
OW-10	Packer Packer	38.9 - 43.7 35.36 - 40.16					8.3×10^{-4}	2.5×10^{-2}	Test invalid - water up hole during test.

R - Rising Head Test

F - Falling Head Test

Bechtel, 1981.

Table 8-7

NEW ENGLAND ENERGY PARK PERMEABILITY SUMMARY (CONT)

Boring	Type of Test	Depth or Interval (ft from GS)	PERMEABILITY						Remarks
			Soil (Gravity)		Soil and Rock (Gravity)		Rock (Pressure)		
			ft/sec	cm/sec	ft/sec	cm/sec	ft/sec	cm/sec	
OW-10	Response (F) Constant Head Falling Head	8.3 - 38.3 19.0 19.0	6.8×10^{-6} 5.9×10^{-4} 5.7×10^{-4}	2.1×10^{-4} 1.8×10^{-2} 1.7×10^{-2}					
OW-11	Packer Response (F) Constant Head Falling Head Falling Head Falling Head	91.0 - 104.0 35.65 - 75.25 14.0 14.0 28.4 58.5	8.1×10^{-7} 1.1×10^{-4} 2.23×10^{-5} 3.8×10^{-4} 3.8×10^{-5}	2.5×10^{-5} 3.3×10^{-3} 6.8×10^{-4} 1.2×10^{-2} 1.1×10^{-3}			No Water Take		Data inconclusive–linear estimate.
OW-12	Packer Packer	10.7 - 15.5 15.7 - 20.5					6.7×10^{-5} 2.7×10^{-4}	2.1×10^{-3} 8.3×10^{-3}	
OW-13	Packer Response (F) Falling Head Falling Head Falling Head	60.73 - 69.50 7.35 - 46.95 13.5 29.0 43.5	2.9×10^{-7} 8.7×10^{-6} 4.6×10^{-5}	8.8×10^{-6} 2.7×10^{-4} 1.4×10^{-3}			No Water Take		Test invalid - inconclusive.
OW-14	Packer	55.93 - 61.77					No Water Take		
OW-15A	Response (F)	8.4 - 37.61	6.31×10^{-6}	1.92×10^{-4}					
OW-16	Packer Packer Response (F)	25.46 - 31.25 25.46 - 31.25 12.1 - 31.6			1.0×10^{-4}	3.2×10^{-3}	7.0×10^{-5} 5.2×10^{-5}	2.14×10^{-3} 1.6×10^{-3}	10 psi. 30 psi.
OW-18	Packer Response (F) Falling Head	39.5 - 49.5 7.55 - 37.15 23.3	1.21×10^{-4}	3.69×10^{-3}	1.05×10^{-5}	3.19×10^{-4}			Test invalid - leak in Packer.

Bechtel, 1981

Table 8-7

NEW ENGLAND ENERGY PARK PERMEABILITY SUMMARY (CONT)

Boring	Type of Test	Depth or Interval (ft from GS)	PERMEABILITY						Remarks
			Soil (Gravity)		Soil and Rock (Gravity)		Rock (Pressure)		
			ft/sec	cm/sec	ft/sec	cm/sec	ft/sec	cm/sec	
OW-1D	Falling Head Constant Head	93.0 - 114.8 114.8					5.33×10^{-7} 1.24×10^{-5}	1.62×10^{-5} 3.77×10^{-4}	Linear estimate. Fluctuating water table.
OW-2D	Response (F) Falling Head	8.00 - 27.60 24.0	4.04×10^{-6} 7.10×10^{-5}	1.23×10^{-4} 2.17×10^{-3}					Test 0.4 foot into rock.
TW-1A	Response (F)	7.9 - 37.2					2.30×10^{-5}	7.00×10^{-4}	Test 0.4 foot into soil.
TW-1B	Response (F)	8.2 - 33.9		7.38×10^{-5}	2.25×10^{-3}				
TW-2A	Response (F)	7.9 - 37.2 8.4 - 37.5 8.4 - 37.5 8.4 - 37.5			4.1×10^{-7} 5.4×10^{-7} 3.0×10^{-7} 2.6×10^{-7}	1.24×10^{-5} 1.6×10^{-5} 9.3×10^{-6} 8.0×10^{-6}			Method A. Method B. Method C.
TW-2B	Response (?)	No calculation performed							Data inconclusive.
TW-3A	Packer Response	34.46 - 40.25 8.4 - 37.5			2.3×10^{-6}	7.0×10^{-5}	7.54×10^{-7}	2.3×10^{-5}	
TW-3B	Packer Packer Response (F)	39.0 - 49.7 29.0 - 34.8 18.1 - 37.4	7.6×10^{-6}	2.32×10^{-4}	7.62×10^{-6}	2.32×10^{-4}	3.93×10^{-7} 1.02×10^{-5}	1.2×10^{-5} 3.12×10^{-4}	
TW-3C	Packer Response (F)	37.0 - 50.0 17.4 - 37.4			1.2×10^{-6}	3.6×10^{-5}	No water take		
TW-4A	Packer Response (F) Constant head	20.0 - 36.0 No calculation performed 12.0	1.0×10^{-5}	3.1×10^{-4}			1.23×10^{-6}	3.75×10^{-5}	Data inconclusive.
TW-4B	Packer Response (F)	17.0 - 31.0 No calculation performed					No water take		Data inconclusive.

Bechtel, 1981.

Table 8-7

NEW ENGLAND ENERGY PARK PERMEABILITY SUMMARY (CONT)

Boring	Type of Test	Depth or Interval (ft from GS)	PERMEABILITY						Remarks
			Soil (Gravity)		Soil and Rock (Gravity)		Rock (Pressure)		
			ft/sec	cm/sec	ft/sec	cm/sec	ft/sec	cm/sec	
TW-4C	Packer Response (F)	16.4 - 29.5 7.0 - 26.6			3.5×10^{-5}	1.0×10^{-3}	8.4×10^{-5}	2.6×10^{-3}	
TW-5A	Response (F) Falling Head Rising Head	10.12 - 46.35 14.0 - 15.5 64.0 - 54.8	3.7×10^{-6} 1.44×10^{-5} 1.3×10^{-6}	1.1×10^{-4} 4.4×10^{-4} 4.1×10^{-5}					
TW-5B	Response (F) Falling Head	8.7 - 67.5 68.8 - 82.8	8.4×10^{-6}	2.55×10^{-4}			3.99×10^{-6}	1.22×10^{-4}	Test extended into rock.
TW-5C	Packer Packer Response (F)	86.97 - 91.77 81.58 - 85.38 8.80 - 68.40	3.65×10^{-6}	1.11×10^{-4}			No water take No water take		
TW-6A	Packer Packer Packer Response (R) Response (F) Falling Head	45.5 - 51.3 56.0 - 61.8 75.5 - 81.3 7.8 - 56.7 7.8 - 56.7 20.5 - 22.0	4.45×10^{-5}	1.4×10^{-3}	7.83×10^{-6} 7.8×10^{-6}	2.39×10^{-4} 2.4×10^{-4}	No water take 2.34×10^{-5} 7.29×10^{-6}	 7.15×10^{-4} 2.22×10^{-4}	
TW-6B	Packer Response (F) Falling Head Constant Head	48.0 - 60.8 8.2 - 57.1 25.5 25.5	6.4×10^{-4} 5.0×10^{-4}	2.0×10^{-2} 1.5×10^{-2}	8.7×10^{-6}	2.65×10^{-4}	No water take		
TW-6C	Packer	38.2 - 44.0					2.0×10^{-6}	6.15×10^{-5}	

Bechtel, 1981.

The dense poorly sorted till and the properties associated with it give rise to low infiltration and percolation rates. Thus, the groundwater storage potential of the overburden is low and rainfall tends to run off uplands quickly to adajacent streams and wetlands.

8.3.3 Water Quality/Aquatic Ecology

The water quality and aquatic ecology programs are designed to obtain ecological and chemical baseline data from the surface water bodies and to characterize the aquatic biota on and around the NEEP site. The baseline data sets are useful in evaluating potential impacts, and in designing efficient pre-construction, construction, and operation monitoring programs.

Water Quality Status

The water quality study includes the measurement of:

- Parameters related to criteria for classification of water bodies in Massachusetts (dissolved oxygen, temperature, pH, total coliform bacteria, turbidity, total dissolved solids, chlorides, sulfates, nitrate-nitrite, and radioactive substances);

- Parameters important to the health of each system (total phosphorous, total nitrogen, orthophosphate, ammonia, alkalinity, hardness, trace organics, trace metals);

- Additional parameters that may be reflective of activities associated with the construction or operation of the proposed NEEP facility (cyanide, sulfide, fluoride, selected trace metals, selected organics).

Detailed descriptions of the study results including hydrographic data for Copicut Reservoir, turbidity testing, water quality analysis, trace mineral analysis, sedimentation and pesticide analysis are on file. Testing and additional studies are being pursued.

Aquatic Ecology

Copicut Reservoir is influenced by physical factors characteristic of impoundments that are subject to regular drawdown. The biology of an impoundment such as Copicut can be interpreted in light of two basic ecological concepts: succession and pulse stability. Since the initial impoundment, the reservoir has been quasi-periodically perturbed on a seasonal time scale. These perturbations are severe in this shallow reservoir because considerable bottom area may be exposed during drawdown. This severe pulse (water-covered to aerial exposure) occurring on annual time scale will dictate successional events. The major physical factors which must be considered in an analysis of the aquatic ecology of Copicut Reservoir include:

- the partially stripped bottom,
- the exposure/immersion of the bottom,
- the resultant reworking/resuspension of sediment,
- the shallow nature of the reservoir, and
- the acid nature of feeder streams.

The Aquatic Ecology Study includes evaluation of:

- The trophic status of the water bodies and their sensitivity to the potential construction impacts of runoff, turbidity, and nutrient loading. Parameters being measured include chlorophyll-a, phaeopigment, phytoplankton, and zooplankton.

- Parameters related to potential operational impacts such as metal leachate and organics. These include phytoplankton and zooplankton species composition.

- Parameters related to the possibility of increased sediment load caused by projected construction impacts. Sampling the benthos is particularly valuable in assessing chronic impacts to the bottom due to changes in quality or quantity of the sedimentary environment.

- Fish populations and their age structure in Copicut Reservoir.

Biological studies have been done for the following aquatic systems: Copicut Reservoir, North Watuppa Pond, Stafford Pond, Shingle Island, Southwest Wetland. Primary study results for the Copicut Reservoir (regarded as the area water body of most concern) show the following:

- Trace metals - relatively high turbidity of Copicut Reservoir is associated with high levels of manganese, as well as particulate iron and other suspended matter. The results of the trace metals analysis in sediments followed the same general pattern as that of the water. Concentrations of As, Cr, Cu, Fe, and Mn in the sediments of the surrounding streams and of North Watuppa Pond are comparable to the concentrations detected in Stafford Pond. The surface waters contained no unusually high concentrations of organic pollutants, pesticides, or PCB's.

- Phytoplankton

  Phytoplankton analysis was used to determine the health of a water body. Spring chlorophyll-a concentrations in the Copi-

cut Reservoir were high, although not as high as in other Massachusetts ponds and reservoirs characterized as eutrophic (high in nutrients, low in oxygen). Low phytoplankton biomass estimates and spring species composition suggest that Stafford Pond, used as a control, may be oligotrophic (low in nutrients, high in oxygen).

8.3.4 Terrestrial Ecology/Wetlands

The terrestrial ecology program consists of several related studies that describe the existing plant, mammal, bird, reptile, amphibian, and invertebrate communities within and around the NEEP site. The program will provide baseline information on both uplands and wetlands. These data will be used in predicting impacts, designing mitigation measures, and developing monitoring programs required by applicable laws and regulations.

The major objectives achieved by the terrestrial ecology program were:

- Indentify, map, and evaluate wetlands;
- Indentify and map habitat types based on vegetation;
- Conduct a wildlife inventory using representative habitat types as sampling units;
- Search for rare and endangered species;
- Conduct Habitat Evaluation Procedures (HEP) analysis; and
- Evaluate habitats and wildlife with respect to conditions in the future with the project.

A principal issue that was addressed is potential impact to wetlands. The Massachusetts Wetlands Protection Act restricts dredging, filling, or altering wetlands. Therefore, accurate boundaries for the wetlands located on the NEEP site have been determined and mapped. In addition, the nature of these wetlands has been evaluated and that information incorporated

into specific facility placement decisions. The Fall River Conservation Commission will decide, through its Wetlands Order of Conditions, the exact conditions and limitations that regulate NEEP activities in wetlands. DEQE is likely to become involved in this process as well.

The Federal Endangered Species Act requires an evaluation of the presence on NEEP property of species that are on, or proposed for inclusion on, the endangered species list. The developers have received written confirmation from the U.S. Fish and Wildlife Service and the Massachusetts Department of Environmental Management (Natural Heritage Program) that, to date, no endangered species have been recorded in the vicinity of NEEP. During NEEP field surveys, no endangered species were encountered, therefore no further action will be necessary to meet this Act's requirements.

The vegetation study provided a framework for the wildlife study so that extrapolations could be made over the entire site. The wildlife study provided information on animals which may be impacted and allowed an evaluation of the extent of impact. The HEP analysis will deal with "important" species by agreement with regulatory agencies as outlined in the Ecological Services Manual.

