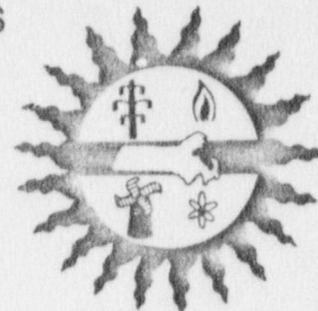




THE COMMONWEALTH OF MASSACHUSETTS

ENERGY FACILITIES  
SITING COUNCIL



MICHAEL S. DUKAKIS  
GOVERNOR

CHRISTINE B. SULLIVAN  
CHAIRMAN

Ronald L. Ballard, Chief  
Environmental Projects Branch 1  
Division of Site Safety and  
Environmental Analysis  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

1 November 1978

Re: Docket Nos. STN 50-568 and 569

Mr. Ballard:

Thank you for your letter of 27 September requesting information about the three sites in Massachusetts being considered as alternatives for NEP 1 and 2. The Siting Council Staff appreciates the opportunity to assist NRC staff in its review of Rowe, Gill and Erving at this early stage in your process.

Attached is a brief report outlining some of the major resource characteristics of the three sites. Highlighted are several possible environmental impacts which your staff may wish to focus on in your review.

As you will note in our report, most of our effort was directed toward the Gill and Erving sites rather than Rowe. Given the limited time period within which we were working and our judgement that Rowe appears to be a far less viable site from a water availability perspective, we decided to devote more resources toward reviewing Gill and Erving.

The research for this report was completed in two weeks and is, therefore, only a cursory review. We would also caution that the opinions expressed here are those of the Siting Council Staff and do not necessarily reflect the thinking of the Siting Council.

If we can be of any further assistance, please contact Mary Beth Gentleman of our staff.

*[Signature]*  
EDWARD J. DAILEY  
Director

*[Signature]*  
7811160126

*0002 (179) ENCL 5*  
*ES*  
*///*  
*OTHER ENCL*  
*TO*  
*P. COTA*

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of )  
NEW ENGLAND POWER COMPANY, ) Docket Nos. STN 50-568  
et al. (NEP 1 and 2) ) STN 50-569  
)

RESPONSE TO REQUEST FOR INFORMATION  
CONCERNING ROWE, GILL, AND ERVING  
ALTERNATIVE SITES

1.0 Rowe Site (Bear Swamp)

The Rowe site is located in the Deerfield River Basin, adjacent to the Bear Swamp Pumped Storage Upper Reservoir and the Deerfield River at a point approximately three river miles downstream of the Bear Swamp Lower Reservoir (see map on next page). The Deerfield River is a tributary of the Connecticut River, flowing in from the west at a point approximately three river miles downstream of the Turners Falls Dam. The Rowe site is approximately twenty miles in a westerly direction from the Turners Falls Dam. This location suggests that the Deerfield River would be the source of cooling water for a plant on that site.



The Deerfield River is an extensively coordinated hydraulic system.<sup>1</sup> Two upstream reservoirs (approximately 7.6 billion cubic feet of usable capacity<sup>2</sup>) regulate the flow in the river for the operation of a series of automated, run-of-the-river hydro-electric plants (98.4 MW<sup>3</sup>). In addition, the Bear Swamp Pumped Storage Facility (600 MW<sup>4</sup>) and the Yankee Rowe Nuclear Power Plant (175 MW<sup>5</sup>), which is located approximately five river miles upstream from the Bear Swamp Lower Reservoir, utilize the Deerfield River for power production purposes. The Siting Council is not aware of any major proposals for future water uses in the Deerfield Basin.

The major water resource issue in locating a 2400 MW plant at the Rowe site would be flow availability.

---

<sup>1</sup> Federal Power Commission, Connecticut River Basin, December, 1976, pp. 3-15.

<sup>2</sup> U.S.G.S., Water Resources Data for Massachusetts, New Hampshire, Rhode Island, Vermont, 1970, p. 211.

