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REGIONAL ISSUE IDENTIFICATION AND ASSESSMENT PROGRAM (RIIA).

ENVIRONMENTAL IMPACTS AND ISSUES OF THE EIA MID-MID SCENARIO: FEDERAL REGION II (NEW YORK AND NEW JERSEY)

BROOKHAVEN NATIONAL LABORATORY

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DIVISION OF REGIONAL STUDIES
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As usual, however, the responsibility for the accuracy and content of the report is solely that of the authors.

MAJOR FINDINGS

The EIA MID-MID scenario generally reinforces existing environmental concerns in the region. This results in part from the emphasis on existing rather than new energy technologies.

- The widespread public opposition to nuclear power in the region is likely to constrain realization of the nuclear goals of the scenario (38% of regional capacity by 1990 versus 25% nationwide). Public opposition has focused on the inadequacy of evacuation plans (particularly in the New York City and Long Island areas) and on the issue of radioactive waste disposal. The need for federal action to solve the latter problem cannot be overemphasized.
- The scenario assumption that a facility in upstate New York, such as West Valley, will provide a third of the nation's reprocessing capacity runs contrary to current expectations of continued closure and eventual decommissioning of West Valley.
- About a 40% improvement in sulfur oxides air quality is projected for the region, based on emissions reductions both within the region and in upwind states. These reductions are premised on the assumptions that current State Implementation Plans will be met by 1985 in all areas of the country and that, for new facilities, the proposed New Source Performance Standards will be implemented. Nitrogen oxides air quality, however, may not show comparable improvements.
- With the decrease in ambient sulfate concentrations, visibility improvements can be expected through the region.
- The scenario-postulated levels of oil and gas production from the Baltimore Canyon area may be constrained by continuing opposition on environmental grounds, particularly from the recreation industry on Long Island.
- Limited water availability in the Delaware River Basin may significantly constrain thermal capacity postulated by the scenario in New Jersey. As evidenced by the demise of the

Tocks Island and Trexler Dam proposals, the scenario requirement of an additional 176 cubic feet per second of low flow augmentation for power generation in the Basin by 1990, equivalent to 12% of the present low flow, must be viewed as extremely unlikely.

- Local air quality problems are projected to constrain energy facilities only in the Buffalo metropolitan area, currently in non-attainment for both SO_2 and particulates, and in New York City. Efforts to address non-attainment problems for nitrogen oxides and photoxidants in the New York metropolitan area may, however, affect postulated transportation energy consumption.
- With the improvement in sulfur oxides air quality, health effects attributable to sulfate exposure are also expected to decrease by some 40%, although impacts due to other pollutants were not quantified. Radiation-induced cancers due to nuclear power plant operation are projected to increase, but because their absolute levels are small, they are likely to constrain the scenario as a result of public perception of risk rather than actual risk. The estimated health impacts of a reprocessing facility, however, are an order of magnitude greater than those associated with nuclear power plant operation and may significantly constrain the scenario expectation of a reopening of such a facility in New York.

These impacts are discussed further in the sections that follow.

Nuclear: Since 47% of the electric generation facilities added between 1976 and 1990 in the scenario are nuclear, the dependence on nuclear power is 13% greater than the national average. Each of these facilities must be expected to encounter significant licensing delays as a result of opposition present even before the Three Mile Island incident. The most tangible issue, radioactive waste disposal, is perceived as a federal responsibility and has particular overtones for Region II. The West Valley, NY, reprocessing and disposal facility (which in the scenario is assumed to supply 30% of the national reprocessing capacity) is the subject of a debate focusing on its continued closure and eventual decommissioning. While this debate continues, existing storage capacity at operating facilities is being used, and, in some cases may be exhausted as early as 1981. A second generic problem, which has

surfaced since the Three Mile Island incident, concerns the adequacy of evacuation plans, particularly for areas with large seasonal population fluctuations and limited access such as Long Island and the barrier island beaches of New Jersey.

Water Quality and Availability: In some areas of the region, available water supplies are simply insufficient to meet projected demand from all sectors, and proposed augmentation projects have met severe opposition. In light of the demise of the Tocks Island and Trexler Dam proposals, the requirement for 176 cubic feet per second of low flow augmentation in the scenario for power plant development in the Delaware River Basin seems unlikely to be met, or, at the least, apt to result in a prolonged delay in the development of thermal capacity additions in the Basin. Any proposed augmentation project may be marked by institutional conflicts regarding priorities among consumptive uses and also conflicts between priorities of use and the prevalent riparian rights doctrine.* Such conflicts have always resulted in complicated, tedious, and time-consuming litigation.

Air Quality: Sulfur oxides quality in the region is expected to show considerable improvement as a result of improved emissions controls both in the region and in the major industrial areas upwind. The regionwide average concentration of sulfur dioxide is expected to fall from 20 ug/m^3 in 1975 to 10.5 ug/m^3 in 1990, and that of suspended sulfate to drop from 9.5 ug/m^3 to 4.9 ug/m^3. These improvements are particularly dependent on improved emission controls on existing coal-burning facilities in the Ohio Valley and TVA areas to the west and southwest, since 73% of the 1990 sulfate concentration in the region is due to emissions from upwind regions.

Local air quality issues are likely to constrain the scenario only in the Buffalo metropolitan area, currently in non-attainment for both SO_2 and particulates, and in the New York City area, where the 700 MW coal-fired facility proposed for the Bronx may encounter severe delay. Important international problems may arise over air quality attainment in the Buffalo area because the Nanticoke coal plant in Ontario, some 50 miles upwind, is currently being expanded to 3000 MW and is not anticipated to have scrubbers.

*The riparian doctrine is based on the concept that water cannot be taken from the riparian owners without compensation, riparian ownership being a package of rights accruing to an owner of real property adjacent to a river or stream.

It should be noted, however, that emissions of nitrogen oxides are not likely to be as well controlled as those of sulfur oxides, and thus the impact of these species and of photochemical oxidants may actually worsen for both 1985 and 1990 depending on the efficacy of the EPA control strategies. In light of much of the region being in non-attainment for these pollutants, these represent important concerns even if the postulated sulfur oxides emmissions are achieved.

Visibility: Since sulfate aerosols comprise the single most important contributor to haze in the Northeast, the decrease in ambient sulfate concentrations noted above should result in visibility improvements in the region. In particular, visibility improvements are projected for the Brigantine National Wilderness Area in New Jersey (the only Class I PSD area in the region) and for portions of the Catskill and Adirondack State Parks in New York that are prime candidates for Class I designations initiated by the state.

Institutional: One of the dominant political concerns of the region relates to the coastal environmental impacts of petroleum exploration and development in the Baltimore Canyon area, and levels of offshore production in the scenario may be constrained by environmental opposition, especially in New York. To the extent that current drilling has failed to result in commercial quantities of oil or natural gas, such issues may be moot. Nonetheless, continuation of the leasing program has resulted in concern on the part of state governments and private groups; in particular, the recreation industry and commercial fishing interests on Long Island remain adamantly opposed.

The ability of the institutional framework in New York to deal adequately with the number of major new electric generation facilities assumed in the scenario must be questioned. The creation of a one-stop energy facility licensing Board, rather than facilitating licensing procedures, has been a source of further delay: Up until Dec. 1978 not a single uncontested permit was granted by the Board despite numerous submissions.

Socioeconomic Impacts

There are three areas of New York State where labor availability, local socioeconomic issues, and low productivity could delay power plant siting schedules necessary to meet scenario goals: Chautauqua, Erie, and Niagara counties, which lack artisans in specific crafts; Oswego and Cayuga counties,

which lack both labor and infrastructure; and Green and Schoharie counties, which lack the revenue and infrastructure necessary to accommodate the predicted 14 to 20% construction force immigration.

Health and Safety: Regarding several issues, there is considerable divergence between the current public perception of their importance and the computed levels of impact of the scenario as derived in this analysis. For example, there is widespread concern over the effects of low level radiation at nuclear power plants in the region: yet our analysis indicates that the expected total number of cancers due to radiation from nuclear power plant operation in the region, including not only occupational and general public exposure, but also the annualized effect of catastrophic accidents, will increase from 0.5 per year in 1975 only to 3.0 per year by 1990. On the other hand, radiation-induced cancers among the general public due to the scenario-postulated reprocessing facility at West Valley are estimated to reach 15 per year by 1990.

The health effects of fossil fuel combustion in terms of excess mortality due to population exposure to sulfates are projected to decline parallel to overall regional decreases in ambient SO_4 concentrations. Thus anticipated deaths related to sulfate exposure will decrease from a range of up to 8% of all deaths in 1975 (19700 deaths) to up to 5% of all deaths in 1990 (13000 deaths). Since these effects are postulated to be chronic, the improvements may not actually be realized until some future year.

It should also be recognized that the calculations for excess mortality involve large uncertainties, including whether or not the sulfur oxides are actually the damaging agent, whether the damage is linear or whether a "no-effect" threshold exists, whether present-day or historical concentration levels are the most important, and whether smoking habits or occupational exposures play an important role.

I. INTRODUCTION

1.1 RIIA Study Description

This study, the Regional Issues Identification and Assessment (RIIA), is an evaluation of the regional environmental impacts of future energy development. The study was produced for the Office of the Assistant Secretary for Environment, Department of Energy. The impacts described for 1985 and 1990 are based on a national energy projection (scenario) which assumes medium energy demand and fuel supply through 1990 but does not incorporate the policies of the National Energy Act (NEA). This scenario, referred to as the Projection Series C or the TRENDLONG MID-MID scenario, is one of six possible energy futures developed by the Energy Information Administration (EIA) of the Department of Energy for the Department's 1977 Annual Report to Congress. It was chosen as representative of the official DOE national energy projections when this project was initiated, prior to the passage of the National Energy Act. Since the RIIA program is part of an ongoing review of the regional impact of energy policies, the next phase will examine the National Energy Act (NEA) and initiatives suggested by the President's second National Energy Plan. However, since coal utilization increases under the NEA, in general, impacts identified in the TRENDLONG Series C Scenario should provide a framework for the discussion of impacts by NEA.

The environmental impacts discussed in this volume are for Federal Region II, comprising New York and New Jersey. Those for each of the other Federal Regions in the Nation (Figure 1) is covered in a separate volume. This set of studies represents a comprehensive consistent portrayal of the regional environmental impacts and implications of future national energy development.[1]

1.2 RIIA Methodology and Assumptions

1.2.1 Overall Program Methodology: In developing the national energy scenarios, the Energy Information Administration balances projections of supply and demand at the federal region level. The RIIA studies used the predicted fuel mixes by federal regions derived from the TRENDLONG Series C Scenario as a starting point for its analyses. County level patterns for utility, industry and mining activities for 1985 and 1990 were then developed from these federal region totals. Thus, the utility siting patterns may show deviations from current utility plans. Energy sources addressed were coal, nuclear, oil shale, gas, geothermal, hydroelectric and solar.

[1]The three volumes on the Northeast are augmented by a series of RIIA issue papers containing detailed technical material and supporting analysis; these are refered to below, where relevant.

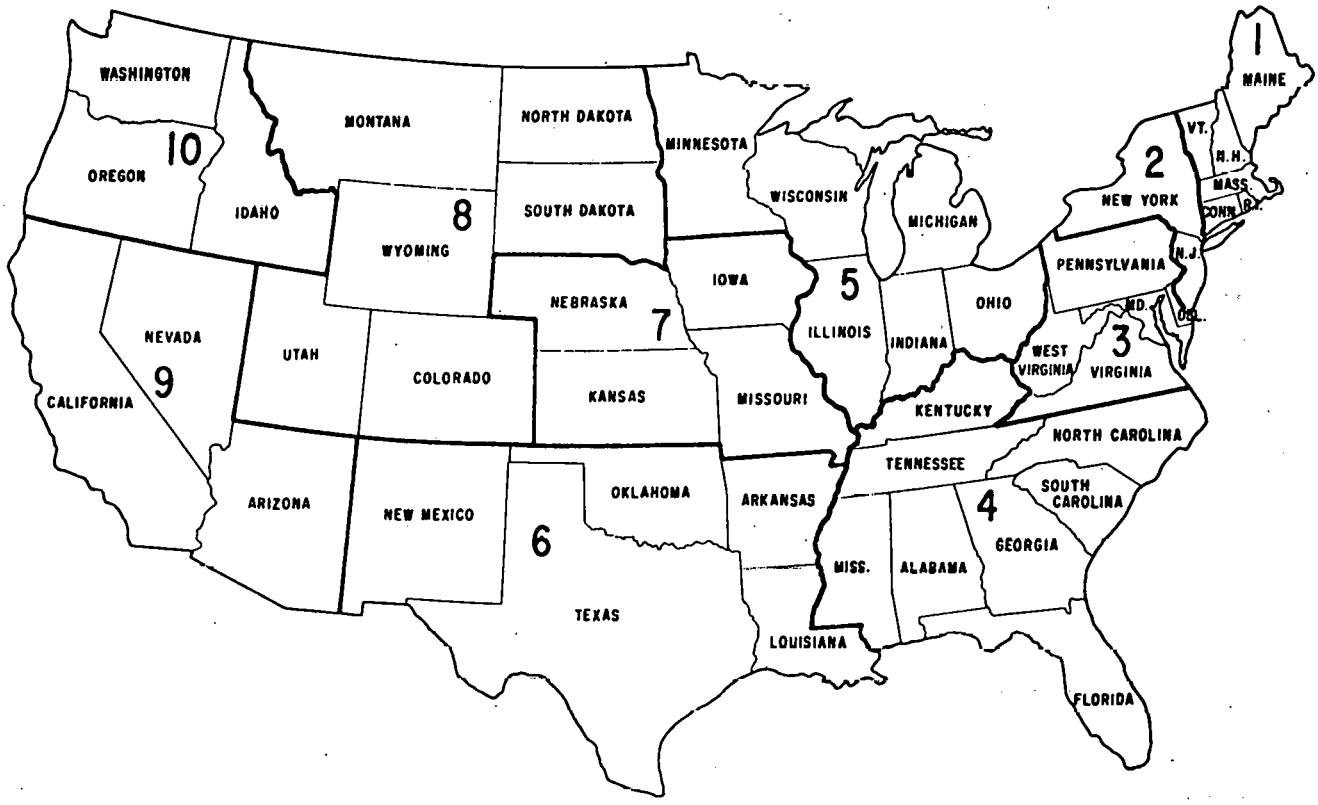

Figure 1. Federal Regions

Six national laboratories, Argonne (ANL), Brookhaven (BNL), Lawrence Berkeley (LBL), Los Alamos (LASL), Oak Ridge (ORNL), and Pacific Northwest (PNL), assumed various lead assignments in analyzing the impact of these county level patterns on the air, water, and land resources of the country and on the socioeconomic, health, and safety aspects of its welfare. When these tasks were complete, each laboratory focused on an assessment of the products of all the lead laboratory analyses from the particular perspective of the states and regions for which they were responsible.