Wetlands

A three-stage effort is being executed for the wetland definition work:

. development of a preliminary wetlands map based on aerial photographs and field observations (Figure 8-7);

. ground truthing and preparation of a final wetland map; and

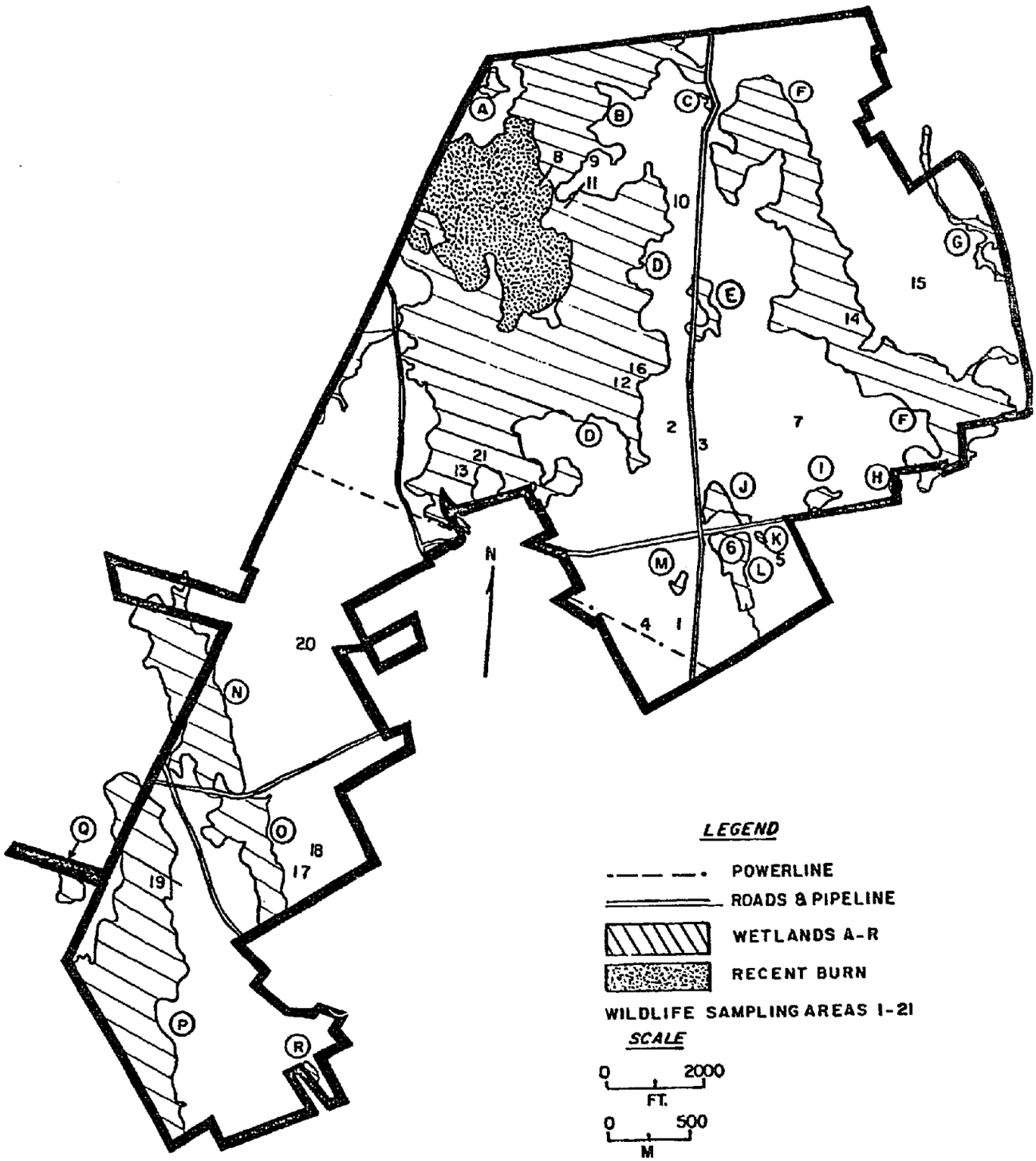


Figure 8-7
PRELIMINARY NEEP WETLANDS MAP

- mapping of the precise location of wetlands in areas which may potentially be developed near the 100-foot buffer zone of wetland borders.

A preliminary 1:5000 scale wetland base map was created by inspection of color aerial photographs. Ground truthing efforts have been completed to verify and record wetland borders at various locations on the NEEP site.

Vegetation

A vegetative cover-type map is required in a HEP analysis to provide a framework from which site-specific wildlife data may be extrapolated over the project area. Such a map further allows a stratified random sampling program to be devised such that homogeneous units may be sampled to reduce data variability, time, and cost.

Figure 8-8 is a preliminary cover-type map of the NEEP site, delineating deciduous, coniferous, and mixed deciduous and coniferous areas, and areas recently lumbered (essentially clear cut) as of February 1981. These cover types will be further divided in the final map and will include additional vegetational units.

Wildlife

Mammal, bird, reptile, amphibian, and terrestrial invertebrate sampling areas were located on all common vegetative cover types and at locations disturbed by lumbering, fire, and top soil removal. Accessibility played a minor role in locating these areas. A total of 21 sampling areas were distributed over the site. Surveys conducted included a deer and hare/rabbit pellet, small mammal snap-trap, and scent station. Ornith-

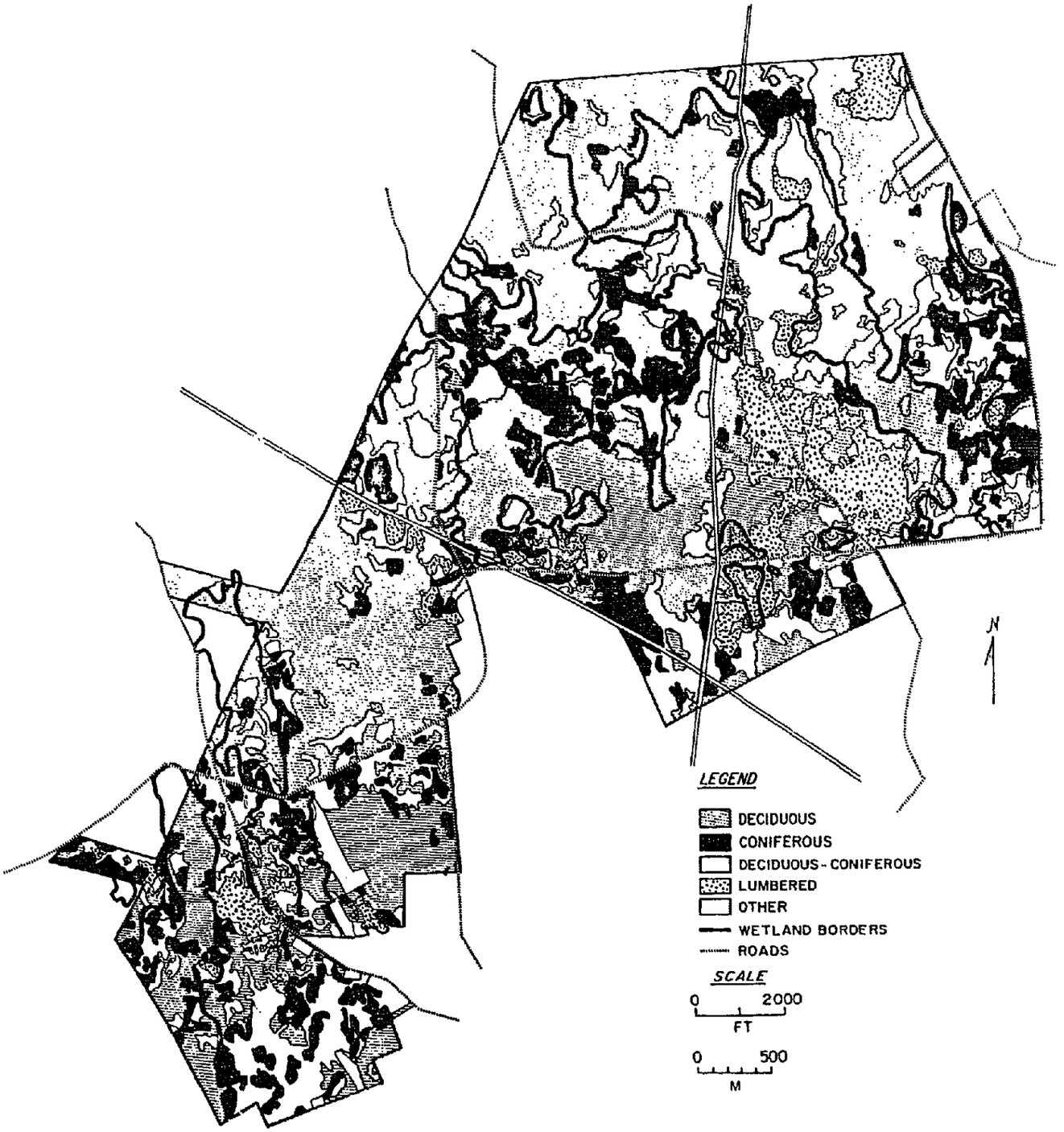


Figure 8-8
COVER-TYPE MAP FOR THE NEEP SITE

ological studies have investigated species discrete habitats. Reptiles and amphibians found on the NEEP site were studied and data was cataloged. Data collected from the terrestrial invertebrate program strengthens the overall ecosystem description at the site. This initial data set will enable a more specific sampling strategy to be designed in the event that terrestrial invertebrates are considered for use in the environmental monitoring program after plant start-up.

8.3.5 Noise

The NEEP site and surrounding area can be classified as rural residential with typical sound levels of 40-50 dBA. At this noise level, a conversation can be conducted with good intelligibility, in normal voices, at a distance of 16 feet.

A noise level model has been run for the NEEP access corridor. Engineering methods are being developed, and equipment specified, to control construction and operation noise to acceptable levels. For example, specification of new locomotives and welded track for NEEP has reduced the anticipated noise levels along the entire access corridor. Noise control guidance is being provided to design engineers to ensure that NEEP facility processes are in compliance with regulatory guidelines. The trees and vegetation on the NEEP site will provide some degree of noise attenuation. The attenuation values for dense woods comprised of a mixture of deciduous and evergreen trees with heavy ground cover are given in Table 8-8.

Based on the data of Table 8-8, it can be concluded that the wood buffer zone planned to be retained at the NEEP site will reduce off-site noise impacts.

TABLE 8-8
ATTENUATION VALUES FOR DENSE WOODS
WITH HEAVY GROUND COVER*

Frequency (Hz)	Attenuation (dB)
63	1.0
125	1.5
250	3.0
500	4.0
1,000	6.0
2,000	7.0
4,000	8.0
8,000	10.0

*Based on woods depth of 200 feet with a visibility penetration of 70-1000 feet.

The goal of the noise assessment is to evaluate NEEP with respect to applicable noise guidelines, including:

- Fall River Zoning Ordinance Section 31-22.1 for Heavy Industry;
- Massachusetts DEQE Noise Guidelines; and
- U.S. EPA Noise Guidelines.

By measuring sound pressure levels and tonal characteristics present at the site and comparing them to allowable levels, permissible noise increments will be determined. By conforming to the more stringent DEQE guidelines, the other noise guidelines will also be satisfied.

The noise assessment program has been organized into two main components: a) baseline monitoring, and b) data analysis and

modeling. Baseline monitoring will be conducted at and around the NEEP site for the determination of present ambient sound levels. The data generated by this field effort will then be used in models to predict sound levels which could occur as a result of construction and plant operation activities. These levels will then be compared to those allowed by the regulatory guidelines.

Both construction and plant operation noise levels will be modeled using existing data bases to make initial estimations. Output data will be in the form of sound levels and octave-band sound pressure levels. Equipment, systems, or operations for which noise control treatments may be required to meet applicable regulations or the acoustical criteria will be identified.

The noise impact associated with plant construction and operation will be evaluated on the basis of predicted noise levels, the measured ambient sound levels, the sound level criteria, community response to intruding noise, and DEQE and EPA guidelines. Mitigative actions relating to construction and plant operations required to satisfy the above criteria will be identified.

8.3.6 Cultural Sciences

In designing the NEEP Environmental Program, there was a thorough consideration of all federal and state regulatory and permitting requirements related to archaeologic and historic resources. Ongoing input from the Massachusetts Historical Commission (MHC) staff and the State Archaeologist has ensured that the project will meet the federal and state requirements.

The NEEP Archaeologic and Historic Resource Assessment Program requires that a team of archaeologists conduct a two-phase study to determine whether or not cultural artifacts exist on the NEEP site.

Phase I of this study is completed and consisted of a literature search of the history and prehistory of the NEEP site, an assessment of the archaeologic and historic sensitivity of the proposed development areas of the site, and an evaluation of the anticipated extent of the field survey. Phase II will be the field survey, required to satisfy federal and state review requirements.

The reports produced under this program will be reviewed by the Massachusetts State Archaeologist, a staff member of the MHC. The MHC administers all regulations concerning the archaeologic and historic resource review required by all federally and state funded or licensed projects. This review is mandated by several federal and state laws and their regulations, primarily the National Historic Preservation Act (NHPA). In addition, the Federal Advisory Council on Historic Preservation comments on all federally funded or licensed projects through the Section 106 Review process under the NHPA.

The background cultural resource survey has indicated a high likelihood of both prehistoric and historic sites in the NEEP development area. Based on the background study, the area has been subdivided into three zones in ranked order of ecological diversity; this will be tested with a reconnaissance-level field survey. The survey will assess the number, location, and nature or archaeologic and historic resources that may be affected by NEEP.

8.3.7 Marine Terminal

Three potential marine terminal sites have been identified in the Fall River area (Figure 8-9). The former Penn Central railroad yard in Fall River (Site A), located south of the Fall River State Pier has been purchased by the NEEP developers. The area is approximtely 8 miles from the proposed coal gasification plant site. If this site is used for the terminal, coal will be transported along a route that will run along the Taunton River to a point north of the city of Fall River and then eastward to the Energy Park site. The final access corridor has not yet been selected; however, the shortest potential corridor would be approximately 12 miles long.

