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REGIONAL ISSUE IDENTIFICATION AND ASSESSMENT PROGRAM (RIIA)

SOCIOECONOMIC IMPACTS OF PROPOSED POWER PLANTS
IN THE NORTHEAST: ISSUE PAPER 1

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REGIONAL ISSUE IDENTIFICATION AND ASSESSMENT PROGRAM (RIIA)

ISSUE PAPER 1

SOCIOECONOMIC IMPACTS OF PROPOSED POWER PLANTS IN THE NORTHEAST

by
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May 1979

Prepared for
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ABSTRACT

Each new major electric generating facility during its construction and operation periods presents a variety of social and economic consequences to the local, state, and regional areas. The potential for delay due to socio-economic factors and the economic costs and benefits associated with proposed power plants are described with regard to two energy development scenarios: 1) Department of Energy National Energy Plan I, and 2) a utility plan composite. Only proposed power plants with capacities over 400 MW and slated for completion by 1990 located in the three eastern federal regions (1, 2, and 3) are included.

PREFACE

This paper is one of a series prepared for the Regional Issue Identification and Assessment Program (RIIA) of the Office of Technology Impacts, U.S. Department of Energy. The intent of this report series is to document methodologies appropriate to the regional assessments program and to provide detailed technical analysis of important regional issues; the series thus augments the regional analyses of DOE scenarios published by BNL for the three Federal Regions in the Northeast. The papers in this series prepared to date include:

W. Metz, Socioeconomic Impacts of Proposed Power Plants in the Northeast, Issue Paper 1, BNL 51288, Brookhaven National Laboratory, Upton, N.Y.

R. E. Meyers, L. I. Kleinman, T-Y. Li, and R. T. Cederwall, Atmospheric Long-Range Transport Lead Laboratory Methodology, Issue Paper 2, BNL 51289, Brookhaven National Laboratory, Upton, N.Y.

C. Bryant, Selected Institutional Aspects of Energy Development in the Northeast, Issue Paper 3, BNL 51290, Brookhaven National Laboratory, Upton, N.Y.

E. Kaplan, A Methodology for Analyzing the Water Quality Impacts of Cooling-Tower Blowdown, Issue Paper 4, BNL 51291, Brookhaven National Laboratory, Upton, N.Y.

F. W. Lipfert, A Methodology for Analyzing the Short-Term Air Quality Impacts of New Power Plants, Issue Paper 5, BNL 51292, Brookhaven National Laboratory, Upton, N.Y.

INTRODUCTION

This Brookhaven National Laboratory (BNL) issue paper is a backup document to the U.S. Department of Energy, Office of Technology Impacts, Regional Assessments Division, Regional Issue Identification and Assessment (RIIA) Report, July 1979. It supports the description of the social and economic consequences of new power plant construction in the three eastern Federal Regions (1, 2, and 3). Its purpose is twofold: (1) to review in greater detail the potential for construction delay due to various socio-economic factors for each of the large, proposed power plants and (2) to describe the economic costs and benefits associated with the proposed power plants.

The socioeconomic consequences of two energy facility development scenarios are described here. Both scenarios focus on proposed power plants with capacities over 400 MW and on plants slated for completion by 1990. One is the Mid-Mid scenario from the the U.S. Department of Energy's National Energy Plan I. The other is BNL's scenario, a composite of what appears to be the most realistic set of power plant construction plans and operational dates.

Both scenarios might be affected by socioeconomic factors. One major cause of delay in power plant construction is the unavailability of labor, possibly as a result of too much demand relative to the area's supply. Attracting and maintaining quality workers with high productivity, is fundamental to staying on schedule. Schedule delays due to shortages of workers with specific skills, low productivity, high turnover among workers, and absenteeism are usually the result of the interaction of three factors: labor availability, site accessibility, and area accommodations. Each proposed site must be evaluated with regard to these three factors.

Local, state, and regional areas are affected economically by each power plant construction project. Adjacent communities bear the social and economic costs of immigration (temporary and permanent job-related relocation) of workers and their families, which subjects community services to increased demands. The economic benefits include the project payrolls, tax revenues, and material/supply purchases. Occasionally the communities receiving the benefits are not the ones bearing the costs.

SOCIOECONOMIC IMPACT FACTORS

This RIIA socioeconomic issue paper examines the following factors with regard to the two scenarios: (1) worker immigration at new power plants, (2) economic costs of this to the affected communities, (3) construction payroll, (4) indirect benefit of local/regional material/supply and service purchases, (5) operation payroll, and (6) local tax benefits. After these six factors are explained, each of the three eastern federal regions will be described in relation to them.

