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Utility Survey on Nuclear Power Plant Siting and Nuclear Energy Centers

David F. Cope
Howard F. Bauman

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UTILITY SURVEY ON NUCLEAR POWER PLANT SITING
AND NUCLEAR ENERGY CENTERS

David F. Cope Howard F. Bauman

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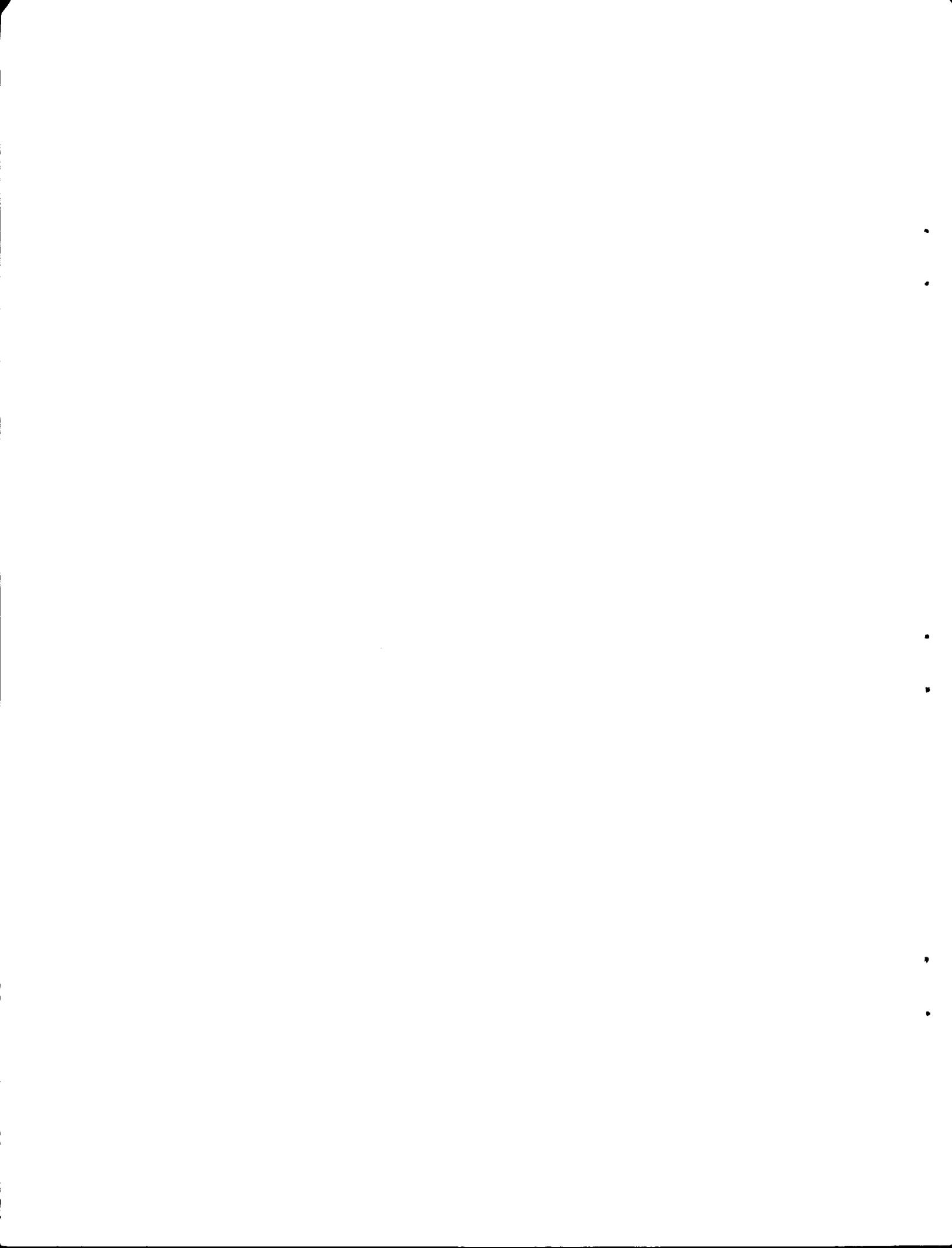
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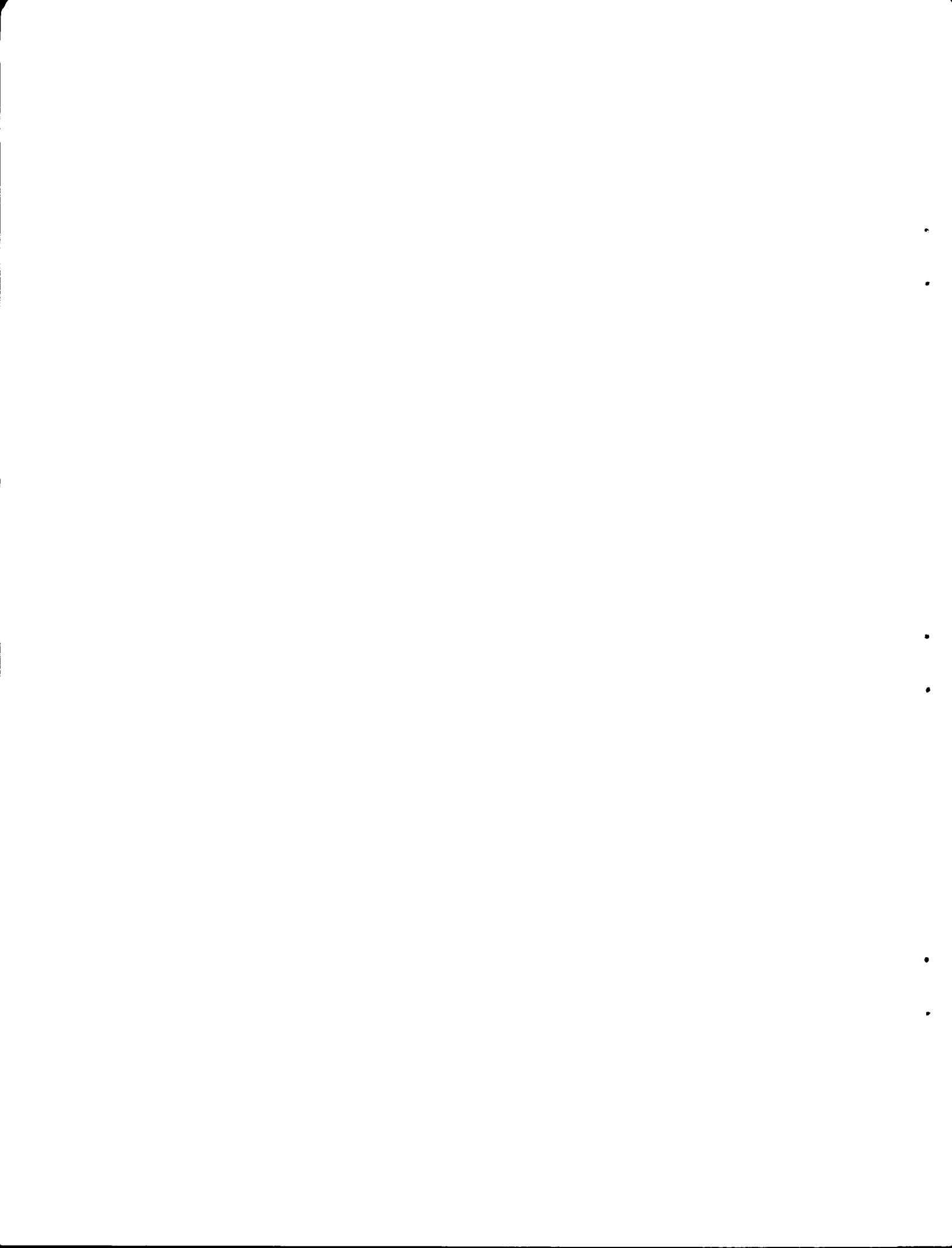