The first alternative marine terminal site (Site B) is located along the Fall River waterfront approximately one mile south of the Penn Central site. It is approximately 8.8 miles from the proposed coal gasification site. If Site B is used for the terminal, the proposed access corridor for Site A will also be used.

The second alternative site (Site C) is located in Tiverton, Rhode Island, along Mt. Hope Bay, approximately two miles south of the Rhode Island-Massachusetts border. It is approximately 11 miles from the Energy Park site. The town of Tiverton, Rhode Island, and North and South Watuppa Ponds lie between Site C and the proposed gasification plant site. If this site is used for the terminal, the same access corridor as with Sites A and B would also be used. Impacts on the terrestrial and aquatic environments are expected to be primarily a consequence of construction activities, although some minor operational impacts can be expected.

The Region I EPA has determined that the marine terminal sites presently under investigation will not require a separate Pre-

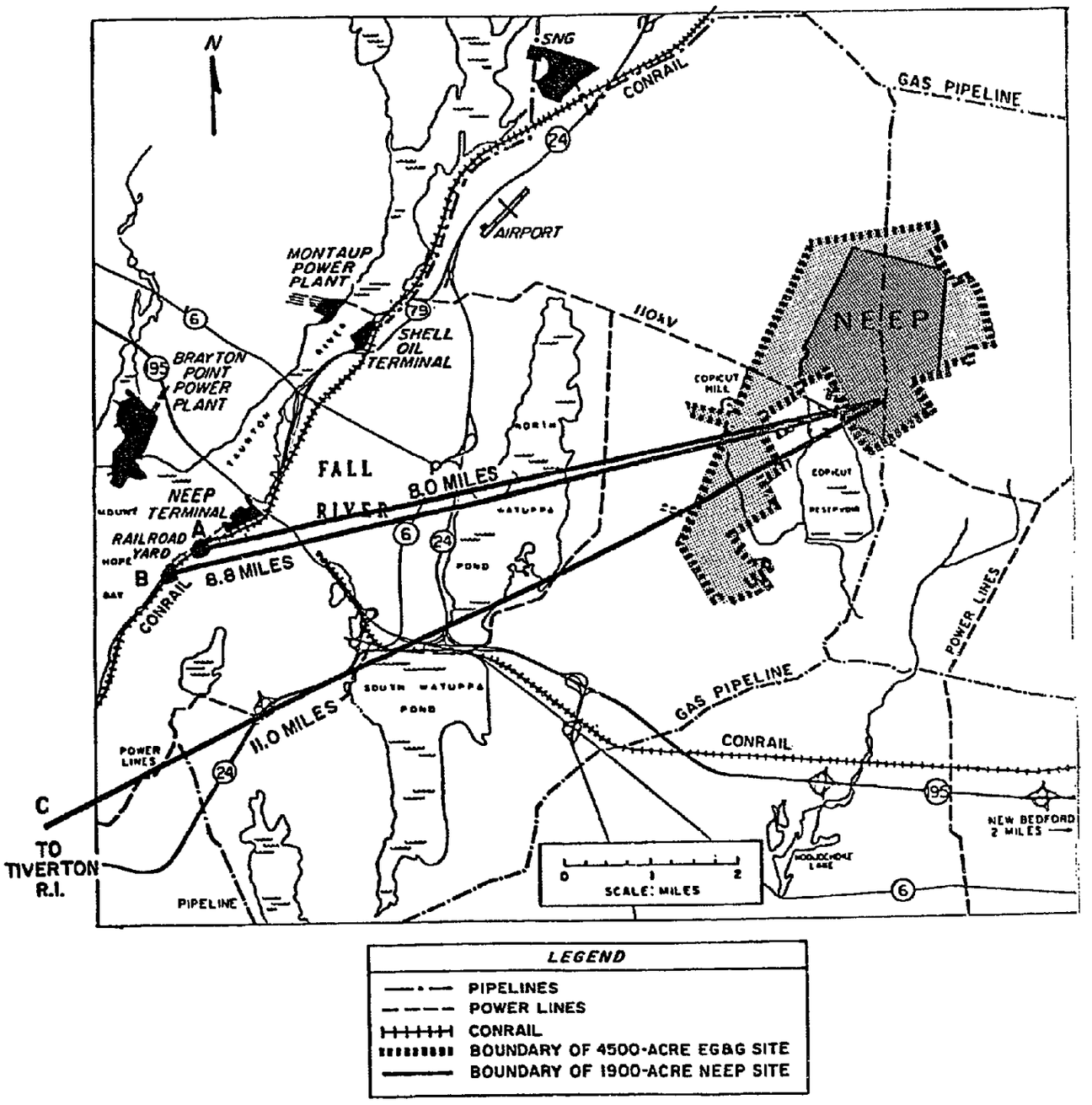


Figure 8-9
PROPOSED NEW ENGLAND ENERGY PARK SITE SHOWING PROXIMITY
TO PORTS AND HARBORS

vention of Significant Deterioration (PSD) Permit. Construction of a marine terminal will require a federal Section 10 permit (Rivers and Harbors Act), a federal Section 404 permit for dredge and fill, a state Chapter 91 Waterways License, a state dredge and fill permit and a Wetlands Order of Conditions. Discussions to date with the Corps of Engineers and the DEQE do not indicate that this will be a major problem, provided necessary and prudent precautions are taken.

No dredging is required for the NEEP marine terminal or shipping channel other than that required for shoreline stabilization; however the NEEP project has been closely following the Corps activities in the area associated with dredging. Dredging operations within the Taunton River and Mount Hope Bay are conducted by the U.S. Army Corps of Engineers (COE), New England Division. Their major project in the area involves the deepening (to 40 feet) of a channel extending from Mount Hope Bay northeasterly to a turning basin in the vicinity of the Shell and Montaup wharves on the Fall River waterfront. This proposed activity does not interfere with the NEEP marine terminal development. It would provide additional flexibility concerning the shipping of coal; however the NEEP project does not have any requirements associated with this proposed COE project.

From the assessment of the environmental information available on the Taunton River-Mount Hope Bay area, it is apparent that a fairly extensive data base exists. The climate, geological setting, water quality, and biological resources of the area are generally well known. The importance of Fall River as a regional center for the in-shipment of fossil fuels is also well established and is an item of interest in the context of potential NEEP activities in the area. The Corps of Engineers' plan to deepen the main channel depth in Fall River Harbor to 40 feet further enchances the area's attractiveness for the siting of a marine terminal.

8.3.8 Access Corridor

In order to transport materials from the NEEP coal terminal on the Taunton River to the NEEP site located in the northeast side of the city, a transportation corridor is needed for the following functions:

- Movement of 3.5 million tons annually of coal from the coal terminal to the project site.
- Movement of 15 - 18 MGD of process water from the City's wastewater treatment plant (also located on the Taunton River on the southwest side of the City) to the plant site.
- Vehicular access for employees during construction and subsequent operation.
- Movement of other materials/supplies into the project area, as well as the shipment of products from the Energy Park.
- Utility lines (gas, methanol, wastewater, etc.).

Based on a feasibility study examining the movement of materials to and from the NEEP site, a decision was made to develop a rail connection. The rail connection was the favored mode because both slurry and conveyor modes considered are limited to movement of a single commodity, coal, uni-directional to the site. The selection procedure used to locate the best route for rail spur and a vehicular access road into the plant property is detailed in the report entitled "Evaluation of Alternate Routes for a Transportation and Access Corridor to the New England Energy Park," March, 1982. The selection criteria focused on minimizing the corridor's impact on residences and the environment. The report concluded that the corridor should

follow the existing Conrail line (Newport Secondary Line) which passses through and runs northerly. At a point approximately seven miles from the coal terminal, adjacent to the intersection of the rail line and Route 24, a new rail spur will be built which will run southeasterly for a distance of about four miles into the Energy Park. The separate vehicular access route would extend from Riggenbach Road (adjacent to the Fall River Industrial Park) and merge with the rail corridor. State legislation to acquire right-of-way through the Forest area has been pursued as noted in Section 8.1.1. Favorable outcome is expected.

8.4 SOCIOECONOMIC CONSIDERATIONS

8.4.1 Introduction

Introduction of a large advanced energy facility such as NEEP into an area with underutilized labor and services could lead to major economic benefits to the Fall River region. The key factor is determining the socioeconomic impacts of the project in the site area is the extent to which the local labor force satisfies construction labor requirements. A suitable labor force reduces the need to bring in workers from outside the region, thereby minimizing increases in population attributable to the project.

The largest skilled labor requirements for NEEP are pipefitters, carpenters, electricians, iron workers, and general laborers; these requirements are expected to peak at approximately 2,800 during the ninth quarter of construction. If labor supply analyses indicate a shortage of skilled labor, training and recruitment programs will be developed to enhance local project benefits and minimize increased demand for public services and housing.

The regional work force characteristics, demographic profile, housing stock, tax base, public services, regional income, and transportation infrastructure are being defined to accurately assess the effects that the NEEP project will have on the region.

8.4.2 Economic Impact Assessment

The construction and operation of a large-scale energy project such as NEEP can introduce significant economic benefits to the region in which it is situated; however, the potential also exists for significant economic and social costs, particularly if adequate assessment and planning are not accomplished well in advance of project construction. Careful planning by NEEP developers and appropriate local, regional, and state agencies during the design of the project will help maximize the use of local labor and industries as the project proceeds. The socioeconomic impact assessment will:

- provide an accurate definition of the existing socioeconomic situation, including industrial composition, work force characteristics, demographic profile, housing stock, tax base, public services, regional income, and transportation infrastructure;

- develop a detailed inventory of project requirements, particularly for the construction phase, as they relate to labor and material needs, transportation, public services, and fiscal effects;

- assess the likely socioeconomic impacts of the project given the baseline socioeconomic situation and project requirements; and

- identify significant problem areas and develop effective mitigating measures.

Several studies are being pursued to address the essential elements of the socioeconomic impact elements listed above:

(a) Regional Economy

To adequately assess the economic effects of the project, the appropriate study region and the nature of the economy of that region will be defined. Given this information, and data concerning the economic stimulus being proposed, the changes which might occur in regional gross output, employment, and income will be estimated. The regional impact analysis will be designed to measure the additional rounds of economic effects resulting from NEEP construction and operation, taking into account 1) interrelationships among industries in the region; 2) the implications of increased household income; and 3) the effects of increased household expenditures. A popular approach to estimating these effects involves the use of multipliers that measure the total effect of an initial stimulus. A set of multipliers will be determined by using a model such as the Massachusetts Economy Policy Analysis Model (MEPA) utilizing this or other acceptable models, a baseline forecast can be made. This forecast will provide estimates of future population, employment, income and other socioeconomic elements.

(b) Labor Force and Employment Characteristics

A study of unemployment rates in the Fall River/New Bedford area shows improvement (decrease) in the unemployment rate during the past year, due in part to the introduction of

"high technology" industries. This has partially offset declines in traditional industries, but an important percentage of the work force has been forced to seek employment outside the region. In Fall River, for example, 31% of the employed work force commutes outside of Fall River for work.

In the Southeast Regional Planning and Economic Development District (SRPEDD) study region during 1979, nearly 48% of those employed worked in manufacturing industries. Other key sectors are wholesale/retail trade (24%) and services (16%). Contract construction trades employ only 5017 individuals, or 3% of the region's employed work force.

With regard to specific construction skills, it is important to distinguish between the aggregate supply of labor and the availability of labor at the appropriate time. That is, those people who make up the supply of labor are not likely to be available to NEEP in the same numbers due to other projects. The project architect/engineer has provided preliminary estimates of craft supply and demand for the 1981-1990 period in northeastern United States. The largest skill requirements are pipefitters, carpenters, electricians, iron workers, and general laborers. Should activity increase at competing facilities (e.g., Bath Iron Works or General Dynamics Shipyard), this shortage may pose serious concerns. Similarly, the initiation of other projects in need of similar skills (e.g., Central Maine Power's Combined Cycle Facility) could create competition for this labor resource. On the other hand, the recent cancellation of the Pilgrim II nuclear generating station in nearby Plymouth reduces the competition considerably, as will the completion of the Seabrook I nuclear generating station just north of Boston.

(c) Population and Demograpic Characteristics

According to preliminary 1980 census data, the population of Bristol County is 474,345. Fall River, New Bedford and Taunton account for nearly half of this total (235,680). Between 1970 and 1980, the population of Bristol County increased by 30,044 persons (6.8%). Fall River and New Bedford populations declined by 4,658 and 3,380 persons, respectively, during this period. Taunton's population increased from 43,756 to 45,043.

Between 1965 and 1975, these three cities experienced little growth in population (1%) while many of the surrounding towns realized significant population increases. The population of Bristol County increased over 11% during the same 10-year period, with Freetown and Dartmouth experiencing growth rates of 62% and 26%, respectively.

The declines in population in Fall River and New Bedford can be attributed at least in part to the out-migration of traditional industries. Historically, these cities have relied on their waterfront facilities and textile mills to develop a trade- and textile-based economy. Technological advances and foreign competition have caused a gradual erosion in both of these economic sectors, with an accompanying loss of jobs, income, and tax base. Surrounding communities were not influenced to the same extent due in part to differences in their economic bases.

(d) Housing Characteristics

An Areawide Housing Opportunity Plan prepared by the regional planning group identifies housing deficiencies in

Southeastern Massachusetts for more than 26,000 people. SPREDD defines the "shortage" as the number of individuals who need financial supplements to afford housing, plus the number of individuals currently residing in deficient housing. A preliminary review of existing data indicates that careful planning will ensure that suitable housing is available for NEEP construction and operations personnel. Much, if not all, of the construction work force can likely be accommodated with temporary housing, as most of the approximately 1000 people that will be required for three years of the four year construction period already live in the immediate area or will commute. Preliminary 1980 census data indicate that the number of housing units has increased since 1970 for every municipality in Bristol County. For the county as a whole, the number of units rose from 148,106 to 176,481 (19%). In Fall River, New Bedford, and Taunton the number of units rose by 2,732 (8%), 2,902 (8%), and 2,986 (22%), respectively, to 1980 levels of 36,918, 39,499, and 16,756, respectively. The ability of these and other nearby towns to accommodate NEEP-induced growth will be determined. Several methods are available for examining the effects of growth on housing stock, quality, and costs.