<sup>3</sup> Massachusetts Electric Co., et al., Supplement 1B for the Ten Year Period 1977-1987 to the Long Range Forecast filed with the Energy Facilities Siting Council.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

A U.S.G.S. gaging station was established just downstream of the Bear Swamp Lower Reservoir in 1974, which is centered in a five mile reach of the Deerfield River likely to include intake and discharge structures for this 2400 MW plant. This limited data source indicates a mean flow in the range of 500 to 1000 cfs and a minimum flow in the range of 25 to 100 cfs. These estimated ranges are supported by data collected at the Charlemont gaging station, located approximately ten river miles downstream of the Bear Swamp Lower Reservoir Dam. An estimate of natural minimum flow on the order of 50 cfs past the site can be obtained by using the .20 cfs per square mile of drainage area guideline developed for the Connecticut River.<sup>6</sup>

Using the water use data for the proposed Montague Nuclear Power Plant (2300 MW) for illustrative purposes, a natural draft cooling system at Rowe would require an average intake of 64.5 cfs and represent an average consumption of 51 cfs.<sup>7</sup> These numbers indicate that 100

---

<sup>6</sup> For a discussion of the standard see Environmental Research and Technology, Inc., Potential Impacts on the Connecticut River of the Proposed Montague Nuclear Power Plant, Nov., 1977, prepared for the Energy Facilities Siting Council, pp. 2-40. This study has been submitted to NRC in Docket Nos. 50-496, 50-497.

<sup>7</sup> Maximum values: 85.8 cfs intake, 68.6 cfs consumption. Values from Montague Final Environmental Statement, NUREG-0084, February, 1977.

to 120 cfs would have to be provided continuously to the Rowe site just to achieve the .20 cfs standard downstream of the plant. Consideration of entrainment, thermal, and other localized flow problems could dictate a larger minimum flow requirement.

The river system operational changes necessary to achieve such a continuous minimum flow would substantially reduce the peaking power value of the conventional and pumped storage hydropower capacity installed in the basin. The net effect would be a reduction in the energy benefits achieved by constructing the plant at the Rowe site.

Based upon what appears to be a significant lack of water at the site, our Staff has concluded that Bear Swamp is neither viable nor desirable as a site for twin units in the 2400 MW range. Facilities of that size, in general, will be difficult to site inland in Massachusetts due to the present high rate of utilization of the region's rivers. Smaller facilities or plants which require less water for make-up and cooling would be more consistent with the water resources available inland in this state.

## 2.0 Gill and Erving

The map on the following page shows the location of the Gill and Erving sites on the Connecticut River. Given their close proximity, they have many environmental similarities. Therefore, several of the analyses which follow treat both sites jointly.

The environmental impact areas discussed below include the following:

- water resources, including impacts on existing hydropower facilities
- water quality
- fisheries, including impacts on the shortnosed sturgeon, an endangered species
- terrestrial
- land use
- visual
- socioeconomic
- transmission lines
- public health.

### 2.1 Water Resources

The Gill and Erving sites border on the Turners Falls Pool section of the Connecticut River. This body of water would be the most likely source of cooling water for a plant at either site. Being located in essentially

MAP



the same portion of the Turners Falls Pool, these sites will incur water resource impacts of a very similar nature. Therefore, the observations below apply to both sites.

The flow of the Connecticut River in the Turners Falls Pool is affected by several factors. The outflow of the pool (average discharge = 11,670 cfs<sup>8</sup>) is regulated by the Turners Falls Dam and the operation of its associated hydroelectric facilities. The Millers River (average discharge = 610 cfs<sup>9</sup>) is the only major tributary flowing directly into the Turners Falls Pool, entering at a location just downstream of the Gill/Erving sites. The Northfield Mountain Pumped Storage Facility (1000 MW installed capacity) uses the Turners Falls Pool as its lower reservoir, with the intake/discharge facility located on the east bank, directly upstream from the Erving site and directly across from the Gill site. The upstream inflow is regulated by several reservoirs with a combined usable capacity of about thirty-five billion cubic feet.<sup>10</sup> The primary use of the mainstream

---

<sup>8</sup> U.S.G.S., Water Resources Data for Massachusetts, New Hampshire, Rhode Island, Vermont, 1970, p. 178

<sup>9</sup> Ibid., p. 177.

<sup>10</sup> Ibid., p. 175.

reservoirs is for hydropower production (approximately 380 MW installed capacity). The reservoirs on the tributaries are operated for flood control, and to a lesser extent, power, water supply and recreation.<sup>11</sup>

There are two major water resource-related projects which are proposed for the region. One involves the diversion of Connecticut River water to Quabbin Reservoir. The Quabbin diversion plan would skim the spring floods of the Connecticut, utilizing the Northfield Mountain Pumped Storage facility as a means for diverting this water.<sup>12</sup>

The other major proposal is the 2300 MW Montague Nuclear Power Plant. As proposed, this facility would have its intake and discharge facilities located in the Holyoke Pool (approximately four river miles below the Turners Falls Dam). However, potential impacts from that plant on the shortnosed sturgeon population (an endangered species) within the Holyoke Pool may require the selection of an alternative intake location.