1.2.2 Assumptions: Many of the issues identified in this report are premised on clearly identifiable assumptions, variations of which would significantly change the impact and location of the specific issues associated with the MID-MID scenario. Clearly the most important assumption for the region is the electric sector generation mix (as determined by the MEFS* model), and the subsequent allocation of this capacity at the county level. In the industrial sector, an important assumption is that the spatial pattern of fuel use within each BEA area** remains unchanged in the future, although inter-regional shifts of economic activity are considered in the scenario specification.

In terms of the identification of environmental issues the critical assumptions are those relating to environmental regulation, in particular to implementation of the provisions of the Clean Air Act and its amendments and of the Water Pollution Control Act. For example, it is assumed that by 1985 all air emissions from existing facilities will meet current SIP requirements,*** and all thermal electric generating plants located in freshwater basins will be required to have evaporative cooling towers. Fossil plant additions beyond 1982 are also assumed to be subject to the current EPA New Source Performance Standards (NSPS) proposals (e.g., requiring flue gas desulfurization (FGD) systems on coal plants). Table 1 summarizes the specific assumptions for the control technologies considered in the analysis.

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*Midterm Energy Forecasting System (MEFS) is the model currently in use by EIA for projections through 1990. This model was previously known as PIES (Project Independence Energy System).

**Bureau of Economic Analysis Areas, see Figures 2,3 and 4.

***As of summer 1978; the assumptions do not reflect changes contemplated in the more recent 1979 SPI revisions submitted to EPA under the provisions of the 1977 Clean Air Act amendments.

TABLE 1

CONTROL TECHNOLOGY ASSUMPTIONS

	UTILITY	INDUSTRY	MINING
AIR	*EMISSIONS AND LOCAL AIR QUALITY:* COAL • EXISTING PLANTS – UNCONTROLLED EMISSIONS BASED ON FPC COAL CHARACTERISTICS FOR ASH, HEAT AND SULFUR (1976) • PLANTS WITH STARTUP DATES PRIOR TO 1983 – SIPS OR NSPS REQUIREMENTS • PLANTS WITH STARTUP DATES AFTER 1983 – BACT 85% AND 90% CONTROL OR REMOVAL OF SO_2 CONSIDERED OIL • SIPS REQUIREMENTS GAS AND METALLURGICAL COAL • UNCONTROLLED	EMISSIONS AND LOCAL AIR QUALITY: COAL • NEW LARGE SOURCES (250×10^6 BTU/HR) — SO_2: BACT, 80% REMOVAL — PARTICULATES: BACT, 99% REMOVAL • NEW SMALL SOURCES ($180–250 \times 10^6$ BTU/HR) — SO_2: 1.5 LB/10^6 BTU — PARTICULATES: 0.05 LB/10^6 BTU • NEW NON-MFBI PLANTS (*100×10^6 BTU/HR*) — SO_2: SIPs WITH PHYSICAL CLEANING — PARTICULATES: SIPs, CYCLONES • EXISTING LARGE SOURCES (250×10^6 BTU) — SO_2: SIPs FOR MFBIs — PARTICULATES: SIPs FOR MFBIs • EXISTING SMALL SOURCES ($100–250 \times 10^6$ BTU/HR) — SO_2: SIPs FOR MFBIs — PARTICULATES: SIPs FOR MFBIs • EXISTING NON-MFBI PLANTS (100×10^6 BTU/HR) — SO_2: SIPs USING LOCALLY AVAILABLE COAL — PARTICULATES: SIPs USING SETTLING CHAMBER/EXPANDED CHIMNEY & CYCLONES OIL AND GAS • SIPs LIMITATIONS ON SULFUR CONTENT OF FUEL, AS A WEIGHT FRACTION. • EMISSIONS FACTORS IN USEPA "COMPILATION OF AIR POLLUTANT FACTORS".	NO ASSUMPTIONS MADE. AIR POLLUTANTS FROM MINING ACTIVITIES NOT CONSIDERED.
WATER QUALITY	BPCT, EFFECTIVE JULY 1977 BACTEA, EFFECTIVE JULY 1984 NSPS, EFFECTIVE JULY 1977 UTILITY GENERATING LOAD FACTOR – 55%	BPCT, EFFECTIVE JULY 1977 BACTEA, EFFECTIVE JULY 1984 NSPS, EFFECTIVE JULY 1977	MINE DRAINAGE: "COAL SUPPLY REGION" (CSR) DRAINAGE DATABASE – COMPLIANCE WITH EFFLUENT LIMITATIONS ASSUMED. COAL WASHING: ASSUME 50% OF COAL IS CLEANED, 95% OF THAT BY WET METHODS. ALL FACILITIES HAVE ZERO DISCHARGE IN CSRs 7 – 10, 60% OF FACILITIES HAVE ZERO DISCHARGE IN CSRs 1 – 6, CSR 11 AND CSR 12. 40% OF FACILITIES IN THOSE CSRs PRODUCE 2,150 LITERS/METRIC TON OF COAL WASHED. COAL REFUSE PILE: 40% OF ANNUAL PRECIPITATION IN EACH CSR RESULTS IN EFFLUENT RUNOFF; 7.08×10^6 HECTARES/METRIC TON OF COAL CLEANED ARE EXPOSED TO RAIN FOR ONE YEAR. RECLAMATION: SEDIMENTATION CAN ACHIEVE 80% CONTROL EFFICIENCY. OTHER RUNOFF RATES ARE FROM EPA NATIONAL ASSESSMENT OF NON-POINT SOURCE POLLUTION.
WATER AVAILABILITY	COOLING OPTION: NUCLEAR (1000 MW) WITHDRAWAL (MGD) / CONSUMPTION (MGD); FOSSIL (1000 MW) WITHDRAWAL (MGD) / CONSUMPTION (MGD) ONCE THROUGH: 1400 / 4 — 830 / 3 POND OR CANAL: 42 / 26 — 25 / 15 WET COOLING TOWER: 28 / 17 — 17 / 10 DRY COOLING TOWER: 0.3 / 0 — 0.2 / 0	DATA BASE. • WATER CONSUMPTION DATA DEVELOPED FOR THE WATER RESOURCES COUNCIL.	WATER REQUIREMENTS FOR COAL EXTRACTION AND WASHING, DUST CONTROL AND REVEGETATION ARE ASSUMED TO BE NEGLIGIBLE.
SOLID WASTE	• COAL CHARACTERISTICS IN 1985 AND 1990 ARE THE SAME AS IN 1976. DATA FROM FPC TAPES. • USE OF ELECTROSTATIC PRECIPITATORS AND FLUE GAS DESULFURIZATION WITH LIME/LIMESTONE SLURRIES ASSUMED FOR 1985 AND 1990.	• NSPS AND SIPs REQUIREMENTS USED TO DETERMINE ASH AND FGD SLUDGE PRODUCTION AND LAND REQUIREMENTS.	• CONVERSION FACTORS FOR COAL *MINING RANGED FROM 0.0818 ACRES/1000 TONS* (COAL MINED) IN DEEP MINING IN EASTERN KENTUCKY TO 0.235 ACRES/1000 TONS IN STRIP MINING IN ARKANSAS • PAST BUREAU OF MINES DATA AND MINRES PROGRAM WERE USED TO DETERMINE MINING RESIDUALS

ABBREVIATIONS:

BACTEA	BEST AVAILABLE CONTROL TECHNOLOGY ECONOMICALLY ACHIEVABLE
BEA	BUREAU OF ECONOMIC ACTIVITY AREA
BPCT	BEST PRACTICABLE CONTROL TECHNOLOGY
BTU	BRITISH THERMAL UNIT
FGD	FLUE GAS DESULFURIZATION
FPC	FEDERAL POWER COMMISSION
MFBI	MAJOR FUEL BURNING INSTALLATIONS
MGD	MILLION GALLONS PER DAY
MW	MEGAWATTS
NSPS	NEW SOURCE PERFORMANCE STANDARDS
SIPs	STATE IMPLEMENTATION PLANS

1.2.3 Criteria for Ranking Impacts: This discussion of the region and of each state within the region includes a summary matrix displaying the severity of specific environmental, health, social, and economic impacts of energy use and energy technologies imposed by the scenario. The severity is rated as high, medium or low according to the criteria described in Table 2.