(e) Public Services

Information on the existing public services and facilities in the region will provide the basis for evaluating their current adequacy and determining potential impacts generated by NEEP. An inventory of such facilities and services is being conducted to provide information on the current level of services provided by each surrounding community, the adequacy of the services and facilities, and any capacity constraints that currently exist. Six basic categories are being analyzed:

- Education
- Health Services
- Public Safety Services
- Water Supply
- Public Utilities
- Waste Disposal

An assessment of these service categories is important because present service levels may have important implications for patterns of community choice excercised by new residents associated with NEEP.

A fiscal characterization of the region is complex, but will be evaluated "in-depth" in order that the fiscal impacts of NEEP can be clearly assessed.

(f) Transportation

An important issue related to the project concerns site access and transportation during construction. This aspect of the socioeconomic study will assess existing commuter and traffic patterns in areas around the site. Existing sources of data (including a transportation study being conducted by SRPEDD for the Massachusetts DPW) will be relied upon to define present conditions. A field survey of traffic patterns on the proposed access roads may be required, but due to the industrial access tieing directly to the existing Conrail line and limited access State Route 24, a significant impact is not expected. Measurements of traffic flow will be provided to a limited degree through observations during the noise assessment program.

(g) Land Use

Prior to being rezoned for heavy industry in 1980, the Fall River portion of the NEEP site was zoned for single-family

residences. Due to declining levels of economic activity and population, there was little pressure to develop this land for residential purposes. Instead, the land provided a limited recreational resource and a source of firewood and lumber. NEEP site investigations indicated that the site has also been used to dispose of trash, automobiles, tires, and other debris. The site does not appear to possess any unique or extremely important aesthetic, recreational, or biological resources.

Land use in the vicinity of the NEEP site is basically rural residential, and includes the Freetown-Fall River State Forest to the north, North Watuppa Pond to the west, and Copicut Reservoir to the south. Those two surface water bodies provide the basis of the public water supply system for Fall River. The extent to which the NEEP site provides a recharge area for these water bodies for groundwater resources used by neighboring towns is being evaluated via geologic and hydrologic studies.

8.5 HEALTH AND SAFETY

The Health and Safety program was designed to identify regulatory requirements and potential health and safety hazards, and to ensure that appropriate controls are incorporated into the plant design. The regulations pertaining to the health and safety aspects of the NEEP project have been determined. These include regulations of the Environmental Protection Agency, the U.S. Coast Guard, and the Department of Labor. The potential health and safety hazards in each process area have been identified. The major gases associated with this process (Carbon Monoxide, Hydrogen, Hydrogen Sulfide, Nitrogen, Argon, Methane, Carbon Dioxide) are common industrial gases for which toxicological modes of action and permissible exposure levels are well-known. Effects of certain aromatic compounds, which may be present in minor amounts, are less known.

Eight different program areas, including a Preliminary Hazard Analysis (based on DOE's Safety Analysis System Review and DOD's Military Standard Safety System Program) have been developed to ensure that health and safety concerns are considered in the design phase. Design criteria developed by the environmental programs will be tracked by these evaluation programs. A brief summary of each program area to be considered is described in the following sections.

8.5.1 Regulatory Requirements

Numerous health and safety regulations will apply to various aspects of the project. Regulatory jurisdiction varies between the marine terminal, the access corridor, and the NEEP site proper.

Activities relating to health and safety matters at marine terminals are under the jurisdiction of several government agencies. The Coast Guard traditionally has had responsibility for maintaining port security, fire protection, welding, and hot work, under 33 CFR 1926; and for the handling of explosives and dangerous commodities, under 46 CFR 146. Where these standards do not apply, jurisdiction lies with the Occupational safety and Health Administration as defined by 29 CFR 1918 (longshoring regulations) and 29 CFR 1910 (General Industry Standards). At present, OSHA has proposed 29 CFR 1918a, Marine Terminal Standard, to apply where other govenment agencies do not have jurisdiction. The proposed standard is a vertical standard (applies to the entire marine terminal industry) designed to eliminate confusion as to which OSHA regulations are applicable by incorporating pertinent 29 CFR 1910 regulations by reference.

The Department of Transportation (DOT) and the Occupational Safety and Health Administration (OSHA) are expected to have

jurisdiction over health and safety regulations concerning the industrial access corridor.

At the NEEP site, all occupational safety and health matters lie under the jurisdiction of the Occupational Safety and Health Administration. Construction activities at the NEEP site will be regulated under OSHA 29 CFR 1926.

8.5.2 Chemical Inventory

In an effort to assess the potential hazards associated with the project, the various materials and chemicals likely to be used or produced in the process plant have been identified. Basic to this assessment is an evaluation of the raw materials used and process transformations and byproducts.

Raw bituminous coal from the mine mouth will contain clay, rock, pyrite, and debris in various amounts which vary with the type of coal, the location of the seam, and the mining method. The basic structural units of bituminous coals are aromatic ring systems joined by aliphatic, sulfide, disulfide, and ether bridges. Functional groups substituting hydrogen atoms can be found in the aromatic structure and short aliphatic chains of four carbons or less are probably the most common.

Nearly all naturally occurring elements are found in coal in trace quantities. The magnitude of concentration depends on conditions present during the coalifaction process. The mean analytical values for 101 bituminous coals, including the standard deviation, minimum and maximum values for trace elements, and coal constituents have been catalogued. When the final coal source to be used is identified, a detailed characterization will be performed.

8.5.3 Process-Related Health and Safety Issues

Health and Safety issues associated with each of the following process related areas will be analyzed and evaluated:

(a) Marine Terminal

At the marine terminal, the hazards associated with coal handling and storage will be addressed including fire due to spontaneous combustion of stored coal, and explosion due to accumulation of fine particulates and/or coal off-gasing.

(b) Access Corridor

Movement of coal from the marine terminal to the NEEP site will occur by rail. The major health and safety issues to be addressed are:

- fugitive coal dust emissions
- grade crossing safety
- noise
- locomotive emissions

(c) NEEP Site

The coal receiving area involves many of the same health and safety hazards identified at the marine terminal. Concerns such as exposure to coal dust, possibility of spontaneous combustion, and noise levels will be assessed. Issues pertaining to the gasification process will be evaluated. Gasification related safety items have been identified and will be considered during the design phase and through proper work practices.

Should a major process leak occur, a method of quick depressurization of reactor vessels will be available. This system will also be used if an explosion condition (reducing to oxidizing atmosphere) develops. The raw gas would be dumped quickly and routed to a flare system, which would readily avert potential danger to both humans and materials.

A program devoted to leak detection will be developed. As accidental release of gaseous components would pose a hazard, self-contained breathing apparatus will be located strategically throughout the plant for emergency use. Employees will be trained in the use of this protective equipment and the procedures to follow in the event such an accident occurs.

8.5.4 Health Effects

The Texaco process is distinct from most other coal gasification technologies in that operating conditions are not conducive to the formation of tars, soots, cresols, and other aromatic compounds. Further evaluation of process streams for polycyclic aromatic impurities is required. Although these compounds are not major constitutents of the process, every effort will be made to minimize exposure to these compounds, should they be present.

Radiological impacts of the coal gasification process are expected to be minimal. Sub-bituminous coal may contain radon and uranium in very small levels. Radioactive material is anticipated in particulate matter and in the gasifier slag. From literature sources investigated by NIOSH, it has been demonstrated that no signficant radiologic exposure in coal gasification plants is anticipated.

A more detailed toxicologic review of constituents identified will be developed at a later date. The information developed will be used in the system safety analyses to be conducted during the design phases.

8.5.5 Process Evaluation

The chemical constituents and physical hazards detailed in previous sections will be evaluated to determine the degree of hazard inherent in the process and provide for comparison between subsystems. A Preliminary Hazard Analysis (PHA) will be conducted to evaluate the process design.

The PHA objectives are to identify safety critical areas of the process, provide a preliminary evaluation of hazards, and define safety design criteria. Consideration will be given to operational, maintenance, testing, and emergency procedures. Processes will be evaluated regarding the hazardous components, as described previously, and potential energy sources which can contribute to or constitute a hazard.

Following the PHA, numerous other safety analyses are planned to be conducted in conjunction with the design engineers to ensure that system design and operation will be developed in accordance with health and safety principles. The design goal will be to eliminate hazards; if this is not possible, hazards will be minimized and controlled.

8.5.6 Occupational Safety and Health Program

A comprehensive health and safety program will be developed for NEEP. The program will be designed to provide a safe and healthy workplace for employees and, at a minimum, will address the following:

(a) General plant policies and procedures
(b) Medical and first-aid procedures
(c) Health and Safety Department functions and duties
(d) Unit operational and maintenance manuals
(e) Permit system to ensure that safety practices are employed and plant procedures are followed
(f) Contingency plans for emergency preparedness and response
(g) Educational and training programs pertaining to safety related areas

It is anticipated that these programs will be modified as required during the operation of the facility. In all instances, the programs will be developed and maintained to ensure compliance with OSHA regulatory requirements.

8.6 WASTE STREAM ASSESSMENT

The characteristics of solid, liquid, and gaseous effluents from the NEEP facilities are being evaluated to facilitate the permitting process and assist in the selection of pollution control systems. Pollution control options will be evaluated based on stream characteristics, coal feedstock, desired end products (qualitative and quantitative), normal operating parameters, and regulatory constraints.

8.6.1 Wastewater Discharges

The amount of treated wastewater from the plant will depend on the quality of the incoming water and the chemical composition of the coal used. Relatively more water will be discharged if the process water and coal are high in chlorides. The volume predicted is less than 9 MGD, with a much lower figure being likely since the leading candidate coal is low in chlorides. Smaller wastewater components include 0.67 MGD of treated wastewater from raw water pretreatment backwash and the power plant, and 0.03 MGD of treated sanitary wastewater.

8.6.2 Emissions and Effluent Analysis

An analysis of emissions and effluent data based on conceptual design has been performed. The objective of this analysis was to determine the environmental constraints likely to impact on NEEP plant capacity, recognizing that the configuration and processing capacity of NEEP is, as all plants are, limited in part by the ability of the regional environment to assimilate additional pollutant loading attributable to the plant. Of primary concern were air emissions, wastewater, and solid waste. A preliminary report was prepared which evaluated these issues based on available engineering data and waste stream characterizations.

8.7 IMPACT ASSESSMENT

The following sections provide brief overviews of impact assessments for the environmental and permitting issues discussed in Section 8.

8.7.1 Air Quality

Assessing the potential air quality impacts is the primary objective of the NEEP Aerometric Program. The monitoring/modeling system that has been implemented will be the primary methodology to be employed for impact assessment. Two basic regulatory constraints which the impact assessment will address are: compliance with 1) the applicable National Ambient Air Quality Standards (NAAQS); and 2) the Prevention of Significant Deterioration (PSD) concentration increments.

The energy facility itself represents the major focus of air emissions. The compliance analysis will account not only for the pollutants designated as "major" according to PSD guidelines, but also those minor pollutants which represent only a small part of the effluent streams.

Two other parts of the NEEP development, the waterfront coal transfer operations and the on-site coal preparation, potentially have significant impacts on TSP air quality. Both of these facilities are sources of fugitive TSP emissions. Since Fall River is currently a designated nonattainment area for TSP, emission offsets are required. Continuous TSP monitoring to date, however, indicates that ambient TSP levels over the rural portions of Fall River have been extremely low. Continued monitoring and modeling will elucidate this and other impact issues so that compliance will be ensured.

In addition to the analysis of NEEP-specific emissions, several peripheral issues must be examined. These issues include TSP and CO impacts due to construction and earth-moving activities, increased traffic, and other human activities. Air quality implications of socioeconomic changes in the surrounding communities are also of importance. Issues of vegetative impacts and visibility will be addressed in accordance with applicable guidelines and regulations.

8.7.2 Water Quality/Aquatic Ecology

Protection of water resources, both surface and groundwater, is of utmost importance in selection of NEEP construction methodologies and mitigation measures. The potential impacts of NEEP on the aquatic ecology and water quality of surface waters are associated with construction-related activities; product, material and waste storage; and plant operation. Standard construction practices will minimize the potential for physical alterations, which could lead to changes in hydrology, erosion rates, sediment load, and chemical changes in nutrient concentration, dissolved organic matter, and dissolved and particulate trace metals. Therefore, the potential impacts to the

aquatic ecosystem from construction to be considered are suspended solids due to increased runoff and fugitive dust, and increased nutrient loading due to deforestation. Sedimentation and erosion will be controlled.

The potential impacts on aquatic ecosystems associated with plant operations will be related to leaching of stored materials (coal, slag), and depositon of fugitive dust from coal piles, slag storage, and airborne particulates. The potential for organic compounds entering the aquatic environment from materials stored on-site is also an area of concern because of their potential effect on the aquatic communities and the public drinking water supplies. Many organic compounds are toxic to algae in parts per billion (ppb) concentration. In addition, trace level organic compounds in drinking water have been linked to adverse health effects in humans.

The surface waters and their associated sediments have been sampled for a complete organic screening to determine the baseline levels of organics listed on EPA's list of priority pollutants. This screening should provide a basis for understanding the present distribution of organics in the surrounding aquatic environments and provide a basis for assessing the potential effects of any additional inputs that may result from the activities associated with NEEP.