1. Worker Immigration. All proposed power plant sites will sustain some immigration, which will be of two different types: (i) relocators or movers and (ii) travelers. In this report, emphasis is given on relocators, workers who take up continuous residence in a site area, change their mailing address and voter registration, and consider the new location their primary residence. A traveler resides in the site area only during weekdays and returns to a distant primary residence on most weekends.

The non-manual workforce at a power plant construction site is composed of engineering, administrative, supervisory, subcontract management, vendor, and clerical personnel from the sponsoring utility, architect/ engineering (A/E) firm(s), and vendor/subcontract firms. Non-manuals normally represent, on the average, approximately 15 percent of a construction workforce at peak, and a higher percentage at project initiation and construction termination. Generally a minimum of one third, quite often one half, relocate depending on the closeness to a major urban area, utility headquarters, and A/E and subcontractor main and branch offices. Selected utility and A/E personnel who relocate are compensated for their expenses. Except for subcontract and vendor personnel, only a very small percentage, if any, are travelers because of the duration of employment at the job site.

Craftsmen, or manual workers, at a power plant construction site comprise the workers with special skills (electrician, ironworker, operating engineer, cement mason, pipefitter, etc.) and the relatively unskilled laborers. Unlike projects in the South and West where poor site accessibility, limited area accommodations, and insufficient labor availability often cause shortages of local craftsmen and high relocation and turnover rates, projects in the East generally have a relocation rate of zero to 10 percent of the workforce at most: craftsmen are mostly union members hired out of numerous local union halls on the basis of seniority, recent length of unemployment, or an

unemployment/employment ratio, and any non-union workers hired usually join the union. Craftsmen are more prone to be travelers because of the personal cost of relocation, the relatively brief period of employment on a power plant project, possible loss of seniority in changing their union hall, and uncertainty of further work in the area.

Determination of a construction worker relocation rate at a proposed facility must be site specific. A rough generic estimation can be made for non-manual workers, but for craftsmen the relocation rate, though small, depends on a combination of competing area construction projects, union hall boundaries, site accessibility, specific craft shortages, and area accommodations.

Many of the same factors--labor availability, site accessibility, and area accommodations--are used in estimating operational workforce relocation. A utility will always transfer some experienced personnel to a new facility from a central office and from one or more of its operating units. The number of other relocators depends on job classifications (mechanic, guard, electrician, secretary, health physicist, control room operator, coal specialist, etc.) and on local availability of the needed people within an acceptable daily commute range of 20 to 30 miles maximum.

Most relocating construction and operation workers bring family members. Worker/family multipliers vary for construction non-manual and craftsmen workers and operational personnel. Non-manual and operational workers have a higher marriage ratio but fewer members per family than do craftsmen. The number of children per worker has been steadily decreasing over the past decade for all three groups.

Construction and operation workforce relocation numbers for each federal region's proposed power plants have been developed at RNL through a combination of interviews, literature reviews, and best deductive estimates. The number of relocating construction workers was multiplied by 2.5 and that of operations personnel by 3.0, the product indicates number of workers plus accompanying family members.

2. Economic Cost of Workforce Immigrants. Each immigrating worker, whether relocater or traveler, engenders additional cost in community services and facilities expenditures in site-adjacent communities. These costs may be partially or wholly compensated for by revenue producing aspects of the project, but they are still costs. The cost of a relocater (worker or family member) is far higher than that of a traveler.

Argonne National Laboratory has developed a Social and Economic Assessment Model (SEAM) of which PUBCOST is a component.¹ PUBCOST's purpose is to compute, on a standardized regional basis, the dollar cost to a community (on a county basis) of accommodating relocators. Population increases resulting from peak construction workforce and initial operational workforce relocation can be entered as input into the PUBCOST component. Traveler immigration can not be entered into the model and the output is not in a form suitable for extrapolating a traveler's costs. It can be hypothesized that the community service costs for a traveler would at most be 20 percent of those for a relocator and facility costs would be about 35 percent of those for a relocator.

3. Construction Payroll. For this preliminary paper, regional construction payrolls were crudely estimated. Because the proposed power plants are to be operational between 1978 and 1990, they will be constructed between the early 1970s and 1990, and annual dollar values will differ. At present no payroll/MW rule is available for any type of power plant on an escalating basis. Formulation of such a rule will be attempted in the future at BNL for proposed power plants in the East.

Construction payrolls for proposed power plants have been superficially escalated and totaled by BNL. A potential 1100 MW nuclear plant in the scenarios would be attributed an escalating total construction payroll of \$350 million, approximately \$250 million more than the escalating construction payroll of a 1980 operational plant, and less than a 1990 operative plant's predicted construction payroll of approximately \$450 million. An average 800 MW coal-fired power plant in the scenario would be attributed an escalating construction payroll totaling \$200 million.