TABLE 2

DEFINITION OF CRITERIA FOR RATING OF IMPACTS

IMPACT CATEGORY	HIGH IMPACT	MEDIUM IMPACT	LOW IMPACT
AIR QUALITY	MAJOR FACILITIES IN PROPOSED SITING SCENARIO COULD BE CONSTRAINED BY ONE OR ALL OF THE FOLLOWING ISSUES. A) PERSISTENT AND CONTINUED VIOLATIONS OF PRIMARY NATIONAL AMBIENT AIR QUALITY STANDARDS. B) INABILITY TO ATTAIN ACCEPTABLE PSD INCREMENT LIMITATIONS. C) LIMITED PROBABILITY THAT IMPROVED EMISSION CONTROL EFFICIENCIES OR OFFSETS WOULD RESULT IN NAAQS ATTAINMENT.	SOME MAJOR FACILITIES IN PROPOSED SITING SCENARIO COULD BE CONSTRAINED BY HIGH IMPACT ISSUES. VIOLATIONS OCCUR BUT ARE AMENABLE TO EXTENSIVE CONTROL TECHNOLOGY, FUEL (COAL AND OIL) PURCHASING POLICY, AND/OR OFFSET.	AIR QUALITY AND EMISSION LEVEL ARE WITHIN ACCEPTABLE STANDARDS. NO MAJOR ADJUSTMENTS TO SITING OF PLANTS BECAUSE OF AIR QUALITY ISSUES.
VISIBILITY	THERE IS A SIGNIFICANT DECREASE IN CALCULATED VISUAL RANGE IN CLASS I AREAS.	THERE IS A MODERATE DECREASE IN VISUAL RANGE BUT THE REDUCTION IS AMENABLE TO MITIGATION MEASURES.	NO DECREASE IN VISUAL RANGE OR NEW SITING IMPACTS AMENABLE TO MITIGATION MEASURES. NO MAJOR ADJUSTMENT IN SITING.
WATER QUALITY	SIGNIFICANT ECONOMIC BURDEN TO MEET WPCA REQUIREMENTS.	TREATED EFFLUENTS MEET EFFLUENT STANDARDS BUT OCCASIONAL LOCALIZED STREAM STANDARD VIOLATIONS WILL OCCUR IN RECEIVING WATER BODY.	RECEIVING BODY CAPABLE OF HANDLING ALL PROJECTED EFFLUENT ADDITIONS. FEW OR NO VIOLATIONS OF STREAM STANDARDS ANTICIPATED.
WATER AVAILABILITY	NO WATER AVAILABLE WITHOUT MAJOR SHIFTS IN CURRENT WATER USES, E. G., EITHER ENERGY DEVELOPMENT OF AGRICULTURE, EVEN WITH LOW-FLOW AUGMENTATION, OR WATER AVAILABLE THROUGH MAJOR STRUCTURAL AND NON-STRUCTURAL ALTERNATIVES, E. G., STRUCTURAL-CONSTRUCTION OF DAMS AND RESERVOIRS. GROUND WATER MINING WITH NO RECHARGE POTENTIAL.	WATER AVAILABLE AT MODERATE ECONOMIC COST TO THE REGION. GROUND WATER MINING WITH RECHARGE POTENTIAL AVAILABLE OR POSSIBLE.	NO CONFLICTS EXCEPT FOR RECREATIONAL USES. GROUND WATER WITHDRAWAL WHERE ANNUAL RECHARGING OCCURS.
SOLID WASTE	SEVERE POTENTIAL CONTAMINATION PROBLEMS LIKELY TO REQUIRE COMPLETE CONTAINMENT OF WASTES.	*MINIMAL ENVIRONMENTAL IMPACTS WITH PROPER CONTROL TECHNOLOGY.* INDICATION THAT MANY AREAS MAY EXPERIENCE PROBLEMS AND IN SOME OF THESE AREAS SUITABLE OPTIONS MAY NOT BE AVAILABLE.	*MINIMAL ENVIRONMENTAL IMPACTS WITH PROPER CONTROL TECHNOLOGIES.* SOME POTENTIAL PROBLEMS BUT GENERALLY AMENABLE TO CURRENT TECHNOLOGY OPTIONS AT ADDITIONAL COST.
ECOLOGY	CRITICAL NATURAL HABITATS WILL BE DISTURBED.	CRITICAL NATURAL HABITAT OR LARGE ACREAGES OF CROPLAND MAY BE DISTURBED.	LOCALIZED IMPACTS WHICH MAY BE READILY MITIGATED BY STRUCTURAL OR SITING ALTERNATIVES.
LAND USE	CONFLICT WITH HIGH VALUE LAND USE, SUCH AS LOSS OF HABITAT, PARKLAND, SEISMIC RISKS, SCENIC RESOURCES, INDIAN LANDS, AGRICULTURAL LAND.	SIMILAR CONFLICTS, WITH ALTERNATIVE SITES OR MITIGATION MEASURES COSTLY BUT AVAILABLE.	FEW CONFLICTS; OR A RANGE OF ALTERNATIVES AVAILABLE.
PUBLIC HEALTH	SIGNIFICANT INCREASES IN MORBIDITY AND MORTALITY RATE DUE TO EXPOSURE TO ENERGY RELATED POLLUTANTS.	MODERATE INCREASES IN MORBIDITY AND MORTALITY RATE DUE TO *EXPOSURE TO ENERGY* RELATED POLLUTANTS.	NO SIGNIFICANT IMPACT. ALL IMPACTS SUBJECT TO *MITIGATION.*
OCCUPATIONAL HEALTH AND SAFETY	SIGNIFICANT INCREASES IN OCCUPATIONALLY RELATED DEATHS, INJURIES, AND DISEASE DUE TO INCREASED ENERGY DEVELOPMENT.	POTENTIAL SIGNIFICANT INCREASES IN RESPIRATORY AND OTHER DISEASES BUT IMPROVEMENTS IN OSHA, NRC AND EPA REGULATIONS AND WORKPLACE CONDITIONS EXPECTED TO ALLEVIATE *MUCH OF THE PROBLEM.*	NO SIGNIFICANT INCREASES IN OCCUPATIONALLY RELATED DEATHS, INJURIES, AND DISEASE DUE TO INCREASED ENERGY DEVELOPMENT.
LOCAL SOCIOLOGICAL FACTORS	IMPLEMENTATION DELAYED OR POSSIBLY BLOCKED DUE TO POTENTIALLY SEVERE CHANGES IN A COMMUNITY'S QUALITY OF LIFE, HEAVY DEMANDS PLACED ON PHYSICAL INFRASTRUCTURE INCLUDING SERVICES, FACILITIES, HOUSING; CONFLICT IN *VALUES AND LIFESTYLE BETWEEN IMMIGRANTS* AND LONG-TIME RESIDENTS; IMMIGRANTS REPRESENT A STATISTICALLY SIGNIFICANT PORTION OF THE BASELINE POPULATION; EXTENDED NEGOTIATIONS LIKELY BETWEEN DEVELOPER AND AFFECTED COMMUNITIES; AFFECTED COMMUNITIES WILL HAVE GREAT DIFFICULTY ABSORBING HIGH SOCIAL AND *ECONOMIC COSTS OF PROJECT WITHOUT OUTSIDE* ASSISTANCE.	POTENTIAL DELAYS DUE TO COMMUNITY AND LOCAL GOVERNMENT RESISTANCE TO FACILITY; POTENTIAL INCREASED BOOTS TO LOCAL GOVERNMENT; SOME COMMUNITY FEARS FOR CHANGES IN THE QUALITY OF LIFE ACCOMPANYING INFLUX OF POPULATION; *MITIGATION STRATEGIES AVAILABLE, BUT USUALLY* COSTLY; MODERATE CAPACITY OF AFFECTED COMMUNITIES TO ABSORB THESE IMPACTS.	MINOR CHANGES IN LOCAL GOVERNMENT'S INFRASTRUCTURE; FEW IMMIGRANTS OR FEW CULTURAL AND LIFESTYLE CLASHES EXPECTED; MITIGATION COSTS EASILY ABSORBED BY AFFECTED COMMUNITIES.
LOCAL ECONOMICS	IMPLEMENTATION BLOCKED DUE TO UNACCEPTABLE ECONOMIC DEMANDS ON LOCAL INFRASTRUCTURE.	POTENTIAL DELAYS DUE TO LACK OF SKILLED PERSONNEL, FINANCIAL IMPACTS ON LOCAL GOVERNMENT.	INFRASTRUCTURE IMPACTS MINOR. ADAPTABILITY OF COMMUNITY GOVERNMENT HIGH.
REGIONAL ECONOMICS	*CAUSES ADVERSE CAPITAL OR EMPLOYMENT IMPACTS* ON REGION. DECREASES COMPETITIVE POSITION COMPARED TO OTHER REGIONS.	*POTENTIAL EMPLOYMENT,* CAPITAL OR COMPETITIVE IMPACTS, BUT MITIGATION STRATEGY POSSIBLE.	NO SIGNIFICANT IMPACTS.
INSTITUTIONAL AND LEGISLATIVE	PROHIBITION OF IMPLEMENTATION BASED ON AVAILABLE STRONG LEGAL CONSTRAINTS. ANTICIPATED LEGISLATIVE PROHIBITION. ABSENCE OF *EFFECTIVE ORGANIZATIONAL RESPONSIBILITIES,* STATUTES, ETC.	DELAY POSSIBLE DUE TO LEGAL OR POLITICAL CONSTRAINTS. LOW TO MODERATE PUBLIC OR PRIVATE INTEREST IN ENFORCEMENT.	NO SIGNIFICANT OPPOSITION, LEGAL CONSTRAINTS, OR ORGANIZATIONAL PROBLEMS.

II. REGIONAL OVERVIEW

New York and New Jersey, which comprise Federal Region II, are marked by large environmental and physiographic contrast. Their three main ecoregions are the Adirondack Highlands of the Laurentian Mixed Forest Province (all of New York north and west of New York City); the Eastern Deciduous Forest Province (Long Island, New York City, and Central New Jersey), and the southeastern mixed forest of the Outer Coastal Plain Forest (Southeastern New Jersey). Relief ranges from sea level to 3000 ft with occasional peaks higher than 5000 feet. Topography is rolling and, as the southern extent of glaciation bisects the region, glacial features are frequent from Long Island north. New York and New Jersey have more than 5800 miles of tidal shoreline and 413 miles of general coastline. Barrier beaches and tidal wetlands are important environmental and economic assets.

Monthly maximums for the coldest and warmest months (January and August respectively) range from 26° to 43°F and from 69° to 81°F in different parts of the region. Total average annual degree days range from 4847 to 8237 for heating and from 170 to 960 for cooling. Average annual precipitation ranges from 32 to 45 in. with precipitation occurring in all months. Mean annual total snowfall ranges from 12 to 126 in. and the average annual number of days with snow cover ranges from 20 to 140. Small summer water deficits occur in some areas.

In 1975 12% of the U.S. population lived in New York and New Jersey; the respective state population densities were 6 and 16 times the national average. The density varied from 67,808 people per square mile in the Borough of Manhattan to less than 20 in some rural areas. In 1975 average per capital income in the region was about $6600 or 113% of the national average, and value added in manufacturing was $17.8 billion in New Jersey and $35 billion in New York, concentrated in the greater New York, Buffalo, and Rochester areas (Figure 2). The unemployment rate in 1976 was about 10.3% or 140% of the national rate. Since 1970 the region has had a net outmigration of approximately 209,000 workers, 95% of them from New York.

New Jersey and New York have strong socioeconomic ties, evidenced by many interstate organizations, particularly in the metropolitan areas, where coordinated planning is required to avoid duplication of services, particu-

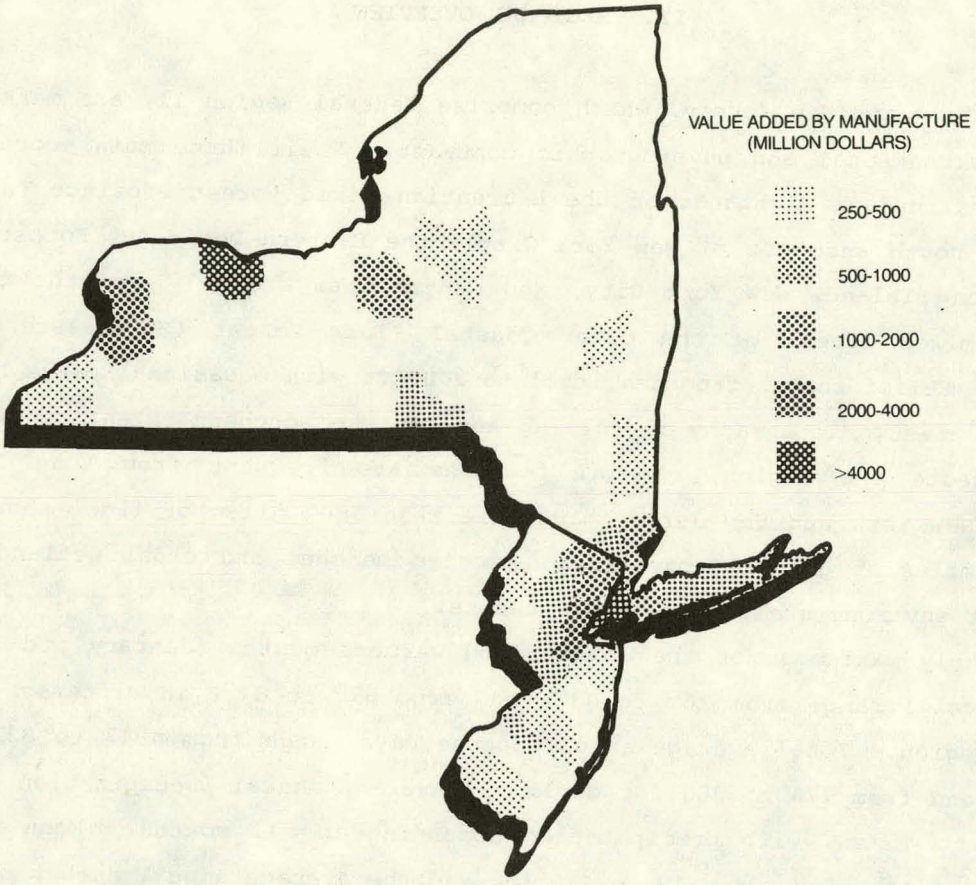

Figure 2. Geographical Distribution of Industry (as measured by value added).

larly transportation. The governments of the two states and of New York City (which, because of its large political base, is extremely influential in the region) have worked closely together and will continue to do so.

The problems and opportunities that each government must deal with are, however, quite different. The most pressing problems for New York City are to provide services and to maintain the integrity of its financial base; environmental protection and energy planning have second or third priority. In addition, the energy and environmental problems of the city are quite different from those of the states. For example, the individual and mass transit problems facing New York City not only differ from those of rural and other urban areas but are also dealt with by distinct agencies such as the New York -New Jersey Port Authority. Similarly, the air quality problems (and solutions) of the city are quite different from those of upstate New York or Southern New Jersey.

Many of the energy controversies in the region can be explained by the proximity of large population centers to the Atlantic coastline and the consequent intense pressure on natural resources. Such pressure creates problems for the siting of energy facilities even if the supply of the resource at issue (e.g., water) is quite abundant compared with that elsewhere (e.g., the arid regions of the West). Problems of environmental quality and protection are of considerable concern and priority in the region, and the diversity of environments and activities results in their being varied and numerous. Because energy facilties are highly visible targets they often serve to catalyze opposition from groups with widely different environmental concerns. Almost every major energy facility proposed in the last few years has met with considerable opposition, and this trend must be expected to continue.

III. THE EIA TRENDLONG MID-MID SCENARIO

3.1 National Scenario

The MID-MID Scenario* represents a mid-range projection of energy development based on assumptions of median supply, median demand, and constant world oil prices. It projects the future on the basis of the continuation of policies existing prior to the implementation of the National Energy Act (NEA). Basic assumptions for the scenario on the national level include the following:

- Slight increase in domestic oil production due to Alaskan oil field and outer continental shelf (OCS) development.
- Continued decline of natural gas production in the lower 48 states.
- Dramatic increase in coal production, particularly in the western states, due to increasing demand coupled with rising oil and gas prices.
- Decrease in the growth rate of electricity sales from the historic 7% to 4.5% per year, representing saturation of the market for air conditioning and other major appliances that appeared during the 1960s. The projected growth is consistent with 5% growth from 1970 to 1976 and 4.2% from 1976 to 1977.
- Shift in the industrial sector from gas to oil and to a lesser extent to electricity, indicated by fuel shares in the industrial sector.
- Constant oil price of $15.32 a barrel in 1978 dollars.

Table 3 shows the national MID-MID scenario projections for energy supply and demand for 1985 and 1990, and the status in 1975. Total energy flow is projected to increase from 72.6 quadrillion Btus (quads) in 1975 to 96.9 quads in 1985 and 110.9 quads in 1990. Total electricity generation in 1975 was 2036 billion kilowatt hours; the scenario projects increases to 3045 in 1985 and 3692 in 1990.