The primary potential hydrological impacts associated with NEEP development are increased soil erosion, surface water runoff, and contamination of surface and subsurface waters. Most major projects involving land disturbance must address these issues, which are not unique to NEEP; however such impacts will be minimized.

Destruction of protective ground cover, stripping of topsoil, compaction, and exposed cut slopes can increase erosion, surface water runoff, and sedimentation.

Sedimentation and erosion will be controlled by sediment ponds or traps, mulch cover, and permanent seeding/revegetation of exposed cut slopes and large surface areas. Alterations in surface drainage patterns will be minimized by avoiding dredging and filling of wetlands as much as practicable, and keeping fill to a minimum and allowing for free-flow and circulation of affected waterways.

Contamination of surface and groundwaters via coal and slag pile leachates and inadvertent spillages is a significant public concern, although the toxicity of sulfur, coal, and slag is considered to be small or nonexistent. Depending on the concentrations introduced into surface or groundwaters, degradation may occur. To minimize the impact on water quality associated with the coal and coal slag storage piles, control structures will be constructed to collect and treat runoff and leachate. Collection and treatment of the surface water runoff from these areas will reduce the possibility of contamination of subsurface waters.

8.7.3 Terrestrial Ecology/Wetlands

Construction activities, placement of roads, paved areas, and buildings, and storage of coal and slag will result in habitat alteration. Installation of impervious surfaces and alterations in drainage patterns can potentially impact water dynamics supporting wetlands, although proper engineering design can mitigate many of these impacts.

The HEP analysis will allow an estimate to be made of the value of lost habitat due to construction and operation of NEEP facilities.

Creating impervious surfaces and altering drainage patterns could impact water sources to wetlands. The extent of impact depends on the location and extent of such surfaces with respect to the location of wetlands. In a worst case situation, the water table could be lowered, resulting in a reduction of wetlands over a period of years and an alteration in plant species composition, with a subsequent change in the type of wetland present. Many wetland species immobilize heavy metals by precipitation in the rhizosphere, while others possess a higher physiological tolerance to metals than upland species. Therefore, wetlands can serve as a biological pollution control system for heavy metals should they reach the wetland environment.

Effects on wildlife from toxic organics depend on chemical stability, biodegradability, and bioconcentration through the food chain. Dust from construction and coal/slag transport and storage will settle on surrounding vegetation and may impair growth; such vegetation adjacent to dust sources may supply lowered quality and quantity of animal food and shelter resources. This impact however will be localized and not of prime concern because no critical habitat will be destroyed. Fencing will reduce mobility of larger animal species; this could impact access to various habitats by multicover users. Noise and human presence will repel some wildlife species and attract other species. The extent of these impacts will vary during the construction and operation phases.

8.7.4 Socioeconomic

The key factor in determining the magnitude of socioeconomic impacts due to construction of NEEP is the compatibility of the

regional labor force and the construction work force required. If an appropriately skilled work force is available in the numbers and at the time construction takes place, the need to bring workers in from outside the region will be minimized. Accordingly, increases in population and the associated demands for housing and public services will be curtailed. During the NEEP peak labor demand, nearly 2,800 people will be working on-site. Over the estimated 46-month construction period, estimating an average annual salary of $20,000, the resulting construction phase payroll will be in excess of $122 million.

Several approaches and techniques will be utilized to forecast the demand for goods and materials, the effects of change in employment, wages, value of output, unemployment rate, tax revenues, and consumer prices. Socioeconomic impacts will be continued over the 25 to 50 year operating life of the plant.

8.7.5 Noise

The noise impact evaluation will take into account the ambient baseline measurement, sound level criteria, predicted noise levels from modeling efforts, and community response to intruding noise. The evaluation will include all noise-sensitive land uses in the vicinity of NEEP. Methods will be proposed to control construction noise to reasonable levels. Noise control guidance will be provided to design engineers if it is anticipated that processes of the NEEP facility will require additional acoustical attenuation.

Coal transport from a marine terminal to the site may be accomplished by use of a dedicated rail line. If the rail route is chosen, a 6,000-HP electric locomotive or its diesel equivalent with 20- to 100-ton automatic dumping rail cars will be used. The rail unit will make three round trips/8-hour shift, 16 hours/day, 6 days/week.

Modeling and impact analysis of noise on the route and access corridor will be conducted using appropriate criteria, as required.

8.7.6 Cultural Resources

Anticipated project effects on any archaeologic and historic resources that may be present on the NEEP site are a function of three distinct considerations: a) the specific areas used by the project; b) the depth of disturbance and extent of surficial modification by plant construction and operation; and c) the kinds, distributions, and significance of any cultural sites.

The locations of project components, transportation facilities, and coal/slag storage have been only tentatively assigned within a 500-acre area. The archaeology background study subdivided the area into three zones in ranked order of ecological diversity, thence into zones of decreasing probability of cultural site presence. However, at present no archaeologic or historic sites are known to exist in this construction area, although, this perception may change as the background survey continues.

The archaeological field survey will locate and determine the general nature of any sites that would be destroyed or altered by NEEP's development. If any of the affected sites are potentially significant, further investigation will be conducted to gather data or excavate prior to construction.

8.7.7 Environmental Monitoring and Assessment Plans

Protection of public health and the integrity of the environment is the philosophy behind the permitting and environmental

review process. Once the NEEP baseline program has been completed and an analysis of projected impacts has been made, monitoring programs will be designed in conjunction with regulatory agencies. Environmental monitoring and assessment plans, as currently visualized, are provided in the following areas of concern: Air Quality, Geology and Hydrology, Aquatic Ecology/ Water Quality, Terrestrial Ecology/Wetlands, Cultural Resources, Noise, Health and Safety.

These plans will be modified as specific compliance monitoring and analyses are required as part of the terms and conditions of various permits.

9. PROJECT MANAGEMENT

9.1 BUSINESS PHILOSOPHY

New England Energy Park developed and implemented a project management system to maintain technical, cost, and schedule control. This management plan was supplemented and supported by the management systems of all participants. The plan includes description of the project; the project participants, together with delineation of each organization's responsibilities and interfaces; the Work Breakdown and cost control system; the schedule development and control system; the change control system; performance criteria; project support requirements; requirement definition; information and reporting procedures; the key elements; and the work package level work plan. The work plan is the base line definition of the work to be performed in each work package. Preconstruction work plans were also developed.

9.2 ORGANIZATION STRUCTURE

The Project Organization structure changes with time, depending on the development phase of the project. The prefeasibility and feasibility study phases are complete; thus the current organization is in the process of being structured for preconstruction activities. The project structure for the feasibility study is shown in Figure 9-1, and the preliminary preconstruction and construction phase organization is shown in Figure 9-2.

The President of EG&G SynFuels is David J. Beaubien. Mr. Beaubien has 10 years of new venture development experience, and has specifically been involved in the analysis of opportunities in energy development. He has a long history of leadership in both engineering and in administration. Mr. Beaubien is a Senior Vice President of EG&G,

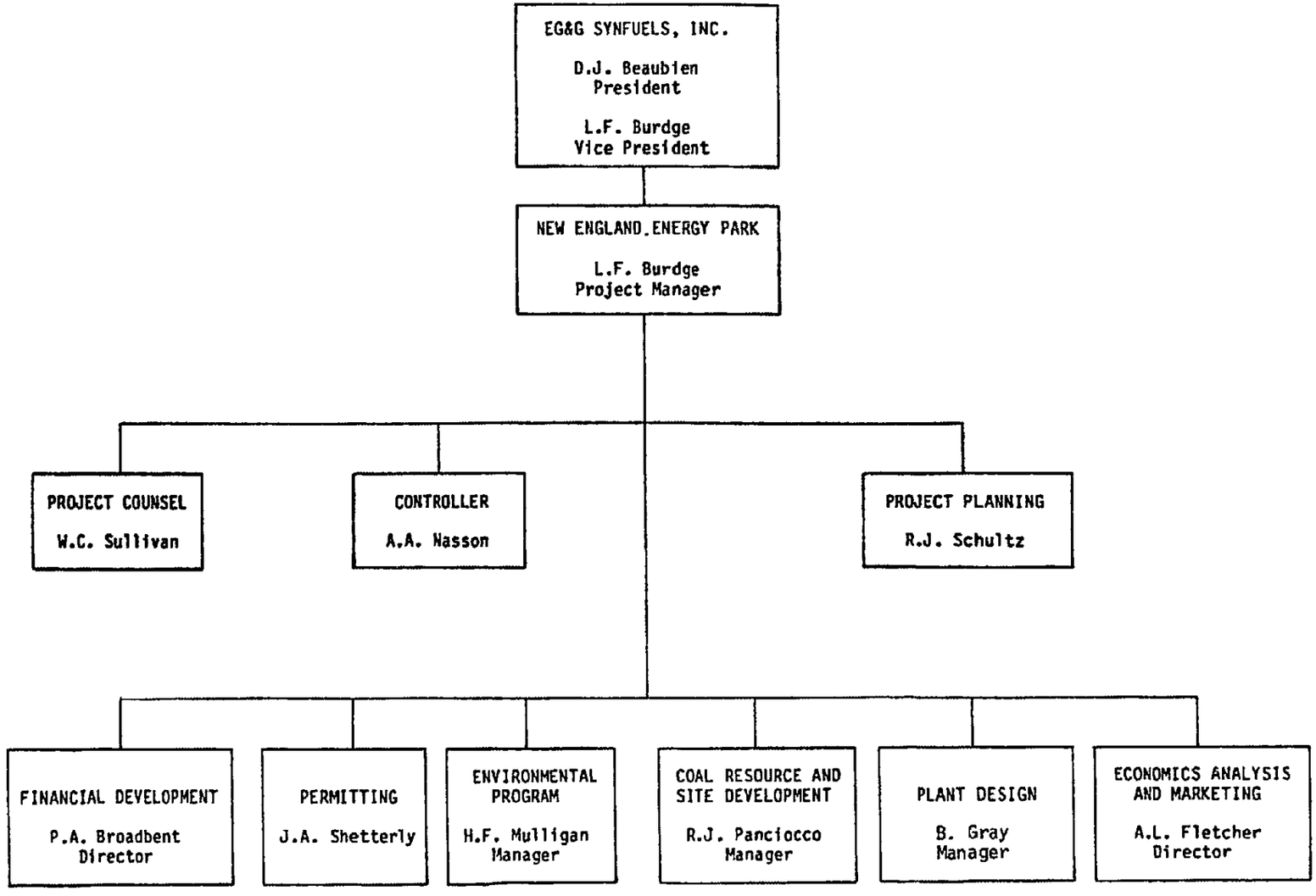


Figure 9-1
FEASIBILITY STUDY ORGANIZATION

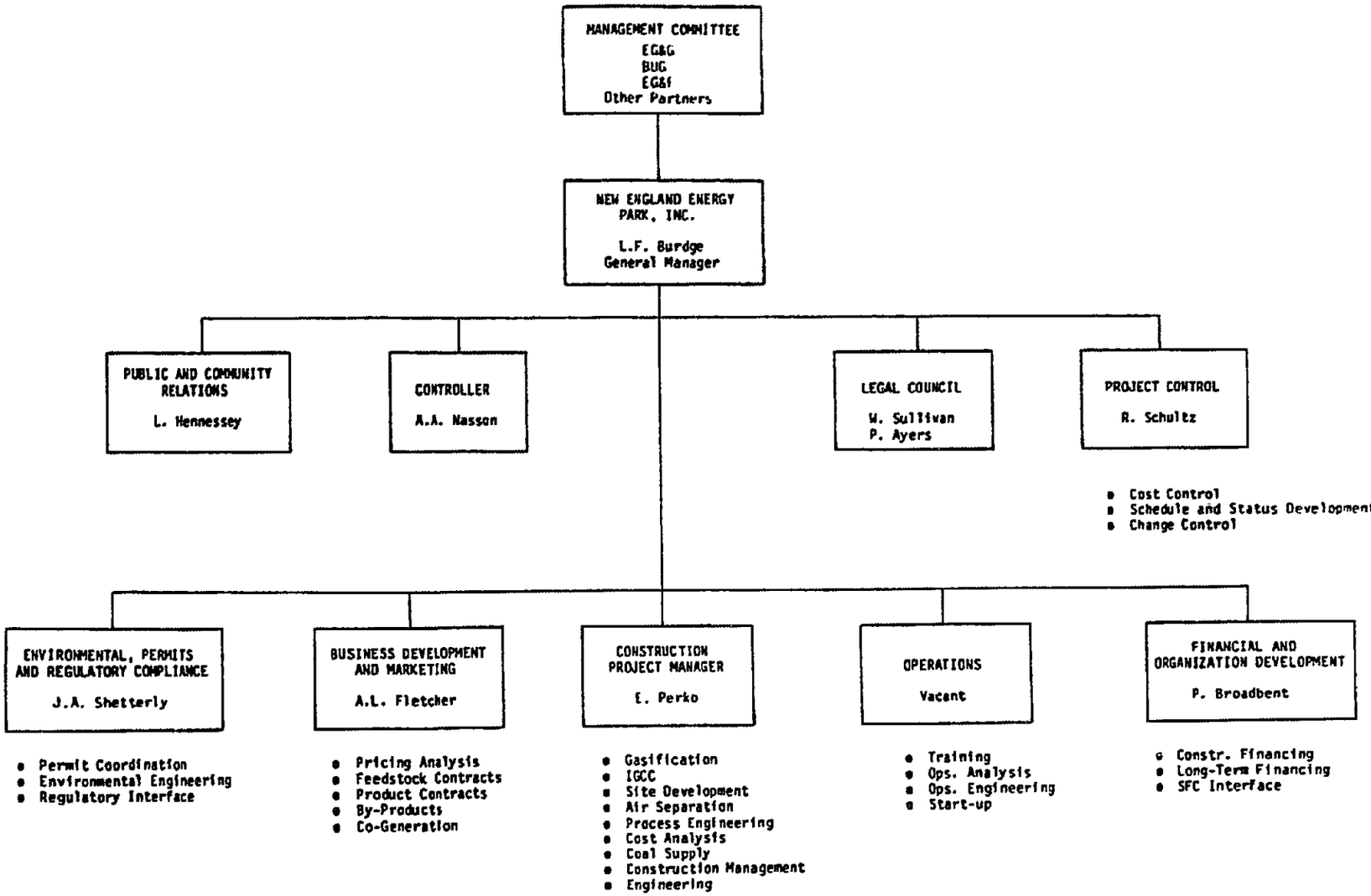


Figure 9-2

PRE-CONSTRUCTION AND CONSTRUCTION PHASE ORGANIZATION

Inc. where he has focused his activities on new venture development. His activities have resulted in EG&G's entering into several alternative energy fields. Mr. Beaubien has exhibited a unique ability for developing a cohesive team to accomplish complex objectives.