4. Local/Regional Material/Supply and Service Purchases. Each proposed new power plant requires the purchase of a large amount of materials (sand, gravel, cement, lumber, hardware, piping, wire, prefabricated buildings, etc.) and supplies (gasoline, oil, vending machine contents, office supplies, etc.), some of which can be purchased locally, others regionally. Purchase locations often depend on the ability of area companies/stores/salemen to fill orders at

¹Erik J. Stenehjelm, Summary Description of SEAM: The Social and Economic Assessment Model, Argonne National Laboratory, Chicago, April 1979.

an acceptable price. In many cases, purchases and services are intentionally kept local in order to disperse benefits to the area that is experiencing some construction worker impacts or as compensation for the plant's presence. Local and regional service contracts are usually signed with area contractors for constructing administrative and service buildings, setting up fencing, paving access roads, repairing of equipment, etc. Most service contracts are lump sum and include labor costs. A crude estimate was made of local/regional material/supply and service purchases based on present actual Seabrook and Arkansas data plus several utility estimates, without distinction as to whether the purchases are local or regional. In most states a sales tax is imposed on material/supply purchases, though any machinery used in the actual generation of power is exempt. This is an added state benefit.

In the Montague Environmental Impact Statement a resultant income benefit of the local/regional material/supply purchases was addressed. The ratio of value added to sales was considered to be 0.55, thus, income generation would be 55 percent of the local/regional material/supply purchases.

5. Operation Payroll. The BNL estimate is that by 1990 the escalated payroll for a 200-member nuclear power plant workforce will be about \$7.4 million, and that for a 70-member 850 MW coal-fired plant workforce it will be about \$3.5 million.

6. Local Tax Benefits. Power plants pay enormous local taxes, sometimes representing as much as 90 percent of a township, school district, borough, or county tax base although taxables, rates and recipients vary greatly by state in Regions 1, 2, and 3. For example, local taxing authorities receive little tax revenue from power plants in Pennsylvania. In Vermont some of a power plant's taxes are shared with the state. The Power Authority of the State of New York pays negligible local taxes on its power plants.

The taxes paid by utilities for power plants of similar size vary dramatically among local communities. It is estimated that Jamesport units 1 and 2 will be paying around \$29 million; Montague units 1 and 2, around \$7 million; and New England Power (NEP) units 1 and 2, around \$3 million. Some utilities and communities seek levelized payments as at the NEP units, others allow the tax revenue to rise and fall sharply during a plant's taxable life.

FEDERAL REGION 1

There are two different energy development scenarios proposed for the New England region. One is the Department of Energy's National Energy Plan

Mid-Mid scenario, which projects six new large (> 400 MW) power plants for the area by 1990 (Table 1). The other is a composite of what now appears to be the most plausible set of events and utility plans, and it foresees only five new large power plants by 1990.

The Mid-Mid scenario envisions five nuclear units, 1150 MW in size, one (Pilgrim 2) to be operational in 1986 and the other four (Millstone 3, NEP 1, Montague 1, and Seabrook 1) in 1990. A sixth plant, a coal-fired 1150 MW unit (Sears Island) is to be operational in 1985. In the contemporary composite scenario there could conceivably be five new nuclear power plants coming on line by 1990, but the unit names and operational dates differ from the above. Seabrook units 1 and 2 (10% and 4% complete, respectively) could be operational in 1983 and 1984 and Millstone 3 (24% complete) in 1985. New England Power (NEP) units 1 and 2 could be operational in 1988 and 1990, if New England Power receives the abandoned Charlestown Naval Auxiliary Landing Field. The Sears Island coal-fired power plant has very little chance of being operational before 1990 and is not included in the contemporary scenario.

The New England area would suffer a greater socioeconomic impact under the DOE Mid-Mid scenario for three reasons: (1) the Sears Island facility, (2) dispersed facilities, requiring more construction and operative personnel per MW than multi-units, and (3) the paralleling of construction schedules. The impact of Sears Island is obvious, but the difference between the impacts of single and multiple-units may not be.

Sears Island is situated at the northeastern edge of Maine's labor shed. The Wiscasset nuclear site was further south, within easy reach of urban Portland construction workers via the Maine Turnpike, and 92% of its workforce was composed of local Maine residents. Sears Island is somewhat remote, an hour away from Augusta and the Turnpike and one and a half hours away from Portland. Therefore, the site area could be the recipient of at least a 15% construction and 50% operational workforce immigration.