---

<sup>11</sup> Environmental Research, Potential Impacts, op. cit., p. 2-3, Table 2.3-1.

<sup>12</sup> For more information concerning this project, see Army Corps of Engineers, Final Environmental Statement, Northfield Mountain and Millers River Diversion August, 1976 and the paper enclosed with this report entitled "Brief Description of Northfield Water Supply Project." See also the enclosed Metropolitan District Commission brochure on the significance of this project with respect to provision of potable water for major portions of the state.

The Horse Race area of the Turners Falls Pool is one possible alternative.<sup>13</sup>

In addition to these proposed projects, an ongoing program to reestablish anadromous fish runs in the Connecticut River will include requirements for low flow augmentation.<sup>14</sup> For this purpose, the Federal Energy Regulatory Commission plans to include in future Connecticut River hydropower licenses a requirement that the plants pass, at all times, a minimum flow equivalent to .20 cfs per square mile of drainage area. This formula translates into a minimum release of 1430 cfs at the Turners Falls Dam, which Western Massachusetts Electric Company intends to implement in the event that Montague Nuclear Power Plant becomes operational.<sup>15</sup>

The major water resource issues associated with the Gill/Erving sites will be very similar to those identified for the Montague proposal because the plant designs and locations, as currently discussed, are very similar. A detailed discussion of many of these issues can be found in a report prepared for the Siting Council

---

<sup>13</sup> Environmental Research and Technology, Potential Impacts, op. cit., p. 8-18.

<sup>14</sup> Ibid., p. 2-40.

<sup>15</sup> Ibid., p. 6-1.

entitled Potential Impacts on the Connecticut River of the Proposed Montague Nuclear Power Plant, a copy of which is enclosed. Sections of particular importance within that report and errata sheet are indicated by asterisks.

The consumptive use of a plant of this size may introduce significant additional operating constraints during periods of low flow for the purpose of meeting minimum release requirements at the Turners Falls Dam.<sup>16</sup> The proximity of the Gill/Erving intake to the Northfield Pumped Storage intake (and possibly the Montague Nuclear Power Plant intake) may create significant entrainment, recirculation and other localized flow problems. These issues will be of major importance in the event that a 2400 MW plant is proposed in either Gill or Erving.

## 2.2 Water Quality Impacts

The major potential environmental impacts of intake-discharge structures associated with a nuclear power plant sited on a pool along the Connecticut River affect water quality and fisheries. For example, during low-flow periods, the proposed Montague Nuclear Plant

---

<sup>16</sup> U.S. NRC, Montague FES, op. cit.

would increase the concentration of total dissolved solids between Turners Falls and the Holyoke Dam by 40%. Furthermore, based on literature values of lethal concentrations of copper for rainbow trout, EPA (1976) water quality criteria for copper (Massachusetts' future standards) are already being exceeded at times in the Holyoke Pool. In the event that the Montague Nuclear Station commences operation as currently designed, the criteria will be violated all of the time if the present water quality (hardness) of the Connecticut River remains as it is today. If future ambient concentrations improve (decline), violations of the standards would occur at times due to the operation of Montague alone.<sup>17</sup>

Similarly, based on the values for rainbow trout, ambient concentrations of zinc exceed the criteria at all times. If the ambient concentration of zinc were negligible, there would also be violations due to the operation of Montague alone. Before definite conclusions about the impact of copper and zinc are drawn, however, bioassays of the Connecticut River must be completed to determine if the literature values are representative of the Connecticut.

---

<sup>17</sup> Environmental Research and Technology, Potential Impacts, op. cit., p. 9-4.

Heavy metals are also of special significance because of their toxicity to aquatic life. Water quality data<sup>18</sup> indicate that ambient concentrations of heavy metals in the river at times exceed criteria recommended by EPA (1976) for cadmium and mercury.

### 2.3 Fisheries Impacts

The impacts on fish and other aquatic life in the Connecticut River include thermal, entrainment, heavy metals, and flow regime. Of these, entrainment, a major impact has not been previously discussed.

Entrainment impacts associated with a nuclear power plant in the vicinity of the Holyoke and Turners Falls pools are of major concern because of the number of species which spawn in or near these pools. The larvae of most species are planktonic and would be subject to entrainment.<sup>19</sup> These include the economically-important American shad and the endangered shortnosed sturgeon. Shad eggs, for example, do not settle to the bottom immediately after spawning and may float up to five miles depending upon current conditions.