The Project Manager of NEEP is Mr. Larry Burdge. Mr. Burdge has program development, project development, and construction management experience. In a previous assignment Mr. Burdge was the Project Director of a $500 million nuclear test program. This project was completed significantly ahead of schedule and under budgeted cost. Mr. Burdge has extensive experience in planning and development of energy projects, having worked with nuclear, solar, geothermal, coal gasification, conservation, hydroelectric and alcohol fuel energy systems. Mr. Burdge has had extensive experience in all aspects of project development.

Ms. A.L. Fletcher is responsible for Economic Analysis and Marketing. Ms. Fletcher is responsible for assessing the economic viability of NEEP and delineating the risk/sensitivity of various operating and financial parameters. She is also responsible for marketing of the NEEP products. Ms. Fletcher has significant experience in energy economics and strategic financial planning for energy development companies. She was previously employed in the Federal Energy Administration and Booz, Allen & Hamilton.

Mr. P.A. Broadbent is the Chief Financial Officer for NEEP. He is responsible for equity partnership development, construction loan development, and long-term debt development. Previously, Mr. Broadbent served on the EG&G corporate staff as Director of Finance, where he was responsible for all treasury functions and has for the past several years been the Chief Financial Officer for EG&G's Sealol Division.

Mr. Edward Perko is a Project Manager with Bechtel Power Systems Group and is responsible for all design activities, capital costs estimation and technical integration. The Bechtel Project Program Manager (PPM) is the focal point in the execution of the engineering, procurement and construction effort. The PPM administers contracts and is the principal contact between the EG&G organization and Bechtel on overall operations and work execution. The PPM directs the project team in establishing and achieving overall project objectives, scope, work plans, budgets and schedules. The project team is mobilized from the engineering, construction and division services (i.e. procurement and scheduling) departments.

Environmental program development and execution is directed by Dr. H. Mulligan. Dr. Mulligan is a Staff Manager and Project Director with EG&G Environmental Consultants. Dr. Mulligan is also Chief Scientist for energy related studies.

Chief Legal Counsel for NEEP is Mr. W.C. Sullivan. Mr. Sullivan is an Associate General Counsel for EG&G, Inc., and previously was an attorney for New England Electric. He provides major input in the areas of financial development and real estate.

Mr. J.A. Shetterly serves as the prime interface with regulatory and permitting agencies. Mr. Shetterly, a Managing Attorney for EG&G, Inc., provides interpretation of environmental laws and regulations.

Mr. Robert Schultz is responsible for project planning. Mr. Schultz has had extensive experience in both program management and program management information systems. He has previously implemented automated PMIS systems capable of cost/schedule integration.

The NEEP controller is Mr. A. Nasson. Mr. Nasson is responsible for all accounting functions for the project and is manager of all project control functions.

Mr. Richard Panciocco is responsible for obtaining and transporting the raw materials for the NEEP. Mr. Panciocco directs coal selection, transportation, planning and site development.
Key organizations which supported the development of NEEP were:

EG&G SynFuels - Project Development
Bechtel Engineering - Architect Engineer/Construction Management
Lehman Brothers Kuhn Loeb, Inc., - Financial Development
EG&G Environmental Consultants - Environmental and Permitting
Fullbright and Jaworski - Legal, Financial
EG&G Services - Waste heat utilization and project management information systems
Van Ness, Feldman, Sutcliffe, Curtis & Levenberg - Legal (PURPA)
Temple, Barker & Sloan - Economic Analysis
Jenson Associates - Oil Pricing Projections
Camp, Dresser and McKee - Environmental - (hydrology and water resources)
Moore & Slater - Public and Community Relations
Resource Engineering - Coal Resources
Booz Allen & Hamilton - Coal Pricing Projections
Teknekron - Environmental (air quality)

During the preconstruction phase, a New England Energy Park Management Committee will be established, consisting of representatives of the equity partners. This Management Committee, which will include the NEEP General Manager, will review the progress of the Project toward meeting its goals and objectives each month and represent their respective organization's interest in the Project.

The General Manager will develop a Management Plan which will detail how he is going to discharge his responsibilities and achieve the Project goals and objectives. This Management Plan will include a Project Requirements Document that establishes the goals, objectives,

assumptions and requirements for the project. The document is structured in two parts: Goals and Objectives, and Specific Requirements.

The Goals and Objectives section includes the basic assumptions and criteria the goals and objectives are based on and identifies constraints placed on the NEEP General Manager. This section of the document is approved by the Management Committee and cannot be changed without their approval.

The Specific Requirements section is developed by the General Manager to the extent required to provide a basic understanding by those working on the project of how their respective areas of interest support the goals and objectives of the program. This document facilitates effective communication between the General Manager and those working on the project. Changes to this section can be effected by the General Manager through the Project's Change Control Board.
The already completed, Feasibility and Preconstruction Management Plan, in addition to the above, addresses the following:

- Objectives

- Technical Plan
  - General Support
  - Environmental and Permitting
  - Plant Design

- Management
  - General Business Philosophy and Policy
  - Organization
  - Communications and Interfaces
  - Program Baseline
  - Program Control
  - Reporting and Evaluation

9.3 PROJECT SCHEDULE

The process of program definition through development of the Work Breakdown Structure is paralleled by schedule network preparation and development of master baseline schedules for all work packages requiring schedules. After detailing the most critical paths of the network, a combination of planning decisions is made to maximize schedule development. The management networks establish realistic time phasing of task time-span estimates.

The integrated schedule takes a compilation of each individual work package schedule and covers each phase of work with a lesser amount of detail.

9.3.1 Schedules

The time phased Project Network Diagram is presented in Figure 9-3. This diagram indicates the key activities, set timelines for expenditures, delineates interfaces, defines constraints and relates key external events with major program activities. Figure 9-4 is the summary project schedule. This schedule is a top level summary of the activities required to complete the development of the New England Energy Park. Subsequent schedules further define these activities. Those contained herein are:

Figure 9-5 - Feasibility/Preconstruction Summary Schedule
Figure 9-6 - Environmental Program Summary Schedule
Figure 9-7 - Permitting Summary Schedule
Figure 9-8 - Design Summary Schedule
Figure 9-9 - Construction Summary Schedule
Figure 9-10 - Start-Up Summary Schedule