Many of the regional energy system and environmental implications analyzed in this report follow directly from the underlying population and economic trends, the present patterns of which are assumed to extend well into

*For a full description, See Energy Information Administration, Annual Report for Congress, 1977, DOE/EIA-0036/2 (Executive Summary)

TABLE 3: ENERGY SUPPLY/DEMAND BALANCE FOR 1975, 1985, AND 1990
(10^{15} Btu/yr)

	1975	1985	1990
DOMESTIC PRODUCTION			
Crude oil	17.9	19.0	18.0
LNG & butane	2.6	2.0	1.8
Shale oil	0	.1	.3
Natural gas	19.0	17.2	16.7
Coal	14.6	23.1	27.5
Nuclear	1.8	6.2	10.3
Hydro & geothermal	3.2	71.8	79.6
TOTAL DOMESTIC PRODUCTION	59.1	71.8	79.6
IMPORTS			
Crude oil	8.7	16.5	20.9
Petroleum products	3.8	6.7	7.8
Natural gas	1.0	1.9	12.6
TOTAL IMPORTS	13.5	25.1	31.3
TOTAL SUPPLY	72.6	96.9	110.0
DOMESTIC CONSUMPTION			
Oil	32.8	43.9	48.5
Natural gas	20.0	19.1	19.3
Coal	12.8	21.2	25.4
Nuclear	1.8	6.2	10.5
Hydro & geothermal	3.2	4.2	5.0
TOTAL DOMESTIC CONSUMPTION	70.6	94.6	108.5
EXPORTS			
Coal	1.8	1.9	2.1
Refinery loss	0.2	0.4	0.3
TOTAL CONSUMPTION AND EXPORT	72.6	96.9	110.9
DOMESTIC CONSUMPTION BY SECTOR			
Residential	14.7	19.0	21.2
Commercial	11.3	13.5	15.0
Industrial	26.0	40.7	49.0
Transportation	18.6	21.4	23.3
TOTAL	70.8	94.6	108.5

the 1980s. Thus, the region's share of national population and employment are generally below the national average rates in the scenario (See Figures 3,4) although energy growth is near the national average (Figure 5).

3.2 The Regional Scenario:

The energy scenario for Region II is summarized on Table 4, with Figure 6 indicating a 1990 comparison, fuel supply sector, with the nation. We note a much higher dependence on oil in the region (some 66%) than the nation as a whole (46%), again reflecting a continuation of current conditions.

New power plant construction of units larger than 60 MW will total 31,320 MW from 1976 to 1990, with most to be built along the coastlines of Lake Ontario, Lake Erie, Delaware Bay, Long Island Sound, and the Atlantic Ocean and others on the Raritan River (NJ) and the Hudson River and its tributaries. Of the proposed units 47% are nuclear, and all units to be built between 1986 and 1990 are nuclear (9755 MW). The major electric sector facilities in the region by 1990 are shown on Figure 7*. As indicated, a number of the facilities in the scenario do not correspond with current utility expectations. The electric sector fuel mix (Figure 8) shows a much higher than average reliance on nuclear and oil.

Several other features of the scenario are important to the region. The West Valley nuclear fuel reprocessing facility in Western New York is postulated to supply 30% of U.S. reprocessing capability by 1990. Offshore production in the Region is assumed by the scenario to be landed entirely in New Jersey, at 1990 levels of some 233×10^9 cubic feet of gas per day and 0.1 million barrels/day of oil. As noted below, the former will be highly constrained by institutional problems and the latter appears remote in light of disappointing results of exploratory drilling in the Baltimore Canyon area. The successful local opposition to recent refinery, oil storage and terminal proposals, even in the already highly industrialized Jersey City area, is indicative of the problems likely to arise if commercial quantities of offshore oil and gas are found**.

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*This scenario was prepared before announcement of the permanent postponement of the Atlantic 1 offshore nuclear unit. An analysis of siting constraints in the Mid-Atlantic indicates that a Delaware Bay location would be the most likely substitute. (See P. Meier and B. Hobbs, "Water Resource Constraints to Power Plant Siting in the Mid-Atlantic," Water Resource Bulletin, forthcoming.)

**See e.g. D. Morell "Who's in Charge: Governmental Capabilities to Make Energy Facility Siting Decisions in New Jersey" Center for Environmental Studies, July 1977.

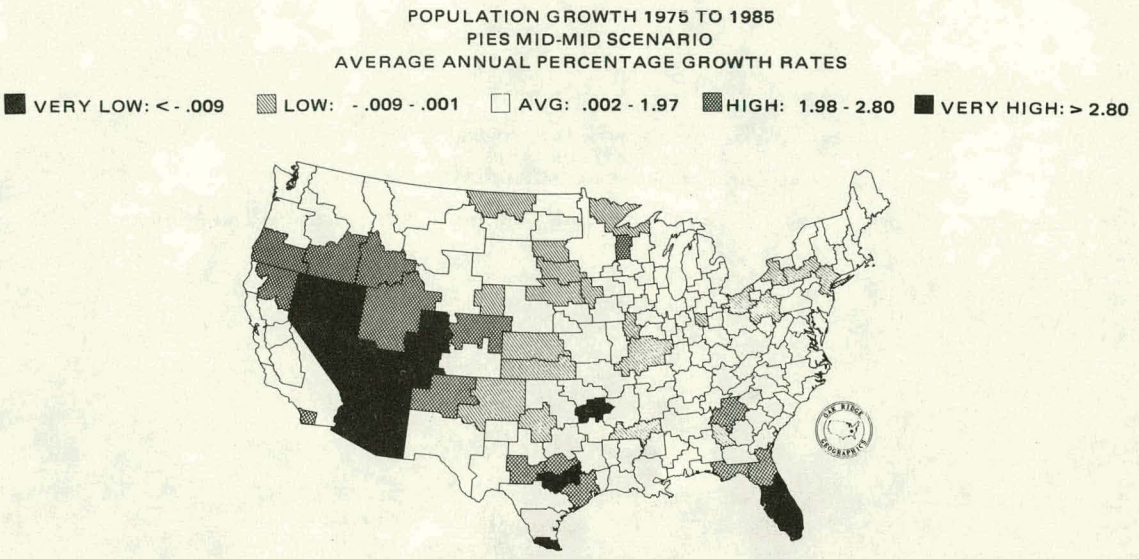

Figure 3. Population Growth in the EIA MID-MID Scenario

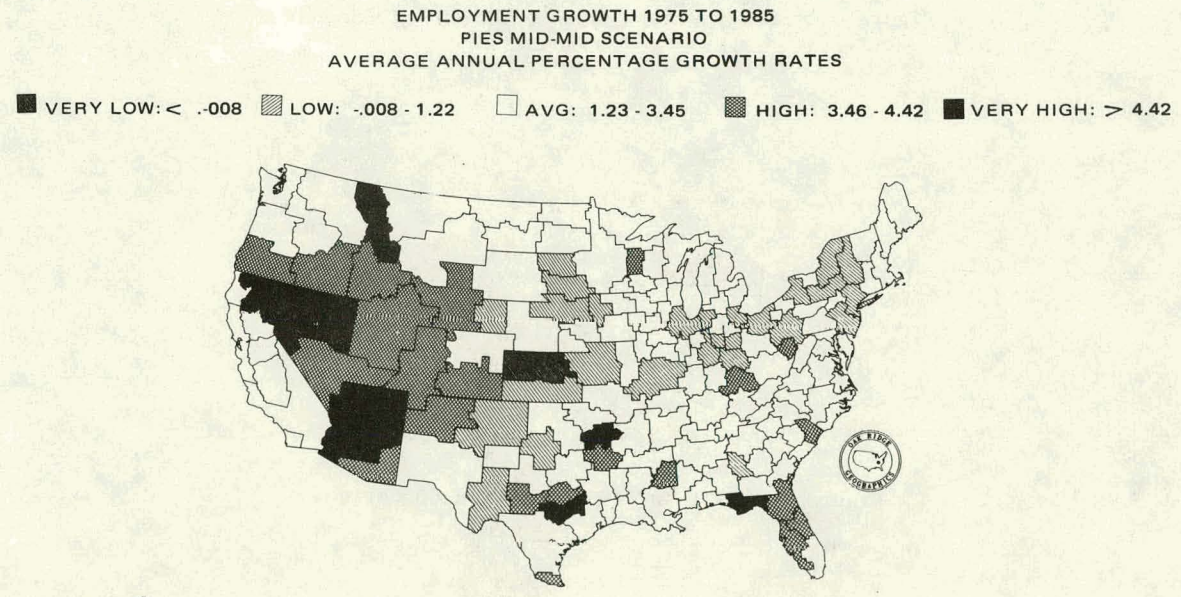

Figure 4. Employment Growth in the EIA MID-MID Scenario

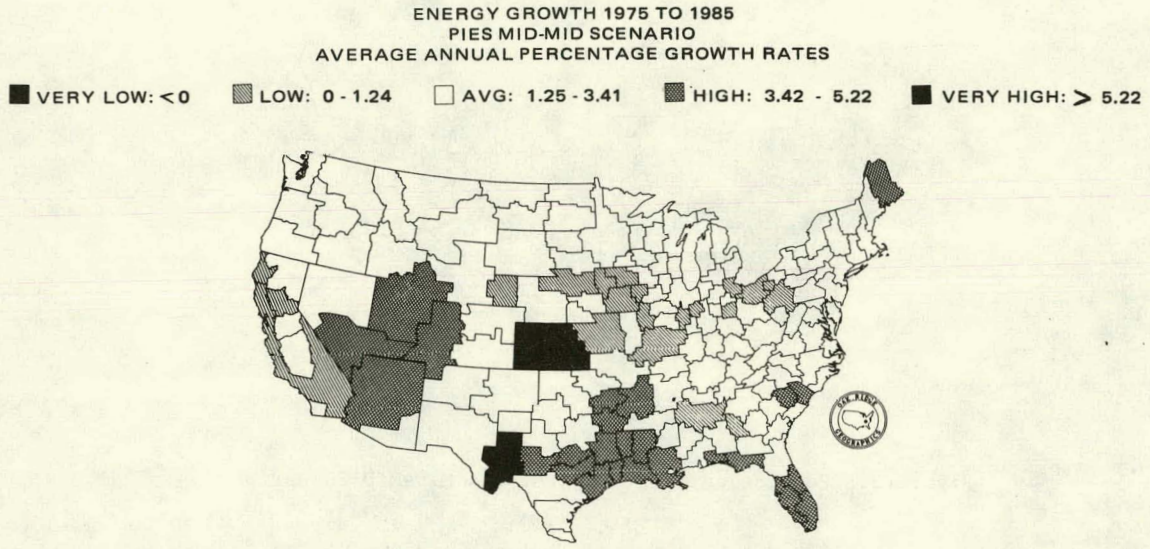

Figure 5. Energy Growth in the EIA MID-MID Scenario

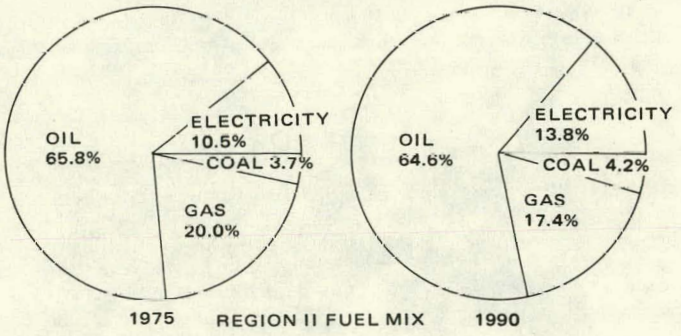

Figure 6. 1975 and 1990 Fuel Mix Comparison

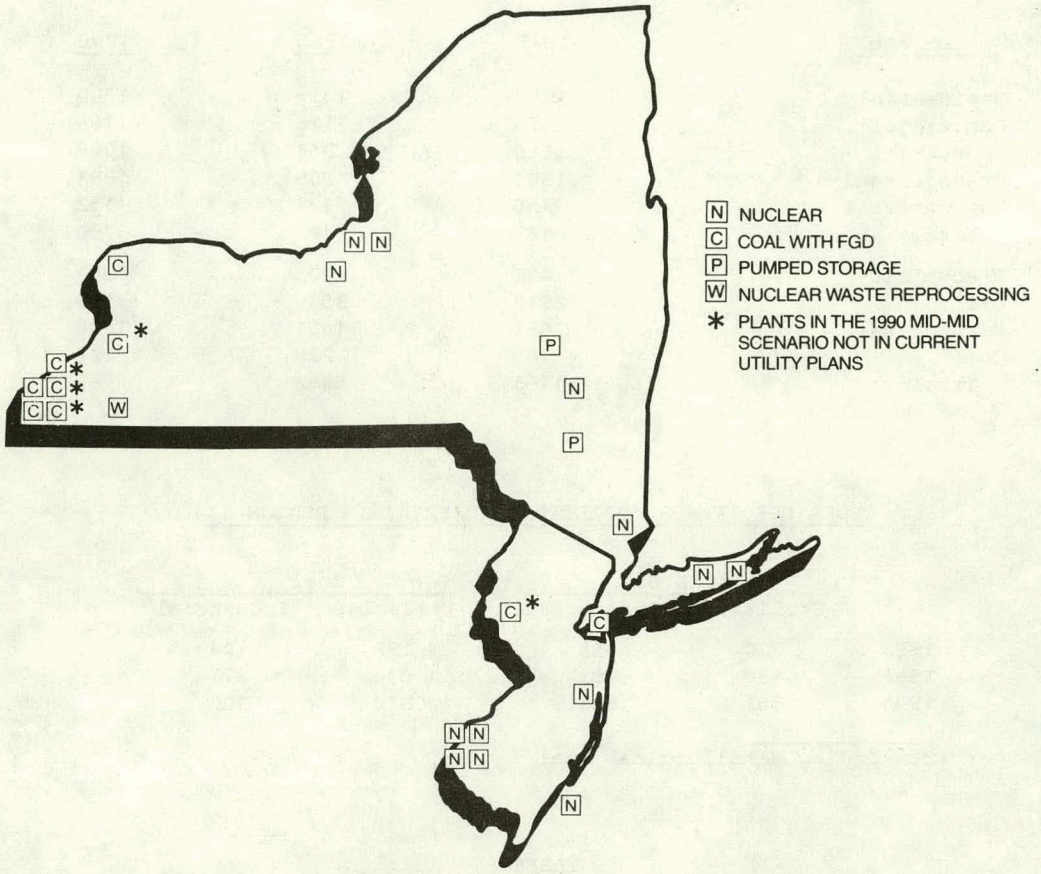

Figure 7. Electric Sector Additons 1975-1990

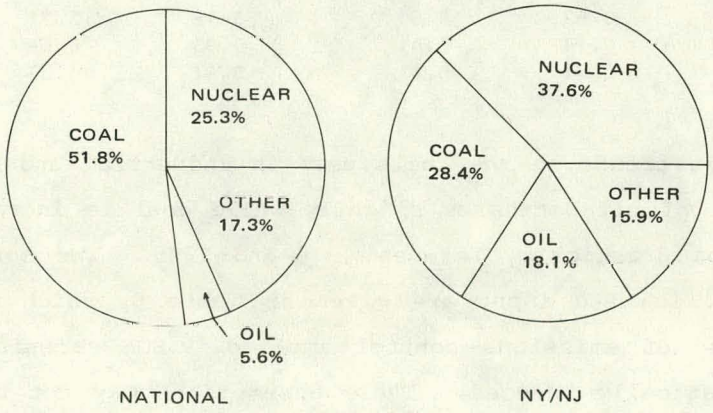

Figure 8. Electric Sector Fuel Mix

TABLE 4
REGION II ENERGY CONSUMPTION (10^9 Btu/YR)