Further, the Holyoke Pool may be considered a "critical habitat" for the shortnosed sturgeon according

---

<sup>18</sup> Ibid., p. 2-56-60.

<sup>19</sup> Ibid., p. 6-31

to the United States Endangered Species Act of 1973 (P.L. 93-05).<sup>20</sup> The shortnosed sturgeon spawn demersal eggs which are not adhesive, and which could therefore pose a potential egg entrainment problem as the sturgeon larvae drift downstream as they mature.

After the new fish ladder now under construction at the Turners Falls Dam is completed (estimated for 1981), shortnosed sturgeon may ascend to the Turners Falls Pool as well. This theory is supported by observations of sturgeon species ascending fish ladders in California.<sup>21</sup>

The state fish and game agencies conduct costly stocking programs throughout the Connecticut River and its tributaries. In 1976, Massachusetts stocked approximately 170,000 browns, brooks and rainbow trout of catchable size in the tributaries of the Connecticut River. The U.S. Fish and Wildlife Service conducts an extensive stocking program for Atlantic salmon.<sup>22</sup> A new federal hatchery is under construction upstream at Bethel, Vermont, at a cost of \$5.3 million. Fishways

---

<sup>20</sup> Ibid., p. 8-16.

<sup>21</sup> Ibid., p. 8-17.

<sup>22</sup> Ibid., p. 2-37.

operated by that federal program in cooperation with New England Power Company and Western Massachusetts Electric Company range in cost from \$1.2 million for the Holyoke Dam fish elevator to \$10 million for the vertical-slot fishways at Turners Falls Dam.<sup>23</sup> Sport and commercial fishing (shad) is expected to increase in the future.

The combined effects on aquatic ecology of the Northfield Pumped Storage facility, the proposed Montague Nuclear Power Plant, and a possible additional facility at Gill or Erving are unknown but merit careful assessment. The combination of entrainment plus increased concentrations of copper and heavy metals could result in harmful effects felt throughout the food chain.

#### 2.4 Terrestrial Impacts

A brief site observation indicated that the eastern half of the Gill site is on a flood plain of the Connecticut River, about fifteen to twenty feet above the river (in late October) in unconsolidated glacial outwash. It is currently being used for production of corn and potatoes. The western portion of the site is a hilly, wooded area.

---

<sup>23</sup> Ibid., p. 2-38.



If the plant were sited in the eastern section, we would anticipate that special construction procedures would be used as generally required for building on flood plains or any unconsolidated materials.<sup>24</sup>

The Erving site, which includes sections of both the towns of Erving and Northfield, is mainly hilly and wooded, with some flatter land in the southern portion of the site. A major transmission line, which spans the Connecticut River, traverses the site's southern section.

Outcrops identified on the Gill and Erving sites include well-indurated feldspathic sandstone (arkose), a pebble conglomerate, a schist (Joshua), and a gneiss (Poplar Mountain).

We urge the NRC staff to consider the impacts, if any, which drilling and blasting at either site would have on the Northfield Mountain Pumped Storage Facility and its associated underground tunnels. Gneisses and schists are often friable and fissile and have been known to separate along micaceous zones. The excava-

---

<sup>24</sup> For more information concerning Massachusetts wetlands restrictions, contact the Water Resources Division of the Department of Environmental Management and the Wetlands Division of the Department of Environmental Quality Engineering. See G.L.c. 131 §§40, 40A.

tions in the bedrock at Northfield Mountain are currently held together to a great extent by pin bolts and metal plates which are commonly-used mining techniques for friable and fissile rock. In the event that either site were chosen, preventive measures would have to be taken to prevent cave-ins and dislocations throughout the Northfield Project area.

#### 2.5 Land Use Impacts

Use of the Gill site for a power plant would result in taking agricultural land out of production. Gill's "Local Growth Policy Statement", a copy of which is enclosed, indicates that the town considers loss of farmland to be a problem which it is attempting to control. In the early 1970's, the creation of a state park (Grassy Hill State Park) on the Gill site was opposed, in part, because it would have entailed the loss of agricultural land.<sup>25</sup>

With respect to the Erving site, the Town of Erving is currently researching the feasibility of establishing an industrial park on land adjacent to the southern boundary line of the site. As part of its planning effort, the town has asked NEPCO about the availability