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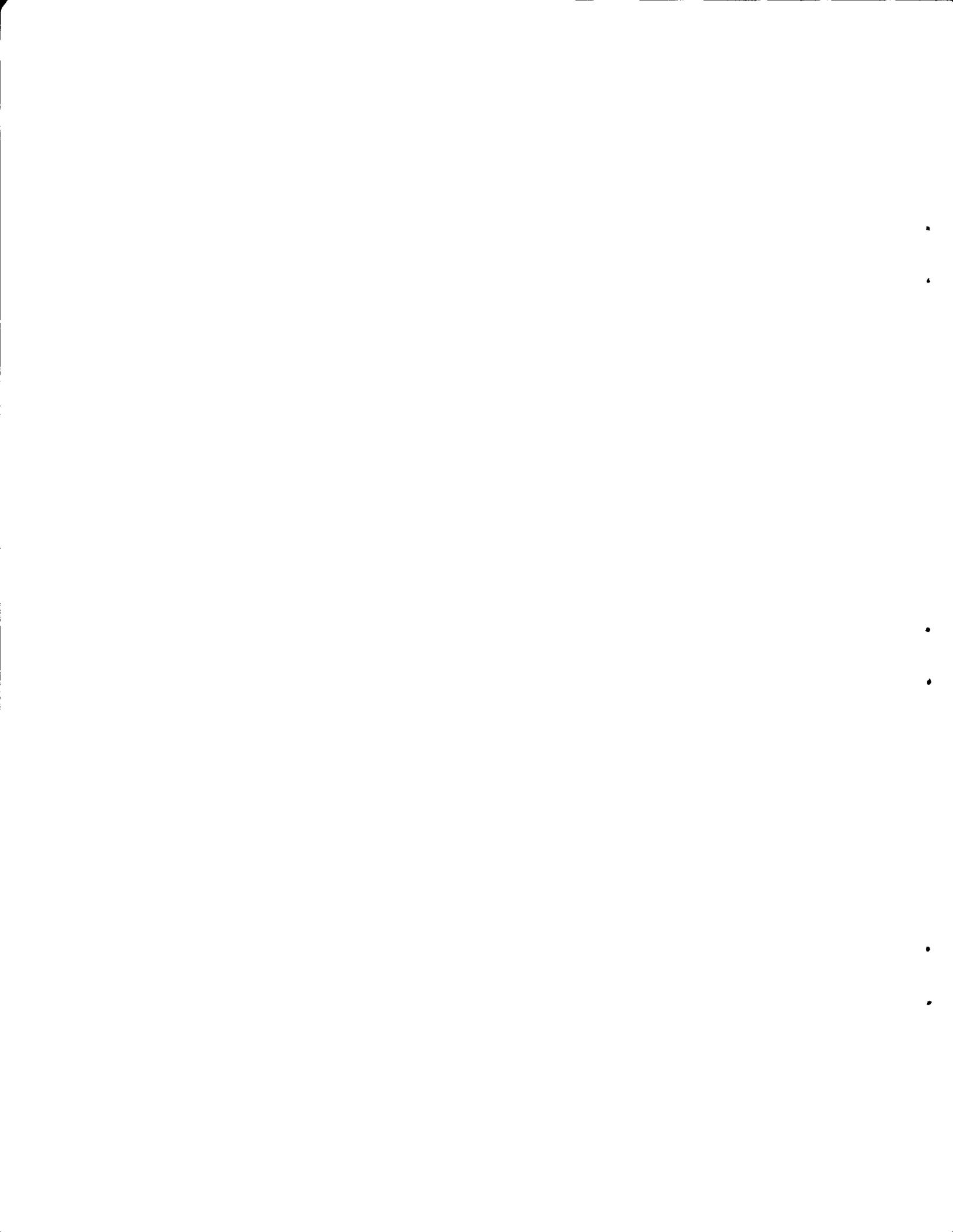
ABSTRACT