Sector/Fuel	1975	1985	1990
Residential	1224	1476	1500
Commercial	986	1126	1155
Industrial	613	950	1089
Transportation	1584	1809	1893
Raw material	56	121	152
Total	4463	5482	5789
Electricity	472	705	801
Oil	2940	3548	3739
Natural gas	882	1001	1005
Coal	169	228	224
Total	4463	5482	5789

TABLE 5
FUEL USE TRENDS (TRILLION BTU/YEAR) IN REGION II)

	Oil & Gas		Coal	
	Utilities	Industrial	Utilities	Industrial[a]
1975	720	553	198	124
1985	630	481	830	277
1990	503	544	810	300

[a]Excluding metallurgical coal

TABLE 6
SO_2 EMISSION RATES (1lb/10^6 BTU) IN REGION II

	Oil & Gas		Coal	
	Utilities	Industrial	Utilities	Industrial[a]
1975	0.82	0.6	3.18	2.71
1985	0.14	0.41	0.93	0.55
1990	0.21	0.41	0.94	0.57

Table 5 shows trends in the fuels used in industrial and utility sectors in Region II; use of oil decreases slightly while coal is increased. Utility use of coal jumps drastically between 1975 and 1985. The corresponding SO_2 emissions per million Btu input are given in Table 6, which may be used to assess the degree of emissions control implied. SO_2 emissions, especially from oil are drastically reduced. These assumptions may not be realistic in view of the positions taken by individual states, described below.

IV. REGIONAL ASSESSMENT

4.1 National Issues

Many of the more important issues and impacts affecting New York and New Jersey as a result of the scenario are national and multi-regional in scope and require analysis on a scale much broader than the state or region. Four such issues must be addressed: long-range transport of air pollutants, radioactive waste disposal, the impact of OCS development, and pollution of U.S. and Canadian international waters (Lake Erie, St. Lawrence River).

4.1.1. Long-Range Transport: Region II is near highly industrialized areas to the west and therefore receives considerable amounts of air pollutants generated outside the region. The impact of acid rain on natural vegetation, agricultural crops, and aquatic ecosystems is currently a subject of some concern, and control of local pollution sources can provide only slight alleviation. In addition, airborne sulfates and oxidants have both been postulated to affect human health,* and the levels of both are thought to be dominated by long-range transport: 74% of the population-weighted** sulfate concentration originated outside the region in 1975, and 73% is expected to in 1990. Thus the impacts shown in Table 7 reflect a judgemental tradeoff between the effects of decreased sulfur oxides and those of increased nitrogen oxides (and very likely oxidants), and the issue of compliance of Midwestern sources may continue to be important in Region II.

Figure 9 shows the amounts of population-weighted sulfate in Region II originating from major fuel burning sources in the various regions (note the extremely minor role of Region I). The substantial improvement in air quality in Region II results more from reductions in upwind regions than from local reductions.

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*The estimates of health effects related to fossil fuel combustion presented below are based entirely on SO_4 concentrations.

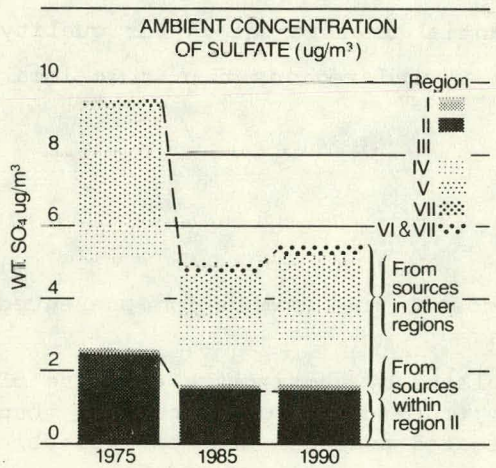
**Population-weighted concentrations are calculated by summing the products of concentration and population for individual grid-square elements and then dividing by the total population. These aggregated averages are most reliable for larger areas such as federal regions.

TABLE 7
DISAGGREGATION OF NATIONAL IMPACTS
TO REGIONAL LEVEL

	Air quality (due to long-range transport)	Regional socioeconomics	Water
Electric sector			
Coal	M[1]	L	L
Oil	M[1]	L	L
Nuclear	-	H[2]	L
Supply			
Gas	-	L	M[3]
Oil	-	L	M[3]
Urban waste	-	L	L
Solar	-	L	L
Coal mining	-	-	-
End use			
Industry	M[1]	L	L

1. NO_x and photoxidant increases may offset SO_x decreases.
2. Radioactive waste disposal problems, seen as requiring federal action.
3. OCS impacts amenable to mitigation at scenario-postulated production levels.

Although the long-range transport analysis used to make these projections does not specifically take into account the effects of terrain features (i.e., the Allegheny Mountains) and of urban or seacoast dispersion characteristics, is based on only one month's meteorological record and reflects simple linear chemistry, the gross features of the results are thought to be correct.



- Ambient sulfate concentrations in the region fall sharply between 1975 and 1985.
- 75% of the total concentration in region II is due to sources outside region II - with regions III, IV and V the major contributors.

Figure 9. Population-Weighted SO_4 Trends by Location of Source.

4.1.2 Radioactive Waste Management: One of the more severe constraints on the realization of the MID-MID scenario is the degree to which the high reliance on nuclear capacity expansion in the electric sector will be constrained by widespread opposition on grounds of inadequacy of arrangements for radioactive waste disposal. The waste problem is widely perceived as a federal responsibility, to be solved by action at the national level, and continued inaction will provide a focus for continued opposition to additional nuclear plants.

Much of the opposition to nuclear power in the region is based on more general issues of public health and safety and the adequacy of the federal regulatory apparatus. Nevertheless, the issue of radioactive waste disposal is a tangible environmental issue unencumbered by esoteric probabilistic arguments and should be placed high on the agenda of federal action if continued reliance on nuclear power is to be attained in the region.

4.1.3 Impacts of OCS Development: Offshore oil and gas production levels in the MID-MID Scenario may be significantly constrained by continued opposition in New York on environmental grounds. In any event, the results of exploratory drilling in the Baltimore Canyon area to date indicate few hydrocarbon finds (nine holes dry, six still being drilled, and only two with hydrocarbon finds, of as yet undetermined potential).

4.1.4 U.S.-Canadian Water Issues: There are several international water issues in the region, given that Lakes Erie and Ontario, and the St. Lawrence River represent the northern boundary of the region. Important controversies include the Great Lakes Winter Navigation question, the regulation of lake levels, and the pollution of Lake Erie. While these issues are largely scenario independent, their resolution has important implications for coal supply and cooling modes of power plants on Lake Erie and Ontario, and hydroelectric generation at a number of locations on the border*.

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*For further details see J. Carroll, "Environmental Aspects of Eastern Canada - Northeastern U.S. Energy Relations: An identification of Issues," RIIA Issues Paper No. 2, Division of Regional Studies, BNL, July 1979.

4.2 Regional Issues

4.2.1 Regional Air Quality: All the population centers of Region II are within reach of emissions from the heavily industrialized regions of the mid-west and Appalachia under appropriate meteorological transport conditions, but this analysis has not treated the complexities of transport across the Allegheny Mountains or of the atmospheric dispersion and chemistry of either the urban or coastal environments in Region II. The core of the Washington-Boston megalopolis and some of the worst air quality episodes occur in Region II when winds are roughly aligned with this axis (transporting material northeast). The computer trends in SO_2 emissions and ambient concentrations are shown on Figure 10 and 11, respectively. Both emissions and ambient concentrations are shown to decrease significantly by 1985, but increase slightly by 1990.

The region also contains areas for which the ecological effects of air pollution may be critical. Brigantine National Wilderness in New Jersey is a Class I area for Prevention of Significant Deterioriation (PSD) and thus may require additional controls for any new fossil-fuel plants within about a 100-km radius. In New York, both the Catskill and Adirondack areas, although not designated Class I areas, are noted for their natural values and are thus sensitive to further air quality insults.* In particular, because the Adirondack area contains a number of lakes sensitive to acid precipitation, additional fossil-fuel emissions affecting it are likely to be contested. The results of the MID-MID scenario show a decrease in area-weighted SO_2 and SO_4 for these areas due primarily to reductions in long-range transport, but an increase in nitrogen oxides and/or nitrates is quite likely (a quantitative analysis of which is beyond the scope of the present study) and thus it is not possible to project the net change in acidic deposition for these critical areas. The conclusions of this analysis must also be tempered with the realization that at least some of the protected new nuclear capacity will not in fact be built,** and that substitution of fossil plants for nuclear plants will result in emissions greater than estimated.

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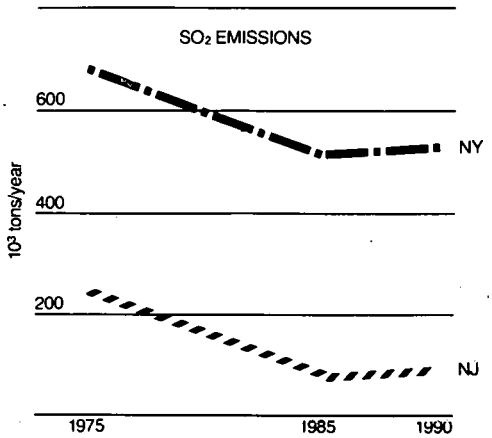
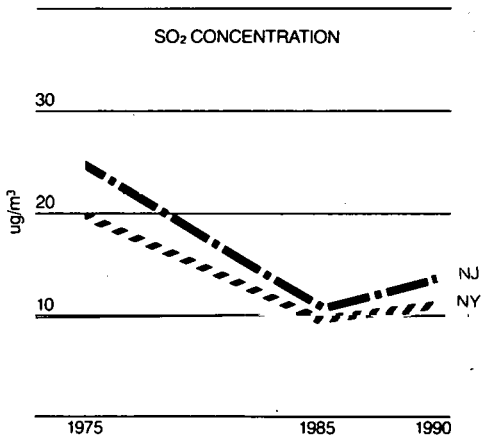
*As state rather than federal parks these areas were not automatically classified as Class I areas under the terms of the 1977 Clean Air Act Amendments. They are obvious candidates for additional Class I designations initiated by the State.

**For example, as a result of a Nuclear Regulatory Commission staff study recommending against the Greene County site, one of those assumed in the scenario, the Power Authority of the State of New York (PASNY) has cancelled this project there.



- SO_2 emissions decline by 33 percent between 1975 and 1990 but increase by approximately between 1985 and 1990.

Figure 10. SO_2 Emission Trends in the Region.



- SO_2 concentrations decrease by more than 10 $\mu g/m^3$ between 1975 and 1985 but increase thereafter.

Figure 11. Trends in Ambient SO_2 Concentrations.

4.2.2 Water Quality and Availability: Inland, the major water issues related to energy activities in Region II concern the use of water for cooling electric generation plants. Competing uses for water at times of low flow and difficulties in providing adequate flow augmentation may pose serious obstacles to the siting of some plants.

In the coastal zone, major water issues concern the severe impacts that oil spills and once-through power plant cooling systems can have on marine organisms. Increased barge and tanker traffic in harbors and coastal waterways, particularly LNG tankers in urban ports, may also conflict with existing uses.

In some areas, such as Northern New Jersey, water supplies simply are not sufficient to meet projected demands for all sectors, and their use for energy production, particularly by nuclear power plants, will create substantial public controversy.

4.2.3 Land Use, Ecology, and Solid Waste: The MID-MID scenario assumes significant increments of coal-fired base-load electric capacity in the region, primarily along the shores of Lake Ontario and Lake Erie. Even though these plants will require FGD systems under current NSPS proposals, adequate land area for disposal of both FGD system sludge and ash is expected to be available since the plants are generally far from urban centers.