---

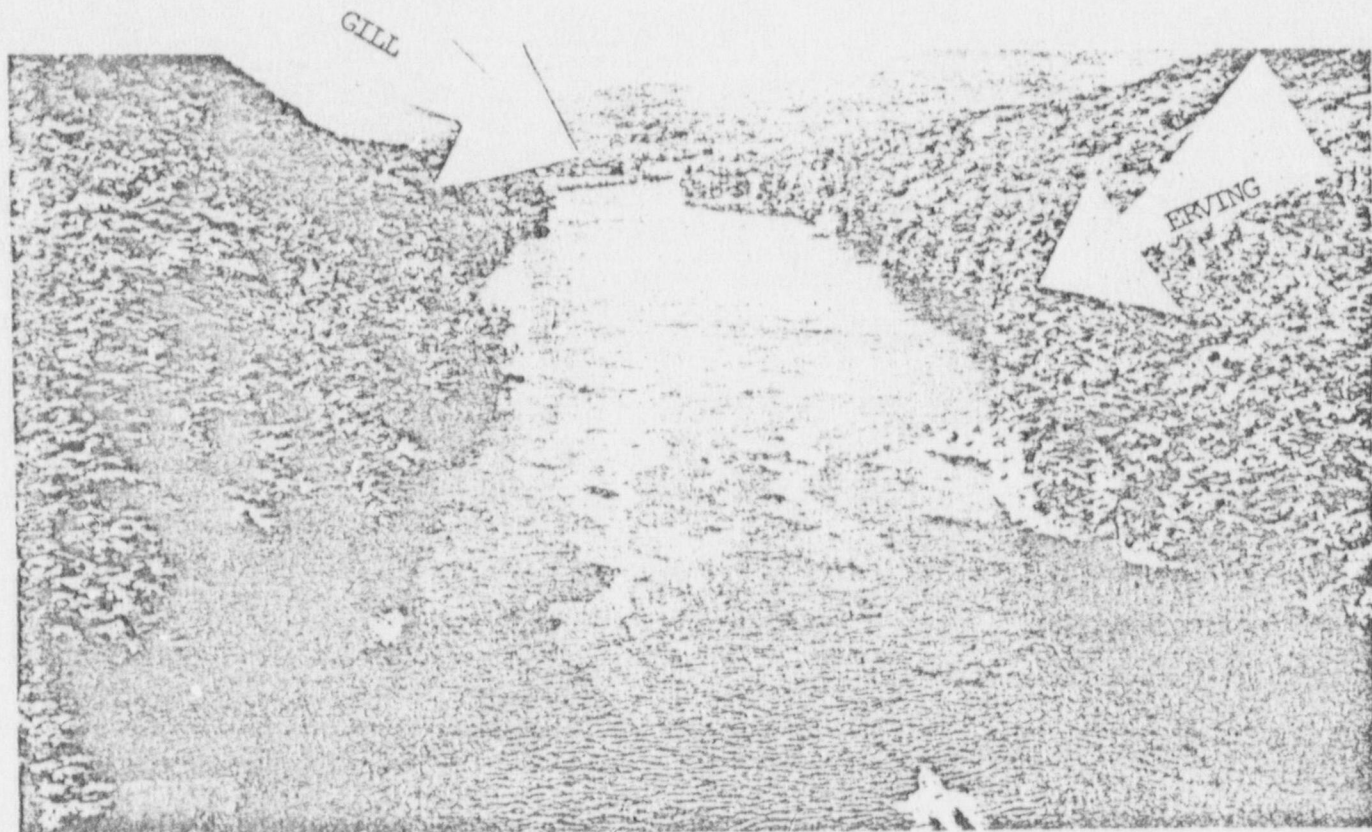
<sup>25</sup> For information on the status of that proposal, contact the Forest and Parks Division of the Department of Environmental Management.

of about twenty acres of the Erving site which abut the park site. NEPCO has indicated that the land may be available, but further discussion of the matter will be needed. At present, Erving is searching for funding to assist with the park development costs, particularly the cost of getting water to the site. Because of the uncertainty with funding, the town has no firm timetable for the establishment of the park.

#### 2.6 Visual Impact

The Gill and Erving sites are located within ten miles of fourteen state forests and parks utilized year-round for fishing, hiking, hunting, snowmobiling and skiing. Both sites are within the viewshed of the Mohawk Trail (Route 2) which is a designated tourist route. The photo on the next page shows a view of the two sites from the Mohawk Trail as one crosses the Connecticut River over the French King Bridge.