Each nuclear power plant requires a construction and operational workforce. In estimating workforces the number of workers needed for one facility are not doubled for a two-unit facility because multi-units share many on-site structures and worker hours and therefore require only moderate expansion of various structures and worker categories (e.g., 100 guards are needed for one unit, 125 for two). The regional impact of 500 to 600 non-manuals at a two-unit facility would be less than that of an estimated 300 to 400 at

Table 1
Federal Region 1: Workforce Relocators, Costs, and Facility Benefits

Relocators and costs						
State	Plant/county	MW/fuel	Peak construction relocators ^a	Operational relocators ^b	Annual services and facilities cost (\$100,000/1977)	
					Construction	Operation
ME	Sears Island	1150 C	750	300	3.9	1.7
NH	Seabrook 1	1150 N	625	225	3.3	1.3
ME	Montague 1	1150 N	375	375	2.0	1.3
ME	Pilgrim 2	1150 N	500	150	2.7	0.9
RI	NEP 1	1150 N	348	225	1.9	1.3
CT	Millstone 3	1150 N	188	90	1.0	0.06
Totals			2786	1365	14.8	6.56

^aNo. of workers times 2.5.

^bNo. of workers times 3.0.

Regional construction and operation fiscal benefits

	\$ Million (escalating)
Construction payroll to 1990	2050
Local & regional material/supply expenditures to 1990	1050
Annual operations payroll in 1990	41
Annual local tax revenue in 1990	25

each separate unit, assuming relocation of a third or a half in either case. The Mid-Mid scenario would also require the hiring of a larger total of manual craftsmen for the five dispersed units because it would entail more on-site work.

The paralleling of construction schedules of four nuclear facilities in the Mid-Mid scenario could increase the number of craftsmen relocating to sites. A shortage of specific craftsmen (ironworkers, boilermakers, pipefitters, etc.) will occur as the supply proves insufficient to meet the demand at peak. This labor availability problem could cause operational date delays, excessive overtime, increased hiring to overcome delays, lower productivity, quality slippage and/or increased area immigration. If many of the major

regional construction projects that are being proposed (bridges, tunnels, off-shore oil construction/supply yards, boatbuilding facilities, refineries, etc.) were to occur during the peak power plant construction periods, the labor availability problem would significantly worsen and local socioeconomic impacts would increase.

In the southern and central area of New England, site accessibility is high and the skilled labor pool is large; construction workers easily travel 60 miles, and sometimes up to 90 miles, each way as a maximum daily commute. Areas around most of the plant sites in the two scenarios have available accommodations so that even in the worst case of worker immigration the socioeconomic impacts would not endanger area residents' health, morals, or social wellbeing.

The economic costs to the six site-vicinity communities in Federal Region 1, according to the Mid-Mid scenario, resulting from construction and operation workforce relocators was estimated to be \$1.5 and \$0.7 million (1977 dollars) respectively. These two costs are, respectively, the totals for peak-year services and for a year of the 20-year annualized costs for the new and/or expanded facilities for all six counties involved. They were derived by using the Argonne Social and Economic Assessment Model and do not show the compounded total of yearly costs incurred during construction. The relocation costs resulting from the contemporary scenario could be as low as half of the above for construction workers and possibly two-thirds for operational workers.

Construction worker payrolls are initially dispersed in a region in accordance with the workforce residence distributions. Assuming that 77 percent of the construction payroll of \$2,050 million (escalating dollars) predicted for this region as a consequence of the Mid-Mid scenario is spendable income, 47,000 secondary jobs will be supported. This is a rough calculation of secondary employment based on 30 jobs per million dollars of spendable total construction income.

Union boundaries play a major role in determining the area from which construction craftsmen are drawn and therefore the communities where economies are affected. In the case of the Northfield pumped storage facility the payroll was spent in communities east of the project site. At Seabrook the Portsmouth and Manchester based union halls are the determiners: in January 1979, 70 percent of the 2500-member construction workforce on site came from

New Hampshire, for craftsmen alone an even higher percentage would exist. At NEP 1 and 2 it has been estimated that 85 percent of the craftsmen will be from Rhode Island. Millstone 3 in July 1975 had 97.9 percent of its manpower originating from Connecticut.

More local and regional material/supply and service purchases will take place under the Mid-Mid scenario because of the duplication of many on-site facilities in single units along with the Sears Island plant. By 1990, about \$1 billion (escalating dollars) would have been placed into the New England economy as a result of the Mid-Mid scenario. With the Seabrook project (2 units) 8 percent complete, approximately \$63 million has already been channeled into local and regional purchases. At Millstone 3, with the project one quarter finished, \$22 million has been spent just in New London County, Connecticut. It was estimated several years ago that at the multi-NEP units approximately \$50 million would be spent in Rhode Island and \$100 million in the region; this is now recognized as possibly half of what might be spent.