Nuclear waste management issues in the region have two aspects. One is the general public concern over the inadequacy of waste disposal arrangements in the industry as a whole, and which has been the basis for anti-nuclear political platforms in a number of recent elections (most notably the 1978 New York gubernatorial campaign). The political rhetoric tends to aggravate public anti-nuclear sentiments, which contribute to licensing difficulties. The second aspect is the specific manifestation of inadequacy: several nuclear plants in the region will exhaust their storage pool capacity for spent fuel assembles in the mid 1980s--the Fitzpatrick plant in New York as early as 1981. A subject of more contention is the Western New York Nuclear Service

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*The recent announcement that the State and Federal Departments of Energy had reached agreement on a temporary reopening of the facility was followed by immediate passage by the lower house of the legislature of a bill opposing such action, and a denial by Governor Carey that any such agreement was imminent. The entire question of public opposition to nuclear power in the Northeast is examined in further detail in C. Bryant, Selected Institutional Aspects of Energy Development in the Northeast, RIIA Issue Paper No. 3, Division of Regional Studies, BNL, July 1979.

Center at West Valley, closed since 1972, whose reopening technically could ease the storage capacity shortage in the region, but politically is extremely unlikely*. Thus the ability to meet the nuclear capacity figures in the MID-MID scenario by 1990 will depend on the Federal Government providing solutions to the nuclear waste management problem

Oil spills have resulted in damage to some areas of Region II. The long-term impacts of coastal transportation cannot at present be estimated, but there is widespread regional concern that future offshore oil development and associated onshore refinery development will aggravate coastal environmental problems. Some studies indicate that onshore diffuse sources (e.g., residential and commercial developments) and coastal point sources (e.g., large rivers that concentrate pollutants and then dump them along the coast where they merge and mix) are greater contributors to coastal pollution than are offshore transportation or potential OCS development.

4.2.4 Social, Economic, and Institutional Issues: Local socioeconomic impacts in this region could be significant enough to cause a delay in several power plant schedules. Construction-related immigration should range from a few percent for units near major urban areas to as high as 20% for units in more rural areas.

Labor availability could cause a problem due to overlapping construction schedules in four locations: (1) Southern and Eastern New Jersey, (2) near Lake Erie, (3) around Oswego, NY, and (4) near Albany. Adjustments in facility scheduling or a strong preconstruction commitment by utility and union leaders could alleviate this problem. Figure 12 summarizes the socioeconomic impacts of the scenario in the region, with an indication of the labor and construction workforce for each major power plant addition.*

The problems of siting nuclear power plants are compounded by active political opposition to this power option in both New York and New Jersey. This opposition has as yet had no major reverberations at the legislative level in New Jersey, but the New York Legislature has recently introduced a number of bills to curb, regulate, or impost moratoria on the construction of nuclear power plants and the storage of radioactive wastes.

Although neither state now prohibits putting all Construction Work in Progress (CWIP) charges into the utility base rate--an issue with far-reaching

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*For futher details, see W. Metz, Socioeconomic Impact of Proposed Power Plant in the Northeast, RIIA Issue Paper No. 1, Division of Regional Studies, BNL, July 1979.

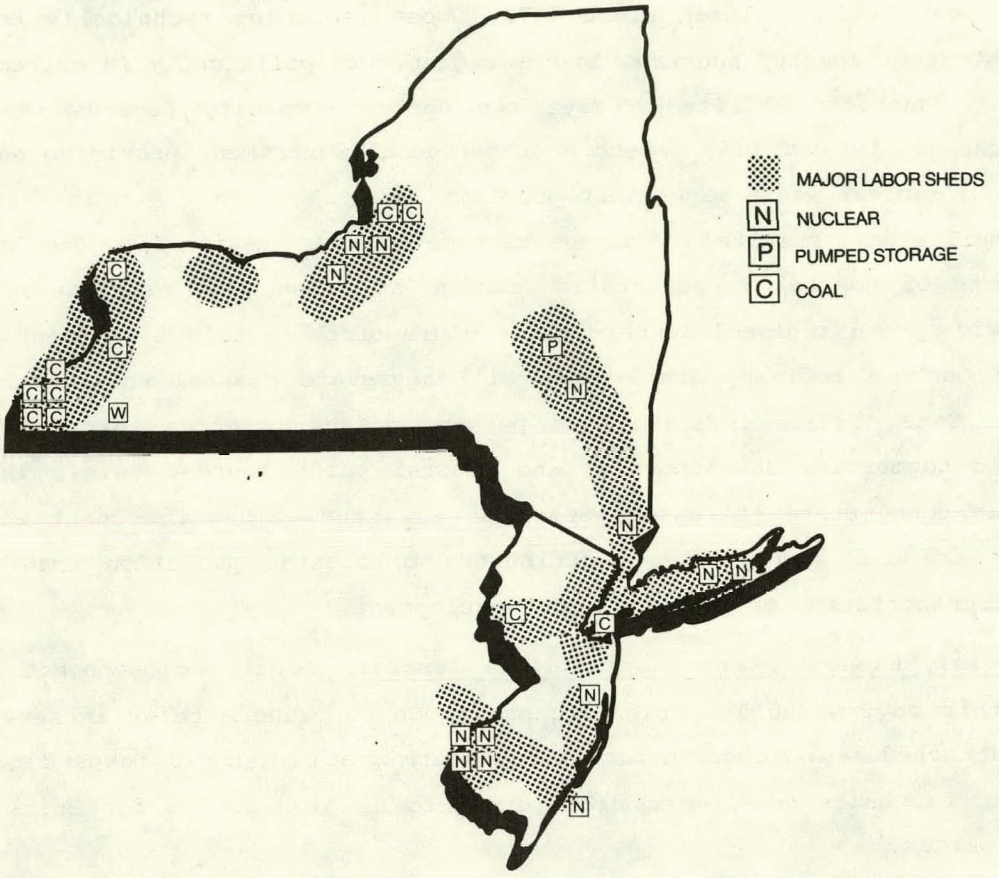

Figure 12. Socioeconomic Impacts.

- o Power plant construction payroll in region to 1990 estimated at $7.5 billion;
- o Annual local tax revenue in 1990 estimated at $210 million;
- o Construction projection in four major areas - The Buffalo Metropolitan Area; Oswego County on Lake Ontario; Greater New York; and Southern New Jersey. Construction Labor is drawn from throughout the region, as indicated below;
- o Average number of construction phase in migrants estimated 700 per project site.

implications for the financing of large power facilities--although such charges can be disallowed for individual projects, as occurred in the case of the scenario's proposed 1150-MW Atlantic Nuclear Generating Station.

The tidal and coastal part of Region II is one of the largest marine habitat and recreation areas in the East, and a number of emerging environmental issues related to it are common to New York and New Jersey. To date, one of the dominant issues has been petroleum exploration and development in the Baltimore Canyon area. This may be moot since drilling has failed to reveal commercial quantities of oil or natural gas, but continuation of the leasing program has led to continued concern on the part of state governments and private groups . The major issues related to offshore development are the coastal and offshore impacts of petroleum pollution or development activities (e.g., on commercial fisheries or on breeding habitas); the onshore impacts of offshore development (e.g., affects on the local economy of support-base development or refinery construction and operation); and support of state and local planning and management activities (e.g., requesting federal financing for coastal zone management planning directed specifically dealing with development related to offshore activities).

4.2.5 Health and Safety: Since sulfate levels in the region are projected to decrease, the concomitant health effects from fossil-fuel combustion, as indicated by population exposure to sulfates derived from fuel burning emission sources, will also decrease (Table 8).* Nevertheless, there is growing recognition in the region of the importance of interregional pollution transport; indeed, by 1990 some 73% of the effects shown can be attributed to sources outside the region.** In addition, any health effects attributable to NO_x or oxidants may worsen, although such effects have not been quantified.

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*For detailed documentation of these computations, see S. Morris, el al., Health Effects of the EIA MID-MID Scenario, Biomedical & Environmental Assessment Division, forthcoming report.

**Both New York and New Jersey are coplaintiffs in a suit against EPA contesting current attainment rules in light of interstate movements of pollution.

TABLE 8
ESTIMATED HEALTH EFFECTS FROM AIR
POLLUTION FROM FOSSIL FUEL COMBUSTION

	Pollution weighted SO_4 conc., ug/m^4	Individual risk level, deaths per 10^{-6} persons/year	Estimated attributable annual deaths*
1975	9.5	48-770	1200-19000**
1985	5.0	24-380	690-11000
1990	4.9	25-390	700-11000

*Effects are shown on an annual basis but may actually occur in some future year.

**The ranges shown for deaths in this table and in sections below reflect approximate 60% confidence limits based on a subjective probability distribution of coefficients relating mortality linearly to ambient sulfate concentrations.

TABLE 9
ESTIMATED ANNUAL RADIATION-INDUCED CANCERS
DUE TO NUCLEAR POWER PLANTS*

	Nuclear power plant workers	General public	
		Routine	Non-routine**
1975	0-0.256	0-0.006	0-0.26
1985	0.0.89	0-0.031	0-0.091
1990	0-1.58	0-0.047	0-1.6

*Long-range atmospheric transport effects not included.

**Annualized effects of catastrophic accidents.

The other major health-related concern, given the absence of coal mining in the region, is radiation-induced cancers from nuclear plant operation. With the increase in nuclear power generation in the region, cancers generally increase (Table 9), but the impact levels are an order of magnitude lower than those associated with the scenario-postulated nuclear waste reprocessing activity at West Valley, NY (see below Section 5.2.5).

V. STATE ISSUES

5.1 New Jersey

5.1.1 Air Quality:

- o A large improvement in sulfur oxides air quality from major fuel burning sources both in and out-of-state, and thus it appears likely that New Jersey will to remain in attainment of the SO_2 ambient standards.
- o Due primarily to reductions in out-of-state sources sulfate concentrations are projected to drop substantially in New Jersey and thus an improvement in visibility would be expected at the Class I area of Brigantine Wilderness.

New Jersey contains four EPA air quality control regions but only one is wholly within the state and thus interstate concerns are important. The entire state had attained the SO_2 and NO_2 standards in 1978 but was non-attainment for oxidants. Primary total supended particulates standards (TSP) were not met in Jersey City or Camden. As a result of the attainment of SO_2 standards there have been some relaxations of SO_2 emissions requirements in the south Jersey and Camden areas. Northern New Jersey remains tightly controlled because of its proximity to New York City.

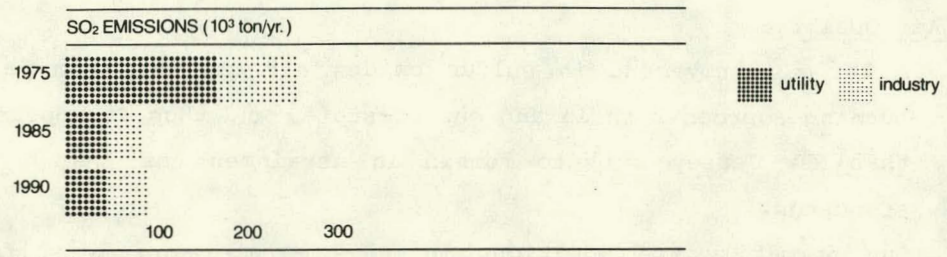
Scenario Induced Changes:

- o Significant improvements in SO_2 and SO_4 ambient concentrations due to lower SO_x emissions in the scenario are expected; SO_2 concentration decreases from 22 ug/m^3 in 1975 to 13.7 ug/m^3 in 1990, and sulfates from 9.6 ug/m^3 in 1975 to 5.6 ug/m^3 in 1990 (Figure 13).

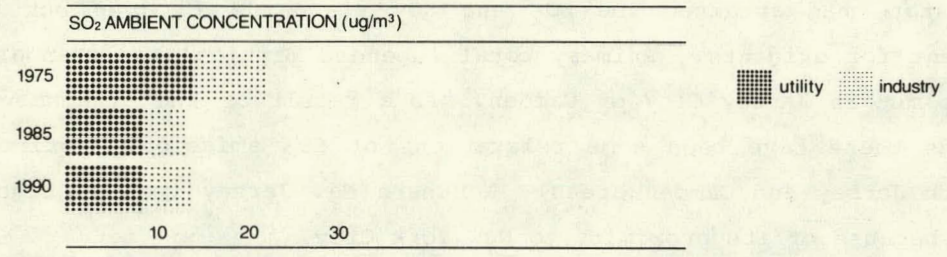
5.1.2 Water Quality and Availability

- o The low flow augmentation requirements for postulated thermal plants in Salem and Hunterden Counties may significantly constrain the scenario.

The estuarine and bay areas of New Jersey comprise one of the most important breeding areas for commercial and recreational fish species in the Northeast and are used intensively for commercial and recreational purposes (particularly the Delaware River and Bay). Because these areas are highly sensitive to both traumatic and sustained pollution and are already intensively



- SO_2 emissions from both industrial and utility sources will more than halve between 1975 and 1985.
- Between 1985 and 1990 utilities will become the major source SO_2 emissions.



- SO_2 concentrations will decline between 1975 and 1990.

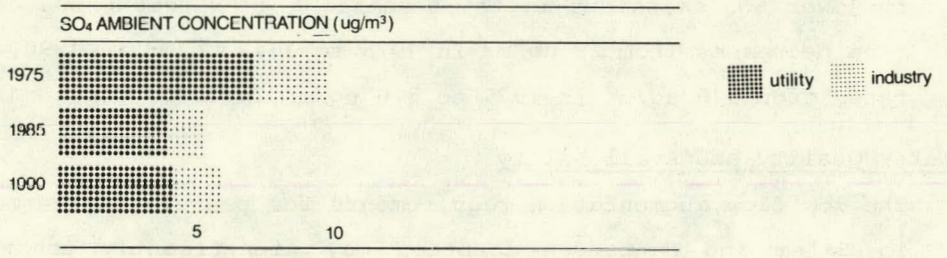


Figure 13. Trends in SO_x Emissions and Populated Weighted Concentrations: New Jersey.

used, proposals for activities that may have a detrimental effect on water quality are receiving intense scrutiny. Such activities would certainly include the construction of power plants and OCS-related facilities.