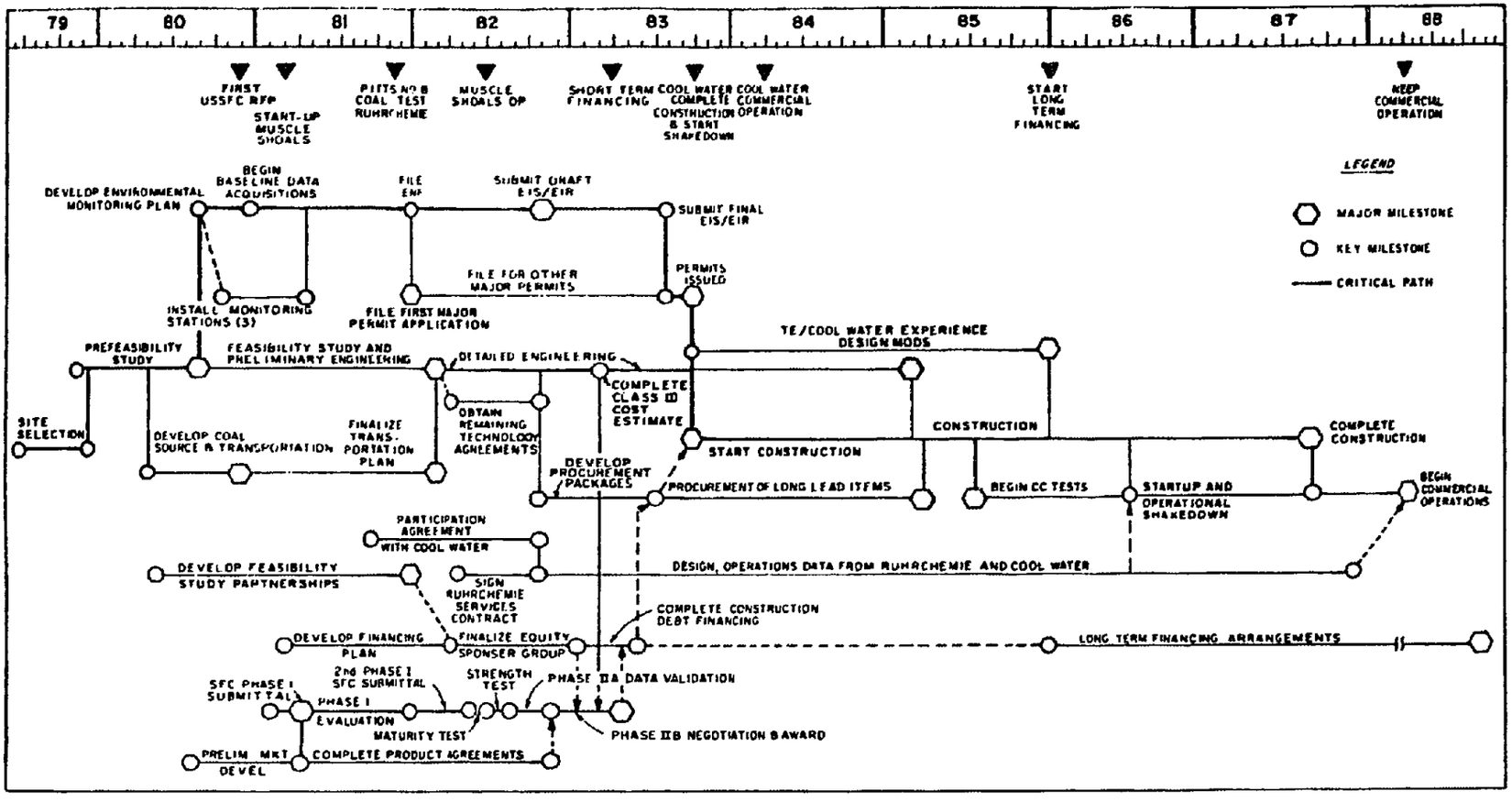


Figure 9-3

PROJECT NETWORK DIAGRAM

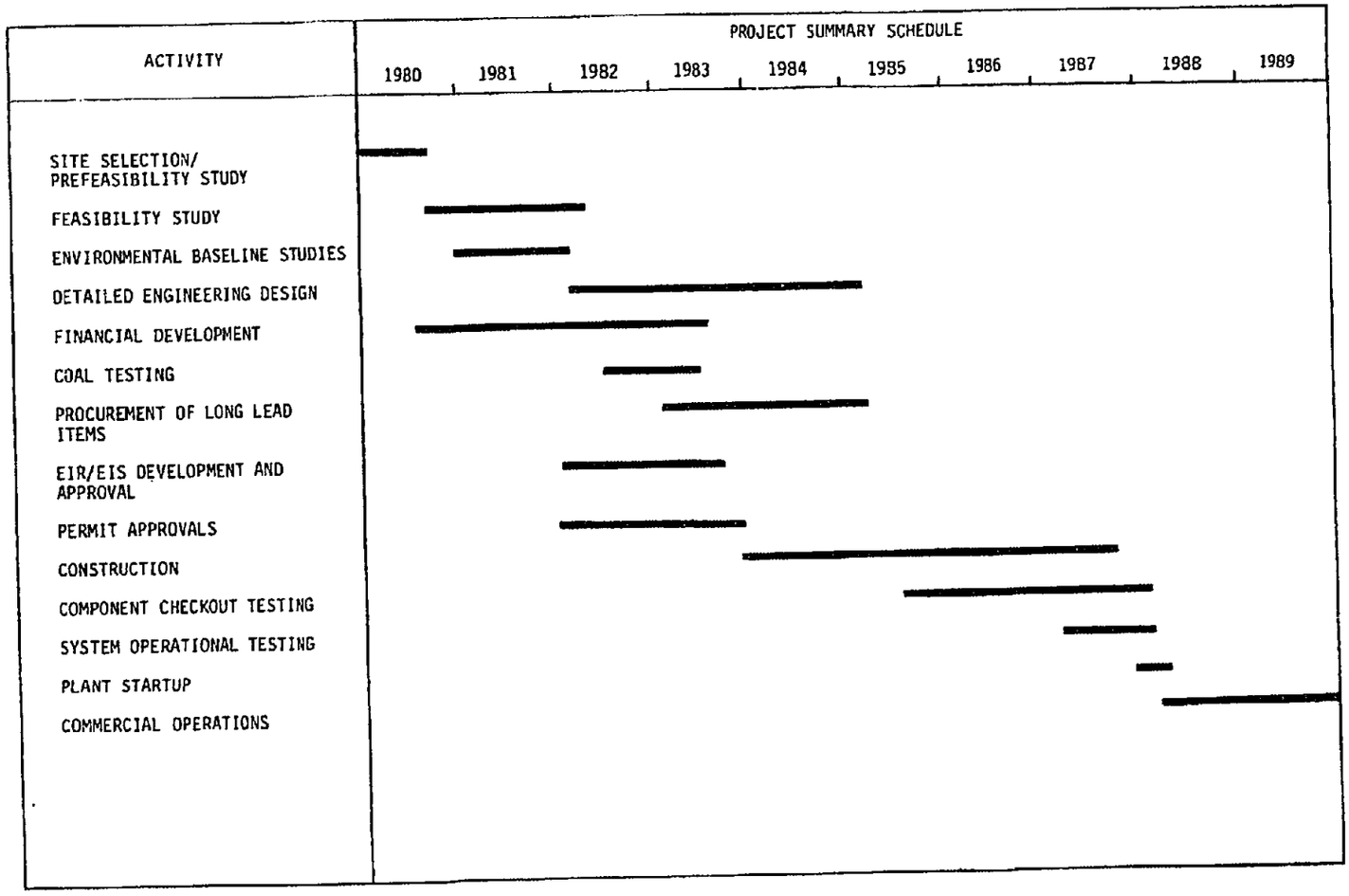


Figure 9-4
SUMMARY PROJECT SCHEDULE

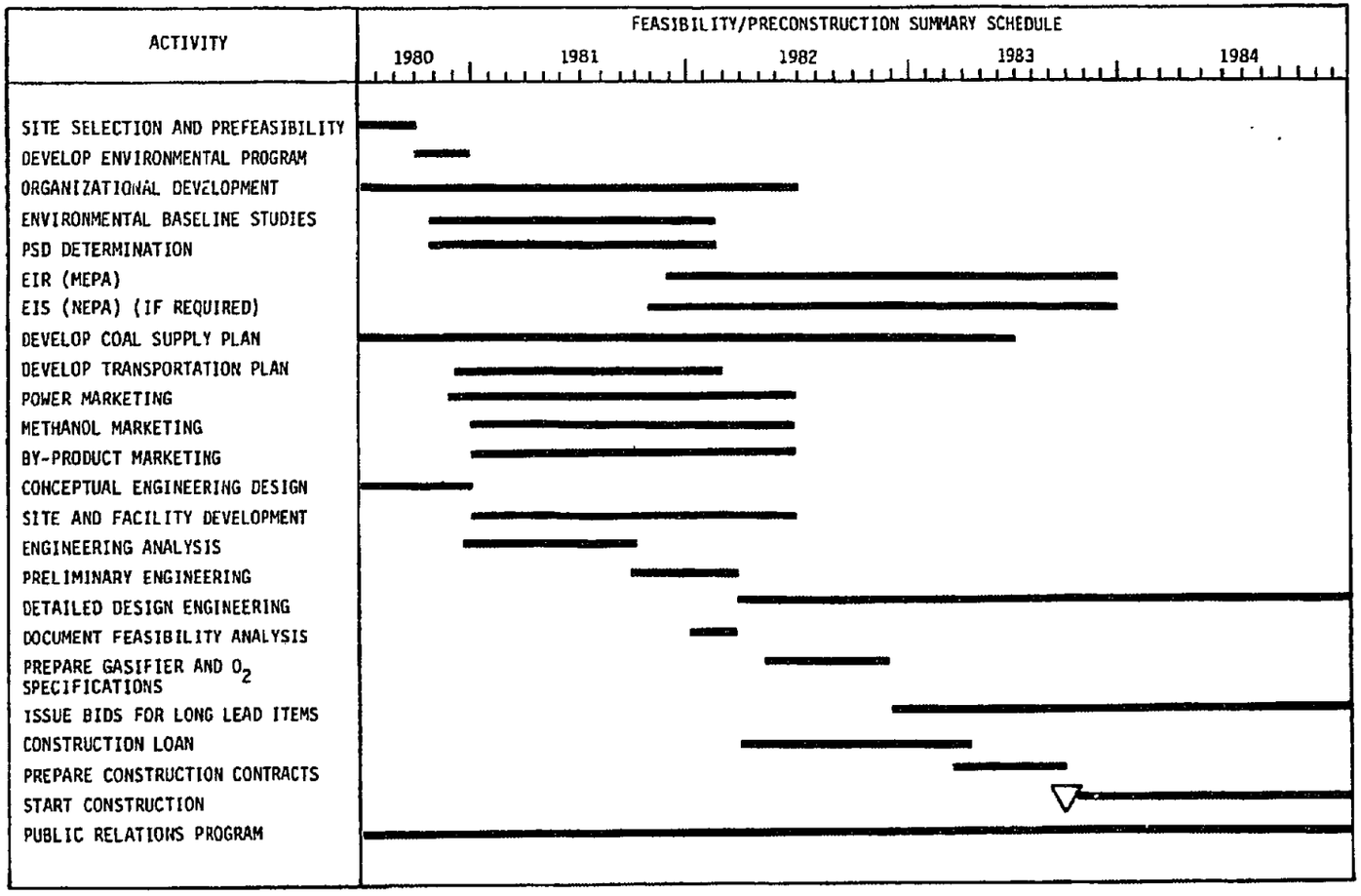


Figure 9-5

FEASIBILITY/PRECONSTRUCTION SUMMARY SCHEDULE

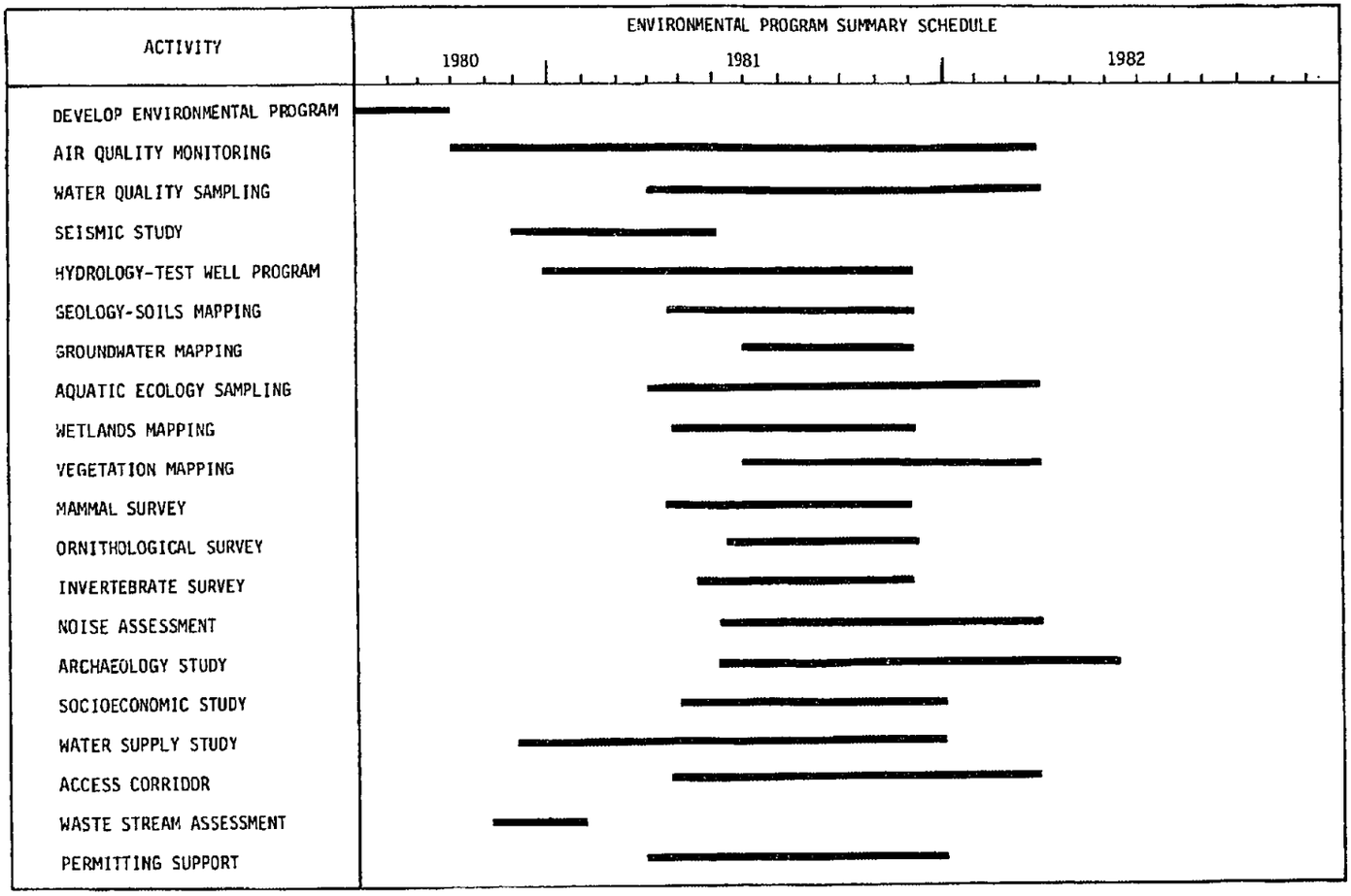


Figure 9-6
ENVIRONMENTAL PROGRAM SUMMARY SCHEDULE

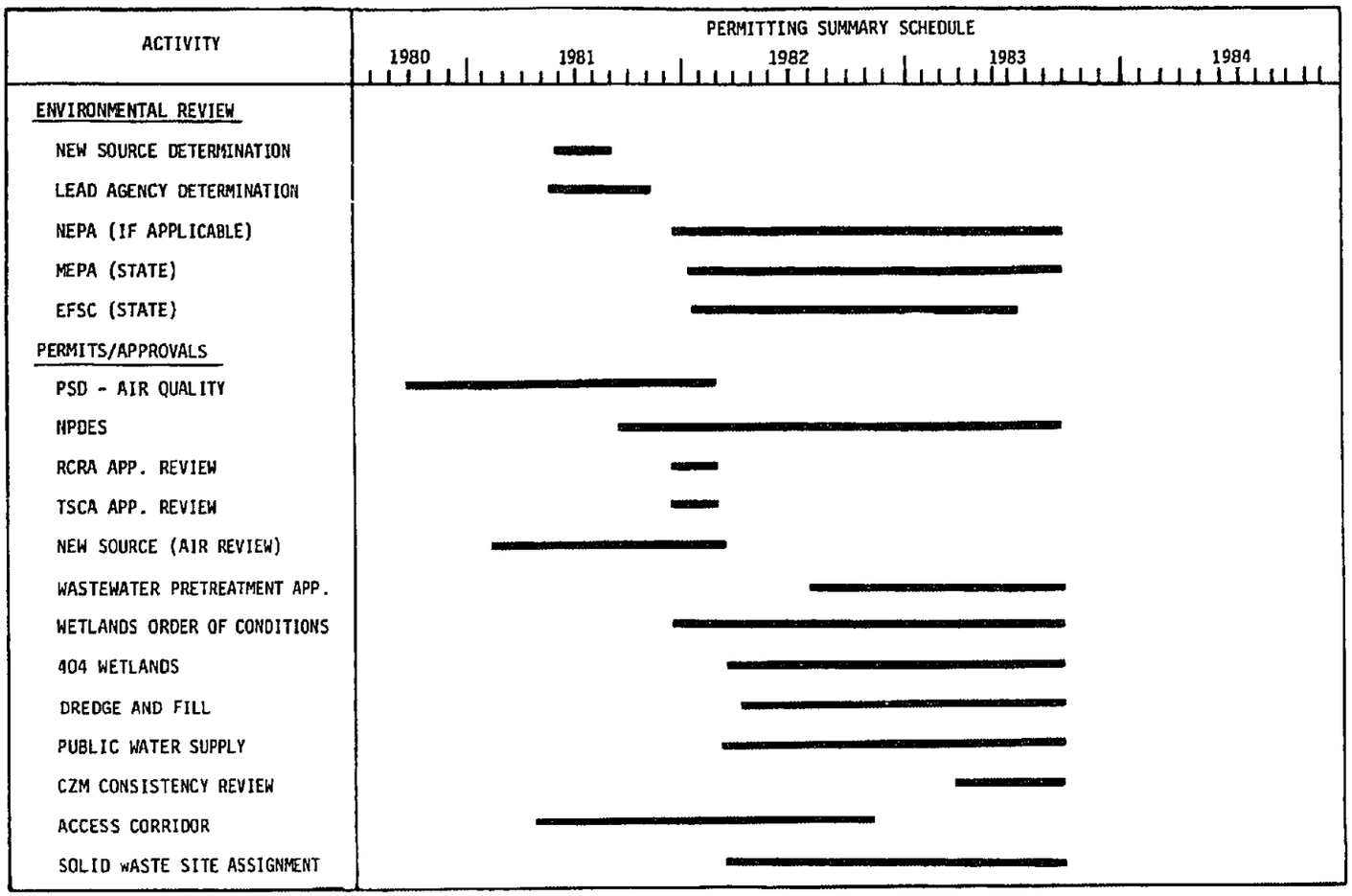


Figure 9-7
PERMITTING SUMMARY SCHEDULE

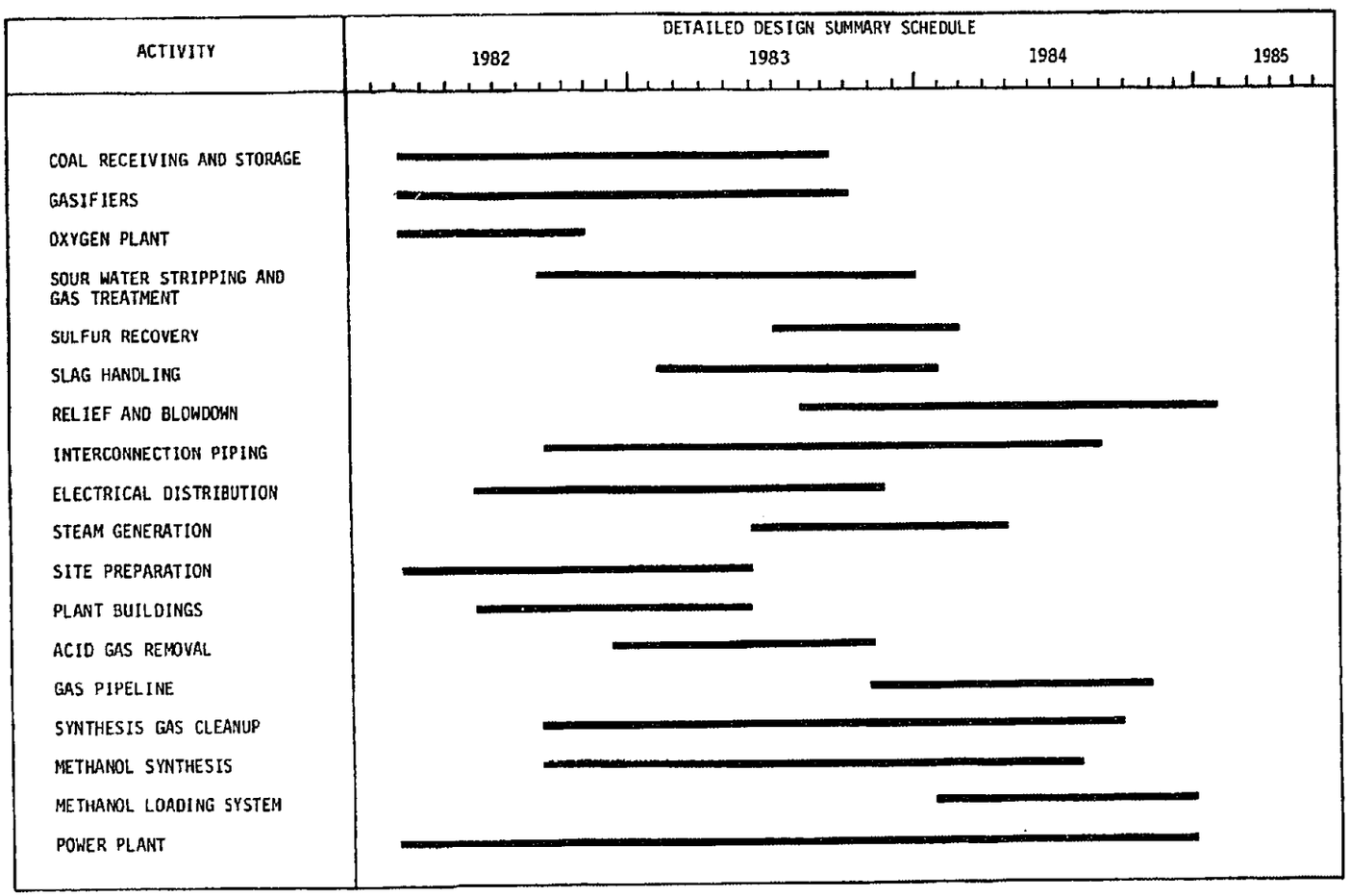


Figure 9-8
DESIGN SUMMARY SCHEDULE

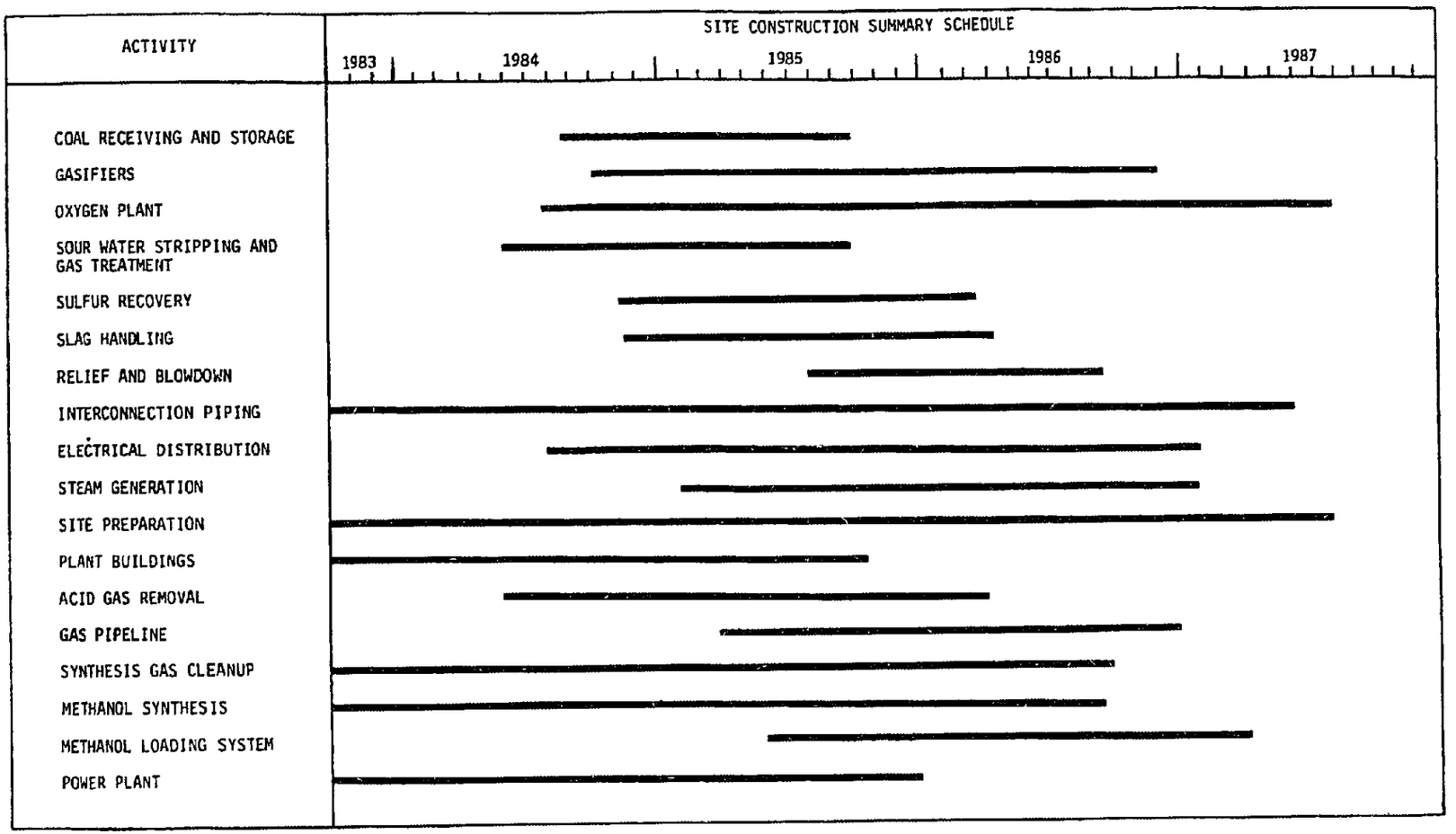


Figure 9-9
CONSTRUCTION SUMMARY SCHEDULE

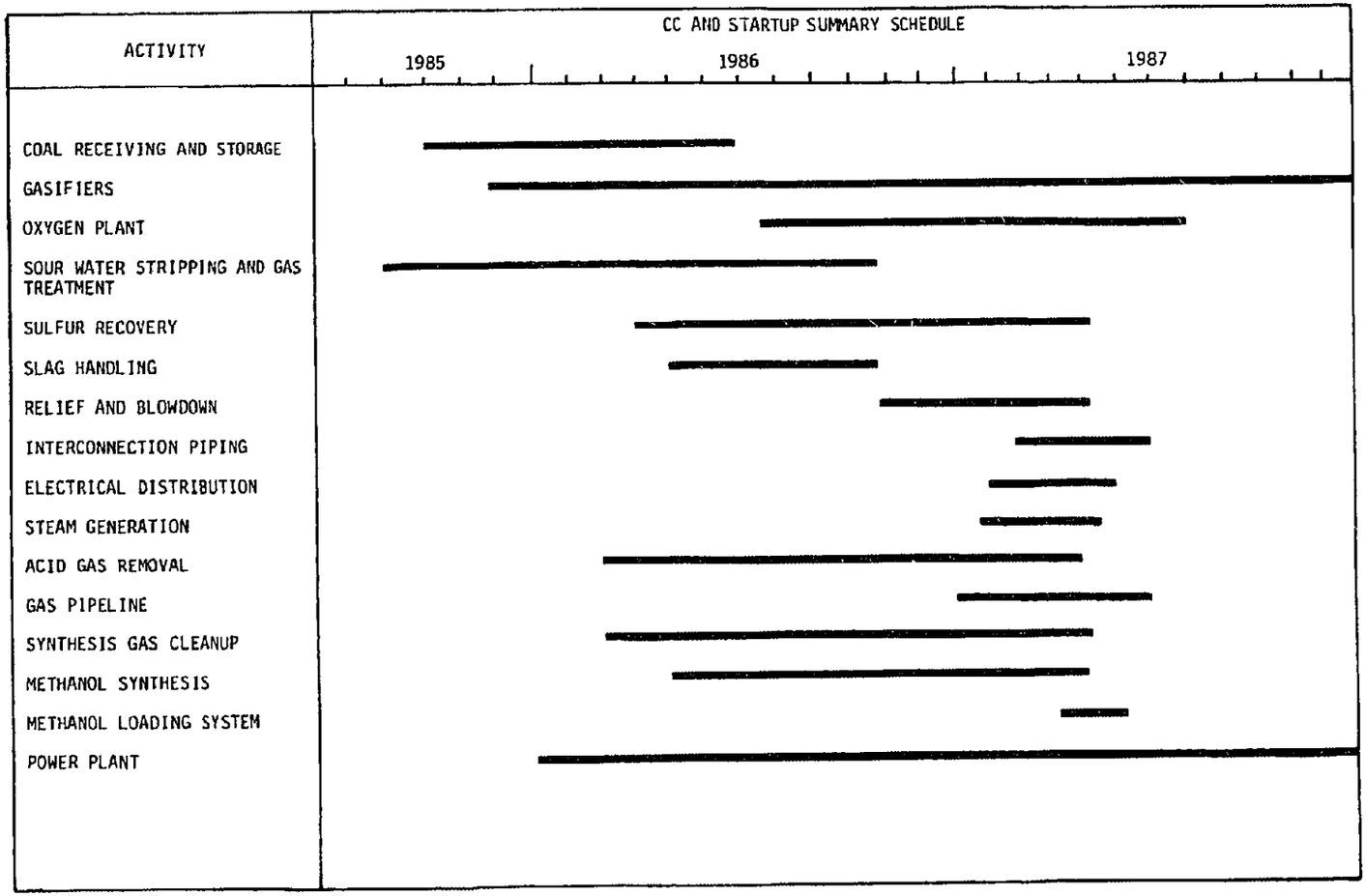


Figure 9-10
START-UP SUMMARY SCHEDULE

Detailed schedules at the activity level for the program elements listed above are included in the back-up data reference material.

9.3.2 Critical Analysis

In developing the NEEP schedule, many facets of the project have been considered and factored into the work plan to develop a meaningful critical path network.

Beyond the normal engineering procurement and construction activities, significant project tasks of a nontechnical nature have been identified and incorporated into the NEEP schedule. Some of the more prominent tasks include: acquisition of plant site property, development of marketing strategy, acquisition of equity partners, licensing and environmental activities, securing of construction financing, securing project labor agreements, coal sourcing and transportation studies, negotiations with coal suppliers, and craft manpower availability and requirements during peak construction activities.

Significant effort has been directed toward the environmental and licensing tasks and the equity partner and financing arrangements tasks since they have been identified as critical path activities.

Key events in the environmental and licensing critical path are:

- Determination of plant waste stream characteristics,
- Approval of Environmental Impact Report and Statement,
- Securing of major permits.

Key events in the equity partner and financing arrangements critical path are:

- Obtaining major equity partner(s),
- Short-term financing arrangements,
- SFC selection and negotiations.