The 1990 operational annual payrolls connected with the Mid-Mid scenario for the six projected power plants are estimated to total approximately \$41 million (escalated dollars). Because of the omission of Sears Island and the reduction in operation staffs due to multi-unit efficiency, the contemporary scenario would have a 1990 operations payroll of approximately \$27 million. The local communities in the vicinity of the proposed plants will be the beneficiaries, since 50 to 60 percent of the operational workforce will have relocated there. Almost all the operations staff personnel will live within 20 miles of the proposed plants.

A very rough estimate of 1990 Mid-Mid scenario local tax revenue for the six plants is \$25 million. The contemporary scenario, with the dropping of Sears Island and the removal of a nuclear unit from heavily taxed Plymouth County, would generate approximately 18 to 19 million dollars in local tax revenue in 1990. In some instances, multi-unit plants could generate 90 percent of the local taxing authorities' revenue, as in the case of NEP 1 and 2 and possibly the three Millstones. Utilities and communities can vary the manner in which a power plant is taxed. NEP units 1 and 2 are to be taxed on a uniform assessment rate for the book life of the two units. The local tax rate would be applied to the uniform assessment rate of 70 percent of the plant's initial investment, or approximately \$1,050 million. Some plants are taxed on the basis of a rising and depreciating plant investment, possibly 8

years of appreciation and 28 years of depreciation until the value reaches that of just the land.

Under the Mid-Mid scenario a socioeconomic factor, labor availability, could cause delays in achieving the operational dates for five of the six units because of the paralleling of construction schedules for four units and the remoteness of Sears Island. Local socioeconomic impacts and costs will not be disruptive enough in any site area to cause construction delays or to endanger the health, morals, or social well-being of area residents. The pay-rolls, local material/supply and service purchases, and tax revenue would be better dispersed throughout the region.

The contemporary scenario would result in few labor availability problems and possibly no delays, unless caused by unforeseen strikes, material shortages, equipment delays, or regulatory agency intervention. Costs and benefits would be more focused in three counties. The lessened material/supply and service purchases would be made in three primary states rather than five states. Tax revenues would be received by three towns rather than six, with two of the receiving towns getting increased revenue from multi-unit facilities.

FEDERAL REGION 2

There are two different energy development scenarios proposed for Federal Region 2 (New York and New Jersey). The Department of Energy's National Energy Plan Mid-Mid scenario projects that by 1990 there will be 13 new nuclear plants and 11,256 MW of coal-fired and pumped storage facilities, all in units of 400 MW and larger (Table 2). The other scenario (derived from a composite of contemporary utility plans and predicted plausible events) projects only seven new nuclear power plants -- one of them questionable, 3350 MW of coal-fired energy facilities, and no pumped storage facilities by 1990.

The Mid-Mid scenario has 10 of the 13 nuclear plants becoming operational between 1985 and 1990. At present one plant is complete (Salem 1), another is 95 percent complete (Salem 2), a third is 80 percent complete (Shoreham), a fourth is 25 percent complete (Nine Mile Point 2), a fifth and sixth are each 10 percent complete (Hope Creek 1 and 2) and a seventh is only 1 percent complete (Forked River), with construction now halted. Two nuclear units have been canceled (Greene County and Atlantic), two units appear infeasible (Indian Point - 1858 MW), and two units are to experience long delays (Jamesport and Sterling) and possible cancellation.

Table 2
Federal Region 2: Workforce Relocators, Costs, and Facility Benefits

Relocators and costs						
State	Plant/county	MW/fuel	Peak construction relocators ^a	Operational relocators ^b	Annual services and facilities cost (\$100,000/1977)	
					Construction	Operation
NY	Chautauqua	3900 C	1500	900	10.4	8.0
NY	Erie	730 C	250	75	2.3	0.8
NY	Niagara	850 C	375	100	3.4	1.0
NY	Sterling	1157 N	375	225	3.4	2.1
NY	Oswego	1976 C	750	300	6.7	2.5
NY	Nine Mile Pt.2	1100 N	750	450	6.7	4.1
NY	Schoharie	1000 PST	400	21	3.6	0.02
NY	Greene	1212 N	1500	225	10.4	2.1
NY	Orange	2000 PST	625	30	5.6	0.3
NY	Indian Point	1835 N	750	300	6.7	2.8
NY	Shoreham	519 N	625	120	5.6	1.2
NY	Jamesport	1150 N	750	450	6.7	4.1
NJ	Hunterdon	800 C	250	75	2.3	0.8
NJ	Forked River	1120 N	650	789	5.9	7.1
NJ	Atlantic	1150 N	500	300	4.5	2.8
NJ	Salem 1 & 2	2205 N	875	900	7.9	8.1
NJ	Hope Creek 1 & 2	2113 N	875	720	4.9	6.6
Totals			11800	5980	100.0	54.62

^aNo. of workers times 2.5.