Background Issues

- o Water quality in the Delaware River Estuary is seriously degraded by municipal and industrial discharges in the Trenton, Camden, and Wilmington areas.
- o One of the main causes of water quality problems in New Jersey is the heavy discharge of organic, oxygen-depleting wastes which cause the receiving waters to be plagued with low concentration of dissolved oxygen and high Biochemical Oxygen Demand and bacterial counts.

Scenario-Induced Changes

- o Plants sited in Hunterden and Salem Counties will require low flow augmentation but water for this will not be available from existing reservoirs. The Hope Creek nuclear plant in Salem County was to have used the now defunct Tocks Island Dam project for this, and a replacement has yet to be found. Low flow augmentation of 176 cfs would be required by 1990 in the Delaware River Basin for the scenario to be realized (which represents 12% of the current low flow).

5.1.3 Land Use, Ecology and Solid Waste

- o Utility siting trends postulated in the scenario conflict with land use priorities the in coastal zone.
- o New Jersey has one class I PSD area and numerous fish and wildlife management areas located in and adjacent to the coastal zone. In at least one case the manager of such areas has opposed plans for a power plant.
- o Habitate alteration in bay and estuarine areas is of serious concern to the recreation and fisheries industry.

New Jersey has diverse land uses, population concentrations, and habitats. Moreover, because of its location and industrialized nature, the conflicts between development and environmental protection often seem more straightforward than in other states. Such conflicts assume added dimensions, however, in respect to the seasonal recreation use of the southern and eastern

shores and the importance of bay and estuarine areas to the commercial and recreational fisheries in the entire northeast.

Insofar as postulated electric capacity additions are generally sited along bay and estuarine areas, major petroleum transportation routes lead into Delaware Bay, and the emphasis of existing legislation and public concern is focussed on coastal areas it would seem that such plants or activities will face continued opposition. And, in light of the fact that New Jersey's coastal waters have suffered from both traumatic and sustained pollution future regulatory initiatives may become even more restrictive.*

Background Issues

- o Bay and estuarine areas in New Jersey are among the most productive aquatic habitats in the northeast.
- o Traumatic pollution incidents have seriously damaged large areas yet chronic pollution threatens habitat change or species disruption which may outweigh those of traumatic incident.

Scenario Induced Changes

- o Electric capacity additions are to be located primarily in the coastal zone.

5.1.4 Social, Economic, and Institutional

- o Labor availability for the construction of the proposed nuclear plants in Southern New Jersey may be a problem.
- o No explicit institutional constraints exist (as yet) for the sites proposed for both fossil and nuclear generating stations. But, several pieces of legislation are being considered which may prolong the licensing process and delay realization of the scenario timetable.

Even though the addition of 2760 MW of oil and coal-fired electric generation capacity is projected for 1985 in four Northern New Jersey counties, it is very likely that sufficient labor for the construction of the plants would be available from the Newark-Paterson urban area and New York City. Little socioeconomic impact should result from the small inmigration and the need for accomodations in the area.

Delays in the construction of the proposed nuclear plants in Southern New Jersey are more likely, although the continuity of construction at Salem 1 and 2 and then Hope Creek 1 and 2 may keep an established, skilled work force in the area, helping to avoid delay. Forked River will be able to draw on some of Northern New Jersey's work force. Still, labor availability is an issue of concern for the proposed plants.*

New Jersey as yet lacks comprehensive statewide energy facility siting legislation. However, its Coastal Area Facilities Review Act (CAFRA), Coastal Wetlands Act, Flood Plain Law, Pinelands Act, and other environmental legislation may well constrain the development of many major new energy facilities in this highly populous and heavily industrialized coastal area.

The 1150-MW Atlantic Generating Station, which was to be located in the Atlantic Ocean about 12 miles northeast of Atlantic City, has for several years faced determined opposition from local and statewide anti-nuclear groups. Public Service Electric and Gas Company has already abandoned its plans for this controversial facility, partly because new demand projections indicate a lack of need for the plant and partly because the utility has been prohibited from including project costs in its rate base.

Background Issues

- The Three Mile Island incident has magnified concern over the feasibility of evacuation plans for areas around nuclear power plants. This issue is of special importance along the East Coast, which has a large influx of seasonal visitors: In New Jersey, on the barrier islands off the Atlantic Coast, the influx is significant in summer, yet evacuation would be possible over only one or two bridges.**.

5.1.5 Health and Safety

- Health and impacts due to sulfate exposure from fossil-fuel combustion are expected to show decreases by 1990, parallel to decreases in ambient sulfate concentrations.

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*For detailed discussion of the socioeconomic impacts of nuclear power plants in the Mid-Atlantic States, see W. Isard et al., Regional Economic Impacts of Nuclear Power Plants, BNL 50562, Aug. 1976.

In recent years growing public concern over significantly higher than average cancer rates in the heavily industralized areas of Northern New Jersey ("Cancer Alley") has raised the level of public interest in the health effects of exposure to low levels of toxic chemicals and radiation.* More recently, the mercury pollution episode in the Meadowlands, also in Northern New Jersey, has focused attention in the ability of state and federal government to deal effectively with such problems.** This naturally affects energy projects as well, and these will be subjected to intense public scrutiny.

Scenario-Induced Changes

- The range of estimated total deaths in the region attributable to sulfate exposure from fossil-fuel combustion is 350 to 5700 in 1975 and 250 to 4400 in 1990; thus, the average personal annual risk of death due to this source drops from 0.78×10^{-3} to 0.44×1^{-3}.
- The estimated number of expected annual radiation-induced cancers in the general public due to nuclear power plant operation (including the annualized effect of catastrophic accidents) increases from 0.057 in 1975 to 0.53 in 1990.

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*The National rate for cancer mortality in 1950-1969 was 174 per 100,000 for white males, 130 per 100,000 for white females. The comparable New Jersey rates are 205 and 147, for white males and white females respectively. The rate for males is the highest in the Nation, that for females exceeded only by New York (at 148 per 100,000). Se T.J. Mason et al "U.S. Cancer Mortality by County, 1950-1969", U.S. Dept, of Health, Education Welfare, Report DHEW-NIH 74-615.

**This is analogous to the impact of the Love Canal toxic waste scandal in New York.

5.2 New York

5.2.1 Air Quality

- Sulfur oxides air quality in the state is expected to show considerable improvement in 1990: much of this is attributable to reductions in out-of-state areas.
- Coal plants postulated by the scenario for Chautaugua, Erie, and Niagara Counties may be constrained by non-attainment problems in the Buffalo metropolitan area.

Discussion

New York contains eight AQCRs including the tri-state metropolitan New York City region. As of 1978 the entire state was in non-attainment for oxidants, the Niagara Frontier (Buffalo) area for TSP and SO_2, and the Syracuse area for TSP. In addition, a part of New York City that could not officially be classified for SO_2 was thought to be in violation of the annual (primary) standard. The non-attainment status of the Buffalo area could be a major constraint for the siting of new coal-fired power plants along Lake Erie although the scenario postulates a substantial decrease in SO_2 emissions in Erie County.

In recent years New York State has been trying to relax certain sulfur-in-fuel limitations in regions that meet the SO_2 ambient standard by a wide margin. This trend is likely to continue because of economic pressures, although pressure is also being exerted by the State of Connecticut to reduce interstate transport of sulfur oxides and other pollutants.

Background Issues

- Considerable controversy has arisen over the 700-MW coal-fired unit originally planned by the Power Authority of the State of New York (PASNY) for Staten Island and now proposed for a South Bronx location.
- So far two requests by Consolidated Edison to burn high-fulfur fuels in the New York City area to lower consumer costs in the wake of recent oil price increases have been rejected on environmental grounds.
- Canadian sources of atmospheric pollution are of considerable importance to air quality attainment in New York State. Emissions from these sources are large: the smelter at Sudbury, Ontario, emits

about a million tons of SO_2 per year. A large coal-fired power plant under construction on the north shore of Lake Erie* is of particular importance to air quality problems in the Buffalo area.

Scenario-Induced Changes

- SO_2 emissions are projected to decrease by 200,000 tons/yr between 1975 and 1985, and to increase slightly between 1985 and 1990 (Figure 14). From 1975 to 1990, population-weighted SO_2 and SO_4 concentrations due to energy-related emissions projected in the scenario show significant decreases: from 19.3 for SO_2 to 10.3 ug/m^3 and from 9.5 SO^4 to 5.1 ug/m^3 for SO_4 (Figure 14).

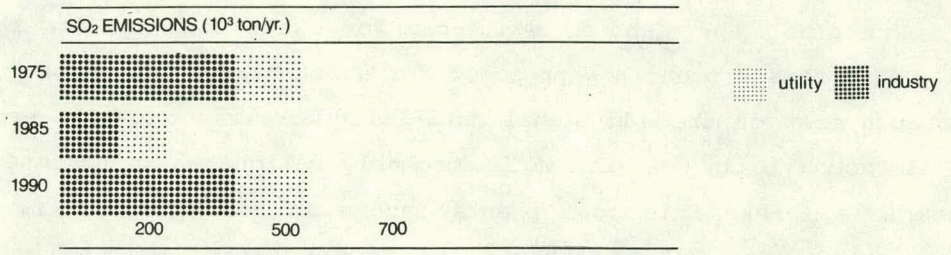
5.2.2 Water Quality and Availability: Most new electric generation facilities will be sited on Lake Erie, Lake Ontario, Long Island South and the Hudson River. Some major controversies could arise regarding these sites but they would not stem from water availabilty problems. Indeed, unless plans for major inter-basin diversions are put forth, water availability other than for domestic consumption will not be a major issue in the state. However, two types of issues may be raised. The first concerns water quality in water bodies that have recently undergone either significant deterioration or improvement such as the Great Lakes and the Hudson River where drawn-out litigation against major polluters has kept water quality in the public and governental eye.** The second type of issue concerns multiple uses of water bodies and will be touched on in the ecology section.

5.2.3 Land Use, Ecology, and Solid Waste

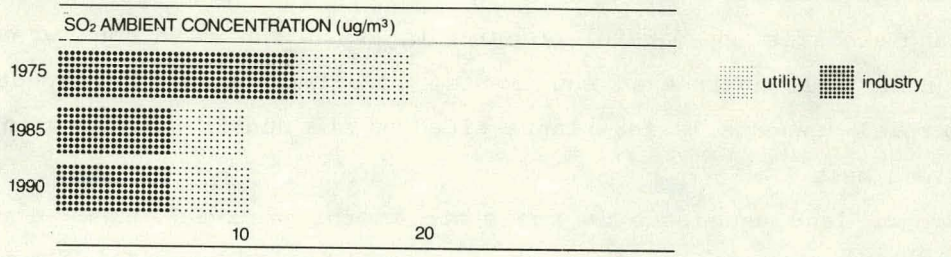
- Several nuclear plants will exhaust their storage pool capacity for spent fuel assembles in the mid 1980s, the Fitzpatrick plant as early as 1981.
- Although the Western New York Nuclear Service Center at West Valley could ease the radioactive waste storage capacity problem in the

*This 3000-MW(e) plant is located 55 miles directly upwind of the Buffalo AQCR. For further details see J. Carroll, Environmental Aspects of Eastern Canada- Northeastern U.S. Energy Relations: An Identification of Issues, RIIA Issue Paper No. 2, Division of Regional Studies, BNL, July 1979.

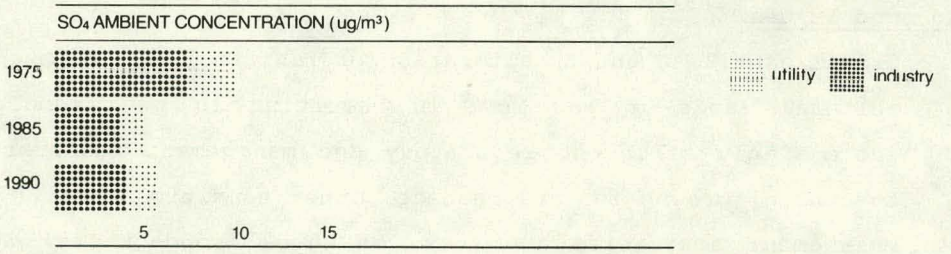
**The problem of PCB pollution in the Hudson, for example, has been highy publicized in recent years; see, e.g., P. Moskowitz et al., Troubled Waters: Toxic Chemicals in the Hudson River, Environmental Defense Fund, New York, NY, 1977.



- Industrial sources are the largest contributors to SO_2 emissions: emissions from those sources will decline dramatically between 1975 and 1985 but will more than double between 1985 and 1990.



- SO_2 concentrations will halve between 1975 and 1985 and show only a marginal increase thereafter.



- SO_4 concentrations will halve between 1975 and 1985 and show only a marginal increase thereafter.

Figure 14. Trends in SO_x Emissions and Population Weighted Concentrations in New York

state and the region it is unlikely that this will happen. The trend of the current debate over this facility, closed since 1972, is towards its continued closure and eventual decommissioning.

- o Practically no land is available for waste disposal for the Arthur Kill fossil plant now proposed for a South Bronx location.

Although most of the additional coal-fired electric capacity proposed by the MID-MID scenario in New York would probably be located in upstate areas on Lake Ontario and Lake Erie coal plants have also been proposed for the New York City area. The 700-MW Arthur Kill fossil plant, originally sited on Staten Island, is now being proposed for a South Bronx location where practically no land is available for waste disposal. Ocean disposal would be the least expensive, but this must be regarded as questionable in light of EPA implementation plans for phasing out ocean dumping in the New York Bight.