Most of the large U.S. utilities were surveyed by telephone and mail on questions concerning nuclear power plant siting and nuclear energy centers (NECs). The main purpose of the survey was for guidance of ERDA's NEC program.

The questions covered the following topics:

- Availability of sites
- Impact of environmental and other restraints
- Plans for development of multi-unit sites
- Interest in NEC development
- Interest in including fuel-cycle facilities in NECs
- Opinions on the roles desired for the state and federal governments in power plant siting

The main conclusion of the survey was that, while many utilities were considering multiple-unit sites of 2 to 5 units, none were planning larger energy centers at the present time. However, several expressed interest in NECs as a long-range future development.



EXECUTIVE SUMMARY

Most of the large U.S. utilities were surveyed by telephone and mail on questions concerning nuclear power plant siting and nuclear energy centers (NECs). Responses were obtained from 68 utilities. The main purpose of the survey was for guidance of ERDA's NEC program. Since the NEC concept is in essence a siting option, the survey included broad aspects of nuclear power plant siting and the roles of various levels of government vis-à-vis the private utilities.

The questions covered the following topics:

- Availability of sites
- Impact of environmental and other restraints
- Plans for development of multi-unit sites
- Interest in NEC development
- Interest in including fuel-cycle facilities in NECs
- Opinions on the roles desired for the state and federal governments in power plant siting

The main conclusions of the survey are summarized as follows:

Nuclear energy centers

1. Many utilities have plans for multiple-unit stations up to 6 GW(e), and a few foresee the evolution of even larger stations up to 10 GW(e), but almost none are immediately interested in developing NECs of 10-20 GW(e). Their reasons for not going to large sites are: (a) many do not believe that the potential advantages associated with "power only" NECs are sufficient at this time to outweigh the problems posed with respect to systems operations, potential environmental effects and the increased risks of heavily concentrated power generating capacity; (b) the regulatory issues are considered to be too formidable and uncertain at this time, and (c) the present procedures of the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) prevent consideration of the full capacity of a site. Thus, utilities would assume major risks in acquiring land for large sites, such as for NECs.
2. As the need for electrical energy grows and the availability of widely dispersed sites diminishes, the NECs and the energy center concept in general may evolve but not on a large scale in the near future.

3. A number of utilities indicated interest in NECs as a future development beyond the present planning horizon. Some believe that NECs may be the best means of assuring the public that the risk of plutonium diversion has been minimized; and, in this context, they believe that NECs may be important as sites for plutonium fueled reactors and co-located fuel cycle facilities.
4. Immediate interest in developing NECs is primarily confined to two regions, both characterized by rapid growth and strong interties — the Southeast and the West Coast. NECs also may become attractive in the near future to areas where loads are concentrated and dispersed sites already have become scarce (e.g., the Mid-Atlantic states). However, offshore siting is seen as another alternative for these coastal areas.
5. The development of the transmission network required for system growth is foreseen by many utilities as a more difficult problem than the siting of generating stations. To the extent that NECs may add to the transmission corridor requirements over dispersed sites, this is viewed as a major obstacle to the NEC concept.
6. Only a few utilities have considered co-location of fuel cycle facilities with power generation. Of those who expressed an opinion, most thought co-location would be an unnecessary complication to the siting process, and they would prefer to ship fuel to a regional processing center. The respondents who had given consideration to NECs were generally also willing to consider co-located fuel reprocessing as a part of the overall strategy.

Power plant siting

With respect to nuclear power plant siting in general, most utilities report that they have sufficient sites available for the next 10 to 15 years; but, in general, three important issues emerge as common concerns of utilities throughout the nation. There was a strong consensus that these issues require the prompt attention of the federal government in order to avoid a breakdown in the system's ability to provide adequate electrical energy to meet future needs. These concerns are:

1. Federal efforts are needed which will direct all regulatory agencies toward a common goal. Local, state and federal agencies need not duplicate the efforts of one another; but there needs to be coordination. The licensing process is becoming so politically oriented that soon the needed electrical output of the Nation could be jeopardized if a consistent policy is not developed.
2. The serious imbalance between desires to protect the environment and the public's need for electrical energy must be corrected. While it is recognized that the environment must be protected, it should also be recognized that there is a need for a proper balance between the environment and energy production.
3. The process of predesignating and approving sites for future nuclear and nonnuclear power plants could significantly help utilities in the planning and licensing process provided that the acceptability of predesignated sites is not subject to subsequent arbitrary reversal. Implementation of the predesignated site concept, however, will have to be brought about by cooperation between all licensing and regulatory agencies. Overlaps in regulatory roles should be minimized and a workable one-stop licensing process should be developed.

In summary, the utilities are deeply concerned about problems, increasing in number and severity, which tax their ability to develop sites and build nuclear power stations of any size. They view this as a high priority issue which demands their full and immediate attention before all else. They are convinced that this is the critical issue which may determine the viability of nuclear power and, hence, the future of NECs.

Roles of the states and federal government

Many interesting comments were received on the roles of the states and the federal government in power plant siting.

1. States: While some degree of approval is required by all states, some states are becoming much more deeply involved in the site selection process, including inventorying or even acquiring future sites. The utilities view this with mixed feelings, but several believe that state action will be required in their region in order to obtain any future sites. States view with concern the intrusion of the federal

government into the power plant siting process, but they recognize that cooperation between the states and the federal government is essential.