^bNo. of workers times 3.0.

Regional construction and operation fiscal benefits

	\$ Million (escalating)
Construction payroll to 1990	7550
Local & regional material/supply expenditures to 1990	4735
Annual operations payroll in 1990	124
Annual local tax revenue in 1990	210

The Mid-Mid scenario envisions 8256 MW of coal-fired facilities dispersed at five locations and 3000 MW of pumped storage facilities at two locations by 1990. But, while it seems possible that 4200 MW of coal-fired generation might be operational by 1990 in four locations, there will certainly not be 3900 MW of coal-fired power in Chautauqua County (possibly 1600 MW, definitely not operational by 1985), and the two pumped storage facilities are doubtful.

Federal Region 2 would receive a greater socioeconomic impact from the Mid-Mid scenario for three reasons: (1) the far greater number of power facilities proposed, (2) the greater size of a few units, and (3) the paralleling of many nearby units' construction schedules. The Mid-Mid scenario would also involve more construction employment and the fiscal benefits as a whole would be greater.

The Mid-Mid scenario assumes construction of almost twice as many nuclear plants and three times as much coal-fired capacity as the contemporary scenario, plus an additional 3000 MW of pumped storage capacity. Labor availability problems, possible project delays, higher labor costs, and a higher workforce immigration could be symptomatic of the Mid-Mid scenario in this Region. Four areas where the Mid-Mid scenario would result in competition between projects and very demanding construction schedules are: (1) southern and eastern New Jersey, (2) New York's Lake Erie region, (3) Oswego, NY, and (4) the Albany, NY region.

Adherence to the Mid-Mid scenario would certainly cause delays in operations schedules for several of the six proposed nuclear plants for New Jersey due to competition between the plants themselves, and with a burgeoning Atlantic City casino complex and a Philadelphia refinery, these problems would produce critical labor shortages at Hope Creek's two units and Forked River. Under the contemporary scenario with Salem 1 and 2 complete, Atlantic canceled, and Forked River delayed, labor availability should not be a problem at Hope Creek or later at Forked River.

The 5480 MW of coal-fired units in Chautauqua, Erie, and Niagara Counties plus the 675 MW of hydroelectric facilities, all proposed for 1985 in the Mid-Mid scenario, could not be accomplished. Though the Buffalo, Erie, and Rochester urban areas could supply large numbers of construction workers, these would not include sufficient workers in specific crafts. Chautauqua County would not be able to accommodate the predicted influx of 1500 immigrants. The three 850 MW coal-fired plants (two in Chautauqua and one in

Niagara) proposed in the contemporary scenario for operation in the late 1980s could be constructed on schedule. Impacts from their construction would be noticeable in the areas, but many of the adverse aspects could be mitigated.

The Mid-Mid scenario proposes 6912 MW of nuclear, coal-fired, oil-fired, and combined-cycle power plants for Oswego and Cayuga Counties between 1976 and 1986. Although the past decade of major power plant construction around Oswego has resulted in a large supply of construction workers in the Oswego-Syracuse area, the immensity of this scenario's construction activity would definitely cause manpower shortages in several critical crafts and labor turn-overs due to the inability of the area to accommodate immigration. In the contemporary scenario 1976 MW of coal-fired and 1157 MW of nuclear generating facilities would not be constructed until after 1990.

The construction of two major projects, a 1000 MW pumped storage facility and a 1212 MW nuclear plant, in adjacent rural counties outside Albany would result in local socioeconomic and labor availability problems. Local socioeconomic issues would be prevalent in Greene County where the tax free status of the utility precludes new tax revenues to upgrade the county's infrastructure to accommodate the 14 to 20 percent workforce immigration predicted by Oak Ridge National Laboratory. Also, the agricultural and service-oriented economies of Greene and Schoharie Counties would result in shortages of certain skilled craftsmen, which would cause the delays, especially in light of two coincidental large projects planned. In the contemporary scenario the nuclear plant is canceled and the pumped storage facility is postponed beyond 1990.

Federal Region 2 by 1990 is projected to experience about 11,800 construction workforce and 5980 operational personnel relocations (including family members) due to project employment according to the Mid-Mid scenario. The economic costs to the project adjacent communities estimated by the Argonne SEAM model will be \$10.0 and \$5.5 million (1977 dollars) during the peak construction year and the initial operations year, respectively. The peak service and facility costs (annualized over 20 years) would be spread among the 13 counties involved. Costs incurred as a result of the contemporary scenario could be as low as 38 percent of the above for construction workers and possibly 25 percent for operational personnel.