Although attempts will be made to minimize the impacts of cooling systems on fin and shellfish by careful planning to avoid sensitive aquatic ecosystems and by using well engineered equipments, such impacts can be expected to be controversial, especially for plants sited on the Hudson near spawning grounds for striped bass.

A major land use issue in the state is the proposed 765-kV transmission network of the New York Power Pool. Several lines already construction for operations at 765 kV are still operating at 345 kV, and the proposed 765 kV line for bringing power from Quebec Hydro has encountered strong opposition from agricultural and environmentalist groups.*

Background Issues

- o Significant loss and/or alteration of habitat, recreation, and agricultural lands in New York is resulting in the promulgation of increasingly stringent regulatory and management measures designed to control growth in, and protect, other sensitive areas. Among the management activities are those of the Adirondack Park Agency and the Coastal Zone Management Program.

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*Since Quebec Hydro is a winter peaking system and the New York Power Pool a summer peaking system, seasonal exchanges are obviously of mutual benefit. The Churchill Falls hydro project on Hudson Bay will be the major source of exports in the 1980s.

- o Among the more insidious threats to flora and fauna are the systemic effects of prolonged incremental changes in environmental quality. Significant reseach is under way to evaluate some of these impacts, such as habitat disruption due to changes in pH.
- o Some existing land uses are perceived to be incompatible with energy development. For example, the use of farmland for transmission corridors faces increasing opposition on the grounds that it forces changes in cropping and irrigation patterns and results in lower crop yields.*
- o As a result of regulatory actions some waste disposal alternatives will be foreclosed in the near future. For example, ocean disposal will not be available because of the Environmental Protection Agency's plants to halt dumping in the New York Bight by the end of 1980.

5.2.4 Social, Economic, and Institutional Issues

- o Several areas may experience problems of labor force availability for power plant construction projects unless construction schedules are carefully optimized.
- o Most baseload capacity additions postulated by the scenario for New York are likely to experience significant licensing delays due to institutional problems, particularly the inability of the state licensing agencies to reach decisions in a timely manner
- o Problems of nuclear power plant siting are compounded by active political opposition: the New York Legislature has recently introduced bills to curb, regulate, or impose quasi-moratoria on the construction of nuclear power plants and the storage of radioactive waste.
- o Continuation of public opposition to both nuclear and coal power alternatives is likely. Key issues include the health effects of low level radiation, the adequacy of evacuation plans, and radioactive waste disposal.

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*The transmission corridor for the proposed Jamesport nuclear plant in Eastern Long Island was opposed by farming interest on the grounds that it would be a pathway for spread of the potato nematode. Since potatoes are a major source of farm income in this area, this possibility was of real concern.

Except for some local socioeconomic effects directly related to the scenario, most of the institutional concerns are generic. The political and executive process is such that the reallocation of authority or duty, the creation of new agencies with discrete powers, or the evolution of major regulatory measures becomes extremely subjective, and susceptible to error. It must, however, be recognized that the technical and environmental factors addressed in the previous sections require major institutional decisions: decisions on nuclear waste disposal, the uniformity of enforcement of air quality regulations, and major land use and coastal zone reforms will determine whether the level of energy development postulated by the MID-MID scenario can be met and, if so, with what costs and impacts.

New York's progressive energy facility siting legislation is comprehensive and detailed and it imposes stringent standards and regulation on the state's utilities. Already several planned facilities sited in the RIIA scenario including the Storm King pumped-storage facility, the Jamesport nuclear plant, and the Arthur Kill coal-fired plant, have been cancelled or postponed, at least partly because of state-level regulatory problems and obstacles. In the case of the Jamesport nuclear plant, the Nuclear Regulatory Commission has granted Long Island Lighting Company a construction permit but work has been delayed by the Public Service Commission's finding that the plant will not be needed until 4 to 5 years after its planned completion date. The question of the need for new capacity will be raised at future hearings on plans for the Sterling nuclear plant.

The siting of nuclear facilities in New York is further complicated by the presence of numerous, vocal and active anti-nuclear groups. Opposition to nuclear power has recently received additional impetus from the controvesy about the fate of the bankrupt West Valley, NY, nuclear waste processing plant. Since January 1, 1979, three bills have been introduced in the New York Legislature to prohibit the construction of nuclear waste facilities in the state.

Background Issues

- The distribution of benefits (essentially tax revenue and employment) from the construction and operation of large energy facilities are not matched by the distribution of impacts.

- The state siting law, intended to facilitate the siting procedure by creating a one-stop process, has not resulted in any noticeable diminuation of institutional constraints to siting.
- Opposition to the siting of large energy facilities has become exceedingly vociferous, partly because activist groups are improving their use of political and judicial leverage; even small local groups are participating in siting hearings to an extent not previously experienced.
- Cooperation and coordination among local, state, and federal agencies in the siting process are extremely poor.

Scenario-Induced Changes

- Several areas in upstate New York may experience problems of labor availability, especially Oswego and Cayuga Counties, where specific skills will be in short supply if the postulated construction schedule is realized.
- Chautauqua, Oswego, and Cayuga Counties have inadequate accommodations for the level of inmigration expected during the construction phase of nearby power plants.
- Skilled worker shortages and infrastructure problems may arise in Greene and Schoharie Counties where nuclear and pumped-storage facilities are postulated for about the same time. Schoharie is a rural county with a small population and poor access. Greene County is also rural and could be heavily affected because it would lack the tax revenue (PASNY being a public utility) needed to upgrade the local infrastructure to accommodate the predicted 14 to 20% inmigration of construction workers. The agricultural and service-oriented nature of this area's economy may result in a shortage of certain skilled craftsmen, and inadequate accommodations could cause work force productivity to decline. The overlapping in construction periods for these plants may also aggravate the skilled worker shortage.

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*The siting scenario for this study was prepared in 1978, prior to abandonment of the Greene County site by PASNY in early 1979, largely on esthetic impact grounds.

5.2.5 Health and Safety

- o Health effects due to sulfate exposure related to fossil-fuel combustion will decline by 1990.
- o Public concerns over low level radiation effects, rather than actual risk levels, may constrain realization of the nuclear goals of the scenario.
- o The health effects to be anticipated at the West Valley reprocessing facility, if it is reopened as assumed by the scenario, represent a significant constraint to scenario implementation.

Potential health damage from air pollution due to fossil-fuel combustion in utility plants and industry is of major concern in New York State, as evidenced by opposition to the construction of a new coal-fired power plant by PASNY and the conversion of existing oil plants to coal. The highly publicized toxic waste scandal in the Love Canal area of Buffalo has heightened public awareness of waste disposal problems of all kinds.

Background Issues

- o Important facility-specific safety concerns in the New York City area have emerged in the last few years: e.g., the spread of viruses and chemical carcinogens from waste via cooling tower drift at the Arthur Kill plant and the hazards of storing naphtha in Manhattan for a Consolidated Edison 4.8-MW fuel-cell unit.
- o The concern over both occupational and public risk of radiation exposure at the Nuclear Fuel Services plant in West Valley makes future use of this plant for either reprocessing or waste storage and disposal unlikely. As noted in the discussion of institutional issues, public concerns have been translated into specific legislative initiatives.

Scenario-Induced Changes

- o The number of estimated total deaths attributable to fossil-fuel combustion as estimated in this analysis for the whole of New York State decreases from a range of 860 to 14000 in 1975 to a range of 550 to 8800 in 1990, and average personal annual risk of death due to this source decreases from 0.41×10^{-3} to 0.16×10^{-3}.

- The estimated annual numbers of radiation-induced cancers from waste management and reprocessing* are as follows:

		Occupational	General public	
			Routine	Accidents
Reprocessing	1985	0.09	7.8	0.001-0.004
	1990	0.19	15	0.002-0.007
Waste management	1985	0.00048	-	-
	1990	0.0006	-	-

- The estimated number of expected annual radiation-induced cancers in the general public due to nuclear power plant operation (including the annualized effect of catastrophic accidents) increases from 0.2 in 1975 to 0.87 in 1990; the number due to reprocessing is an order of magnitude higher.

*Morris et el., Op. cit. The comparable values for 1975 are all zero, the facility having been shut down in 1972.

Table 10

Summary of State Level Environmental Impacts: New Jersey

	Air	Water		Land		Health & Safety[3]	Social and Economic			
Energy Source	Quality	Quality	Availability[2]	Ecology, Land Use	Solid Waste	Occupational And Other	Local Socio-Logic Factors	Local Economics	Regional Economics	Legislative/ Institutional
Electric Sector										
Coal	M	M	M	L	M	L	L	L	L	L
Oil	M	M	M	L	-	L	L	L	L	L
Nuclear	-	M	M	M	H	M	M	L	L	H
Supply										
Gas	L	M	L	M	L	L	L	L	L	M
Oil	L	M	L	M	L	L	L	L	L	M
Urban Waste	L	L	L	L	L	L	L	L	L	M
Solar	L	L	L	L	L	L	L	L	L	L
Coal Mining	-	-	-	-	-	L	-	-	-	-
End Use										
Industry	M	-	-	-	L	L	L	L	L	M

[1]Criteria For Ranking Impacts Found In Table 2.

[2]Includes Ground Water

[3]Includes Health Effects Not Covered By Air Quality

Table 11

Summary of State Level Environmental Impacts: New York

	Air	Water		Land		Health & Safety[3]	Social and Economic			
Energy Source	Quality	Quality	Availability[2]	Ecology/ Land Use	Solid Waste	Occupational And Other	Local Socio-Logic Factors	Local Economics	Regional Economics	Legislative/ Institutional
Electric Sector										
Coal	M	M	M	L	M	L	M	L	L	L
Oil	M	M	M	L	-	L	L	L	L	L
Nuclear	-	M	M	M	H	M	M	L	L	M
Supply										
Gas	L	M	L	M	L	L	L	L	L	M
Oil	L	M	L	M	L	L	L	L	L	M
Urban Waste	L	L	L	L	L	L	L	L	L	M
Solar	L	L	L	L	L	L	L	L	L	L
Coal Mining	-	-	-	-	-	L	L	-	-	-
End Use										
Industry	M	-	-	-	M	L	L	L	L	L

[1]Criteria For Ranking Impacts Found In Table 2.

[2]Includes Ground Water

[3]Includes Health Effects Not Covered By Air Quality

Table 12

Summary of Region II Environmental Impacts

	Air	Water		Land		Health & Safety[3]	Social and Economic			
Energy Source	Quality	Quality	Availability[2]	Ecology/ Land Use	Solid Waste	Occupational And Other	Local Socio-Logic Factors	Local Economics	Regional Economics	Legislative/ Institutional
Electric Sector										
Coal	M	M	M	L	M	L	M	L	L	L
Oil	M	M	M	L	-	L	L	L	L	L
Nuclear	-	M	M	M	H	M	M	L	L	H
Supply										
Gas	L	M	L	M	L	L	L	L	L	M
Oil	L	M	L	M	L	L	L	L	L	M
Urban Waste	M	L	L	L	L	L	L	L	L	M
Solar	L	L	L	L	L	L	L	L	L	L
Coal Mining	-	-	-	-	-	L	-	-	-	-
End Use										
Industry	M	-	-	-	M	L	L	L	L	L

[1]Criteria For Ranking Impacts Found In Table 2.

[2]Includes Ground Water

[3]Includes Health Effects Not Covered By Air Quality

Table 13

THE IMPACT OF ENERGY DEVELOPMENT IN THE EIA TRENDLONG MID-MID SCENARIO
ON REGIONAL ENVIRONMENTAL QUALITY IN 1990

	Regional Dimensions*			Notes
	Local	Subreg.	Regional	
The Likelihood of Projected Regional Energy Use or Development Producing Significant Environmental Impacts	M[5]	M[5]	M[5]	[1]Widespread public opposition: inadequate waste disposal arrangements; concern over West Valley reprocessing facility.
**The Likelihood of not Attaining Projected Regional Energy Mix because of Adverse Environmental Impacts	H[1]	H[1]	H[1]	[2]Water availability problems in the Delaware River Basin.
**The Likelihood Specific Technologies or Resources will not Attain Projected Level of Use				[3]Concern over OCS impacts.
Electric Sector				[4]Potential for refuse to energy conversion and biomass not fully reflected in scenario.
Coal	M[2]	M[5]	M[5]	[5]Concern over impact of interregional pollution transport with respect to future implementation of SO_4 standard.
Oil	L	L	L	
Nuclear	H[1],M[2]	H[1],M[2]	H[1],M[2]	
Supply				
Gas	L	L	L	
Oil	M[3]	L	L	
Urban Waste	L[3]	L[3]	L[3]	
Solar	L	L	L	
Coal Mining	L	L	L	
End Use				
Industry	M	L	L	
***The Likelihood Specific Technologies or Resources could be Available at Levels Greater than Projected Development	L[4]	L[4]	L[4]	

*Definitions:
Local: Local site specific impacts
Subregional: AQCR (Air), ASR (Water), County, State, FEA
Regional: Affects Federal region as a whole

**Likelihood of falling short of projected goals:
High - Large degree of certainty that conflict will arise at several facilities with no or little opportunity for cost effective mitigation.
Medium - Specified concern could occur at few facilities, but potential cost effective mitigation strategies available.
Low - Conflicts unlikely to occur.

***Technologies and resources available to higher degree:
Low - Technologies or resources presently available could be substituted at reasonable costs and impacts.
Medium - Technologies or resources presently or potentially available but the acceptability of costs and impacts uncertain.
High - Technologies or resources unavailable or available at high costs or impacts.