2. State and federal: The utilities are distressed by the uncertainties, the unceasing regulatory changes and the conflicts that exist between and among the multitude of federal and state agencies that have varying degrees of jurisdiction over the siting of energy facilities. They believe that this situation is resulting in major delays and significant cost increases to both nuclear and fossil power plant construction and could even endanger the financial integrity of some utilities.
3. Federal: The utilities fault the federal government for having failed to enunciate coherent and flexible energy policies, the lack of will to get on with solving the immediate and urgent problems, and the lack of leadership required for resolution of the issues which are slowing the development of nuclear power and which is needed to obtain public confidence and acceptance of nuclear energy. Specifically, they suggest federal action and leadership in closing the fuel cycle (including waste disposal), research to resolve outstanding safety and environmental issues, and efforts to increase public understanding and acceptance of nuclear power.

UTILITY SURVEY ON NUCLEAR POWER PLANT SITING AND NUCLEAR ENERGY CENTERS

David F. Cope Howard F. Bauman

1. INTRODUCTION

As part of a continuing study by ERDA on the merits and role of nuclear energy centers (NECs) as a means of developing and preserving energy technology options, the Oak Ridge National Laboratory (ORNL) has conducted a survey for the Division of Nuclear Research and Applications of the Energy Research and Development Administration to determine the plans and interests of utilities in developing multiple-unit nuclear power station sites. In the survey, most of the utilities having nuclear-powered electricity generating programs, or imminent interest in such a program were contacted. The contacts included utilities in each of the Electric Reliability Council (ERC) regions to give a representative sampling of the interested utilities and to provide a national scope of coverage.

The NEC concept is fundamentally a siting option; therefore, in framing the survey a number of background questions on reactor siting, in general, as well as specific questions concerning NECs were included. The purpose of the survey is to assist ERDA and other federal agencies in decisions affecting nuclear power plant siting, in general, and nuclear energy centers, in particular.

2. SURVEY PROCEDURE

The general approach was to develop information on the utilities' interest in various configurations of multi-unit sites. A typical set of questions asked is given in Table 1. NECs as the focus of the survey were arbitrarily defined as being sites having a capacity of 10 gigawatts electric [GW(e)] or more. The other extreme alternative would be dispersed sites of 1 to 4 units. Since the spread between these two extremes is rather broad, it seemed desirable to also consider sites intermediate

Table 1. Representative questions submitted to utilities

This survey concerns nuclear power plant siting, particularly as related to the development of nuclear energy centers. Specific items on which comments are desired regarding your plans, interests and concerns are:

1. The availability of suitable sites, to include:
 - a. Those under control of the utility;
 - b. other sites not under control of the utility, but potentially available;
 - c. impact of environmental restraints, such as cooling towers, on potential sites; and
 - d. possible need of "site banks" to inventory and hold suitable sites until needed.
 2. Developing sites that could take up to 5 GW(e) of nuclear power.
 3. Developing sites for up to 6-10 GW(e).
 4. Developing sites of 10 GW(e) or more, which are arbitrarily defined as nuclear energy centers, including the possible incorporation of fuel cycle facilities as part of NEC sites.
 5. Capacity limitation of existing sites and what the limiting factors are.
 6. Role visualized for the state, with particular interest in areas in which there might be cooperative state, federal and utility endeavors.
 7. Role visualized for the federal government, and what the federal government (ERDA) can do to help.
 8. Other comments or suggestions.
-

in size between the two. Thus, the three questions on sizes of sites were related to:

1. Building nuclear power stations having up to four units or a capacity up to 5 GW(e).
2. Developing sites for between 4 and 8 units or a capacity of between 5 and 10 GW(e).
3. Developing NECs of 10 GW(e) or more, to possibly include fuel cycle facilities.

Since NECs are strongly site dependent, three closely related questions

were:

4. The availability of suitable sites.
5. The desirability of establishing inventory "banks" of good sites.
6. The effect of environmental protection measures on the potential capacity of sites.

The next question was included as part of a related study on the potential capacity of existing nuclear plant sites; the results will be reported separately in a forthcoming report.¹

7. The physical limitations of sites.

From the viewpoint of determining what ERDA's future role should be, it seemed important to gain some insight on how the utilities view the government's role, both at the state and federal levels. Thus, two questions:

8. How do the utilities view the role of the states in developing nuclear power station sites?
9. What can the federal government (particularly ERDA) do to help in developing nuclear power station sites?

The survey was implemented by initiating a telephone contact with the appropriate utility official responsible for long-range planning, typically the president, or a vice-president for power, nuclear power, or engineering. According to the respondent's wishes, the survey was then conducted immediately by telephone, by a follow-up letter, or by a combination of the two. The telephone surveys, being a give and take discussion, frequently deviated from the standard format and, generally, were more responsive and enlightening.