Construction workers' payrolls are dispersed in accordance with their residence distribution. All of the payroll generated in the region will not

necessarily be distributed to the region's inhabitants as some workers from surrounding states commute in on a daily or weekly basis. Assuming that 77 percent of the total construction payroll of \$7550 million (escalating dollars) predicted for this region between 1975 and 1990 in the Mid-Mid scenario is spendable income, 158,550 secondary jobs will result (calculated roughly on the basis of 30 jobs per million dollars of spendable income). The spendable construction income of the construction workforce in the contemporary scenario would support only a third as many secondary jobs.

The energy facility construction in the Mid-Mid scenario could place \$4735 million (escalating dollars) into the economies of New York and New Jersey by 1990 from the local and regional material/supply and service purchases at the 17 construction sites. Because of the closeness of Erie, Pittsburgh, and Philadelphia (all in Pennsylvania) to several Federal Region 2 construction sites, some of the regional purchases will be made outside Federal Region 2.

In 1990, operational payrolls from the new energy facilities proposed in the Mid-Mid scenario could amount to \$125 million (escalated dollars). The contemporary scenario would generate a 1990 operational payroll of possibly half that amount.

A very rough estimate of local tax revenue expected in 1990 is \$210 million (escalated dollars) for the Mid-Mid scenario and \$100 million for the contemporary scenario. Since the contemporary scenario does not include the non-taxable Greene County facility or the 3000 MW of low taxed pumped storage facilities, its ratio of tax revenue to MW is high.

Under the Mid-Mid scenario a socioeconomic factor, labor availability, would cause delays in achieving the operational dates of the projected 25,141 MW of new power generation facilities. In the contemporary scenario, building 9605 MW of new power generation facilities would raise fewer labor availability problems. Local socioeconomic impacts could become significant enough in several communities to cause facility delays as a consequence of worker disaffection and high turnover in the Mid-Mid scenario but not in the contemporary scenario.

FEDERAL REGION 3

There are two different energy development scenarios proposed for Federal Region 3 (Pennsylvania, Delaware, Maryland, District of Columbia, West Virginia, and Virginia). One is the Department of Energy's National Energy

Plan Mid-Mid scenario which projects 24,883 MW of new generating facilities by 1990 (Table 3), each unit being 400 MW or larger. The other scenario is a composite of contemporary utility plans and predicted plausible plans, in which about 23 percent fewer MW of facilities are to be constructed: some of the proposed facilities do not correspond to those in the Mid-Mid scenario.

Both scenarios concur on the continued construction of Beaver Valley 2 (30% complete), Susquehanna 1 and 2 (75 and 50% complete, respectively), and Limerick 1 and 2 (46 and 31% complete, respectively). Three Mile Island 2 was completed in 1978 and will, possibly, be back on line in about two years. In the contemporary scenario the Dauphine County (PA) 1815 MW pumped storage facility has been deleted and a 1000 MW Tucker County (WV) facility added. Of the Mid-Mid scenario's projected coal-fired facilities, the contemporary scenario deleted the following: a 1000 MW Cecil County (MD) plant, a 1000 MW Monroe County (PA) plant, a 1000 MW New Castle County (DE) plant, a 2407 MW Bucks County (PA) plant and 825 MW of generation from Indiana County (PA). It adds the following oil- and coal-fired facilities: a 400 MW Wicomico County (MD) plant, a 400 MW Montgomery County (MD) plant, a 1200 MW Anne Arundel County (MD) plant, a 625 MW Erie County (PA) plant, an 825 MW Beaver County (PA) plant, and an additional 224 MW of facilities in Armstrong County (PA).

The Mid-Mid scenario and the contemporary scenario both place new energy facilities in 17 locations, but only 11 of these facilities are the same. A potential labor availability problem in the Mid-Mid scenario (planned construction of one 1000 MW coal-fired unit for Cecil County, Maryland and one for adjacent New Castle County, Delaware at the same time) does not appear in the contemporary scenario. In the Mid-Mid scenario, this problem would arise at Bath County and Rockingham County, Virginia, where parallel pumped storage projects are proposed. In the contemporary scenario, the pumped storage facilities proposed for Bath County, Virginia and Tucker County, West Virginia, will experience some labor availability problems due to each site's remoteness. Mine employment conditions will also affect area worker availability.