Due to the nature of the region, the contour of the land, and the location of the Mohawk Trail, it is our opinion that a plant at either site would have a significant adverse visual impact on the region. Regardless of whether natural draft or circular mechanical draft towers were to be installed, the facility would be highly visible at either site. Of course, the



-GREENFIELD RECORDER PHOTO

use of natural draft towers would extend the viewshed distance even further into the surrounding region and may constitute an unacceptable visual impact.

We urge the staff to assess the social and economic impacts associated with the visual impact which a plant at either site would create. While tourism does not dominate the economic base of Franklin County, in recent years it has been one of the few growth industries in the region. Therefore, it is critical that a rigorous visual impact assessment be done to ascertain the extent to which tourism may be affected by siting a plant in the Mohawk Trail viewshed.<sup>26</sup>

#### 2.7 Socioeconomic Impacts

The property tax structure of Massachusetts is such that all property tax revenues from power plants go to the host town. Some further distribution of revenues occurs via county tax payments by the host town, but that tends to involve only a small fraction of the tax revenues from the plant.<sup>27</sup>

---

<sup>26</sup> The NRC staff will notice on site visit that while part of the Northfield Mountain facility is located at the same point of the river, it is not visible from the Mohawk Trail.

<sup>27</sup> In the event that the Erving site is selected, the tax distribution situation will be more complex because that site spans sections of two towns, Erving and Northfield.

As a result of this narrow distribution of tax benefits, the county and the municipalities surrounding the host town receive little direct benefit from the plant, despite the fact that they may have to bear costs traditionally associated with large influxes of workers into a region.<sup>28</sup> The degree to which the neighboring towns are impacted is, of course, a function of the extent to which the construction force must immigrate instead of commute. The rate of commutation, in turn, is a function of the size of the available labor pool within commuting distance of the project.

In calculating the extent of immigration which construction of a plant at the Gill or Erving sites would entail, we urge the staff to consider the possibility that one or two other major construction projects may be occurring simultaneously in the region, namely the Quabbin Water Diversion and/or the Montague Nuclear Power Plant. If either one of these projects were under construction at the same time that units were being built in Gill or Erving, we would anticipate a much higher rate

---

<sup>28</sup> A complete discussion of our view of the problem of cost dissociations over space and time can be found in Section 3.3.2 of the enclosed staff document entitled "EFSC Staff Review and Findings: Northeast Nuclear Energy Company's Socioeconomic Impact Analysis of the Proposed Montague Nuclear Station." This study has been filed in Docket Nos. 50-496, 50-497.

of immigration into the region due to the finite amount of available labor within the commuter shed.

Unusually low vacancy rates in housing, part-time town governments, and strained town budgets in the region indicate that, in general, the capacity of the area to absorb a large influx of workers is poor. In the event that two or more major construction projects were planned to be underway simultaneously, somewhat complex mitigation agreements should be required of the applicants to protect the county and neighboring towns from fiscal loss and undesirable changes in their quality of life.

#### 2.8 Transmission Line Impacts

The suitability of the Gill and Erving sites would, in part, be contingent upon the acceptability of the impacts of the transmission lines required. Enclosed is a document entitled "High Voltage Transmission Facilities, Informational Requirements for Proposed Facilities" which details the factors which we believe should be considered in evaluating transmission lines.

At the alternative sites level of review, our staff would be particularly interested in knowing the length and width of new rights-of-way required, the terrestrial and visual impacts anticipated, and the location of the

load center to be served. All of those factors were considered in our review of the ninety-mile transmission line proposed with the Montague Nuclear Station, and we would anticipate doing a similar review for any facilities proposed at either Gill or Erving.

#### 2.9 Public Health Impacts

A final area of concern, one over which the Siting Council has no jurisdiction, is the potential for public health impacts and increased risk which a concentration of nuclear facilities may pose to the region. The area already hosts one 175 MW nuclear plant in Rowe, which lies twenty-one miles west north west of the Gill/Erving sites, and another 540 MW nuclear station in Vernon, Vermont, only fourteen miles north of the sites. An additional 2300 MW station is proposed for Montague Plains, about three miles away in a southwesterly direction. The possibility of yet another 2400 MW station in the same region naturally raises some questions as to the synergistic impact that the sum of these units may have on the health of the area residents and the risk that that number of units poses.

We urge the staff to clearly address this issue in the DEIS, outlining the risks associated with plant operation, decommissioning, and on-site waste storage.



The residents of the area will need an accurate assessment of the synergistic risks involved in order to participate, in an informed manner, in the NEPA process.