Along a parallel path, coal sourcing and transportation studies have been completed and terminal locations have been evaluated for receiving coal shipments and transporting the coal to the plant site. Selection and commitment of specific coal reserves for NEEP will enable coal tests and process development for determination of plant emissions in support of the environmental schedule.

In identifying time durations for engineering, procurement, and construction activities, actuarial data was evaluated for plant systems similar to those required for NEEP. Information from similar projects currently in design has also been used as input to the NEEP schedule. Most long lead time equipment (steam and gas turbines, compressors) have predictable lead times since they are routinely manufactured for many industries.

Not enough historical information exists regarding some gasification equipment (gasifiers, waste heat boilers) to permit accurate prediction of delivery performance. These items will be monitored closely during the development of the two lead projects (Tennessee Eastman and Cool Water).

Delivery schedules of similar projects ahead of NEEP are being carefully monitored to note any slippages in equipment delivery. Detailed schedules (including startup) allow for nominal slippages of gasifier equipment without affecting the initial operation date of the project.

Startup and testing of the gasification trains will be sequential. The coal receiving, preparation, slurry and feed systems

will be tested prior to the initial operation of the gasifiers. All testing required prior to the production of gas from the gasification system will have been completed on gas cleanup systems, as well as the combined cycle power plant.

As each of the four gasification modules is tested, design modifications required will, when feasible, be incorporated in subsequent modules prior to operation.

The schedule allows thirty months from start of component and system testing to commercial operation of the facilities. Since the overall project facilities are modularized and many can be functionally tested independent of other modules, the schedule provides for reasonable contingency for unforeseen startup problems.

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