Local socioeconomic impacts should not delay any nuclear, oil-fired, or coal-fired power plants in either scenario, although the two large coal-fired power plants on the Ohio River in West Virginia will cause some strains in the local infrastructure. All three pumped storage facilities will require definite actions to alleviate socioeconomic impacts to reduce the chance of

Table 3
Federal Region 1: Workforce Relocators, Costs, and Facility Benefits

Relocators and costs

State	Plant/county	MW/fuel	Peak construction relocators ^a	Operational relocators ^b	Annual services and facilities cost (\$100,000/1977)	
					Construction	Operation
PA	Beaver Valley 2	856 N	405	90	2.1	0.6
PA	Armstrong	1666 C	625	300	3.2	1.8
PA	Indiana	1450 C	375	150	2.0	0.9
PA	Three Mile Island	880 N	1250	1050	6.4	5.3
PA	Dauphine	1715 PST	625	30	3.2	0.02
PA	Susquehanna	2100 N	750	256	3.8	1.4
PA	Monroe	1000 C	500	225	2.6	1.2
PA	Bucks	2427 C	500	150	2.6	0.9
PA	Limerick 1 & 2	2300 N	400	150	2.1	0.9
DE	New Castle	1000 C	375	225	2.0	1.2
DE	Sussex	400 C	375	120	2.0	0.7
MD	Cecil	1000 C	250	225	1.4	1.2
WV	Pleasants	1252 C	650	250	3.3	1.4
WV	Marion	1300 C	650	250	3.3	1.4
VA	Rockingham	1250 PST	750	30	3.8	0.02
VA	Bath	2411 PST	900	40	4.6	0.02
VA	North Anna 3 & 4	1876 N	1000	540	11.7	2.8
	Totals		10380	4081	60.1	21.56

^aNo. of workers times 2.5.

^bNo. of workers times 3.0.

Regional construction and operation fiscal benefits

	\$ million (escalating)
Construction payroll to 1990	7750
Local & regional material/supply expenditures to 1990	4550
Annual operations payroll in 1990	121
Annual local tax revenue in 1990	52

expensive project delays.

Federal Region 3 is projected to experience about 10,380 construction workforce and 4080 operational personnel relocations (including family members) due to project employment according to the Mid-Mid scenario. The economic costs to the project-adjacent communities estimated by the Argonne SEAM model will be \$6.0 and \$2.2 million (1977 dollars) during the peak construction year and the initial operations year, respectively. These are service costs and facility costs annualized over 20 years. Costs incurred as a result of the contemporary scenario would be about 20 percent lower. The costs incurred by weekday relocators have not been determined.

Construction workers' payrolls are dispersed in accordance with their residential distribution. Assuming that 77 percent of the total construction payroll of \$7750 million (escalating dollars) predicted for this region through 1990 in the Mid-Mid scenario is spendable income, 179,000 secondary jobs will be supported. The spendable income of the construction workforce in the contemporary scenario would support only 138,000 secondary jobs.

Each construction project results in local and regional expenditures for material and supply purchases and needed services. The Mid-Mid scenario's energy facility construction plans could place about \$4550 million (escalating dollars) into the economies of the Region 3 states. Also, the nearness of several large urban areas of Federal Region 3 to proposed construction sites in Federal Region 2 will generate additional expenditures within Region 3. The contemporary scenario would place approximately \$3500 million dollars (escalating dollars) into Region 3.

In 1990, operational payrolls from the new energy facilities proposed in the Mid-Mid scenario could amount to \$121 million (escalated dollars). The contemporary scenario would generate a 1990 operational payroll of approximately \$95 million.

A very rough estimate of the local tax revenue expected in 1990 is \$52 million (escalated dollars) for the Mid-Mid scenario and about \$49 million for the contemporary scenario. Although the Mid-Mid scenario forecasts that Federal Regions 2 and 3 will receive similar amounts of new generation capacity, Region 3 will receive only one fourth as much local tax revenue as Region 2 because the Pennsylvania tax situation allows almost no facility revenues to accrue to local communities, and Region 3 communities have lower tax rates. Because the contemporary scenario forecasts two new facilities (a

1000 MW West Virginia pumped storage plant and a 1200 MW oil-fired Maryland plant) outside Pennsylvania and omits several facilities inside Pennsylvania, its local tax revenue prediction for Region 3 is about half that for Region 2.

Under the Mid-Mid scenario it is highly probable that availability of specialty craftsmen would cause delays in the operational dates of the plants proposed for northern Delaware and eastern Maryland. Local socioeconomic impacts and labor availability problems could delay the two Virginia pumped storage facilities proposed in the Mid-Mid scenario and the additional West Virginia one proposed in the contemporary scenario because of site remoteness, accessibility difficulties, and inadequate accommodations.