In order to elicit frank and uninhibited responses from the utilities, it was emphasized that the results of the survey would be aggregated by regions and that the emphasis would be on the collective responses rather than individual utility responses. The contacts with the utilities were initiated in March 1976 and continued throughout the calendar year. About 79 utilities or closely associated organizations were contacted, and 68 responses were obtained for an average response rate of 85%. The utility companies contacted are listed in Table 2.

Table 2. Utility contacts on nuclear power station siting

<u>Northeast Power Coordinating Council Area (NPCC)</u>	
Boston Edison Company	Northeast Utilities
Central Maine Power Company	Power Authority of the State of New York
Consolidated Edison Company of New York	Public Service Company of New Hampshire
Long Island Lighting Company	Rochester Gas and Electric Corporation
New England Electric System	New England Planning Committee
New York State Electric & Gas Corporation	Yankee Atomic Electric Company
Niagara Mohawk Power Corporation	
<u>Mid-Atlantic Area Council (MAAC)</u>	
Baltimore Gas and Electric Company	Philadelphia Electric Company
Delmarva Power & Light Company	Potomac Electric Power Company
General Public Utilities Company ^a	Public Service Electric & Gas Company
Pennsylvania Power & Light Company	
<u>East Central Area Reliability Coordination Agreement (ECAR)</u>	
American Electric Power Company ^b	Duquesne Light Company
Cincinnati Gas and Electric Company	Northern Indiana Public Service Company
Cleveland Electric Illuminating Company	Ohio Edison Company
Consumers Power Company	Public Service of Indiana
Detroit Edison Company	Toledo Edison Company
	ECAR
<u>Southeastern Electric Reliability Council (SERC)</u>	
Carolina Power & Light Company	South Carolina Public Service Authority
Duke Power Company	Southern Services ^a
Florida Power Corporation	Tennessee Valley Authority
Florida Power & Light Company	Virginia Electric and Power Company
South Carolina Electric & Gas Company	
<u>Mid-America Interpool Network (MAIN)</u>	
Commonwealth Edison Company	Wisconsin Electric Power System
Illinois Power Company	Wisconsin Power and Light Company
Madison Gas and Electric Company	Wisconsin Public Service Corporation
Union Electric Company	
<u>Mid-Continent Area Reliability Coordination Agreement (MARCA)</u>	
Dairyland Power Cooperative	Nebraska Public Power District
Iowa Electric Light & Power Company	Northern States Power Company
Iowa-Illinois Gas & Electric Company	Omaha Public Power District
Iowa Power and Light Company	Otter Tail Power Company
Minnesota Power & Light Company	

Table 2 (continued)

<u>Southwest Power Pool (SPP)</u>	
Arkansas Power and Light Company ^a	Louisiana Power & Light Company ^d
Gulf States Utilities Company	Mississippi Power & Light Company ^d
Kansas City Power & Light Company	Public Service Company of Oklahoma
Kansas Gas and Electric Company	
<u>Electric Reliability Council of Texas (ERCOT)</u>	
Houston Lighting & Power Company	Texas Utility Services, Inc.
<u>Western Systems Coordinating Council (WSCC)</u>	
Arizona Public Service Company	Puget Sound Power & Light Company
Idaho Power Company	Sacramento Municipal Utility
Los Angeles Department of Water & Power	District
Nebraska Public Power District	San Diego Gas & Electric Company
Pacific Gas & Electric Company	Southern California Edison
Pacific Power & Light Company	Company
Portland General Electric Company	Utah Power & Light Company
Public Service Company of Colorado	Washington Public Power Supply System

^aIncludes Jersey Central Power & Light Company, New Jersey Power & Light Company, Pennsylvania Electric Company and Metropolitan Edison Company.

^bIncludes Appalachian Power, Indiana and Michigan Electric Company, Kentucky Power Company and Ohio Power Company.

^cIncludes Alabama Power, Georgia Power, Gulf Power and Mississippi Power Companies.

^dMembers of Middle South Utilities Company.

It was decided to aggregate and analyze the data by the nine Electric Reliability Council Regions composing the National Electric Reliability Council (NERC), as shown on the map, Fig. 1.² These nine regions include all of the U.S. and parts of Canada though this study is confined to the 48 contiguous United States. The regions covering each state are given in Table 3. The results of the nine regional analyses were then used to make an analysis for the nation as a whole.

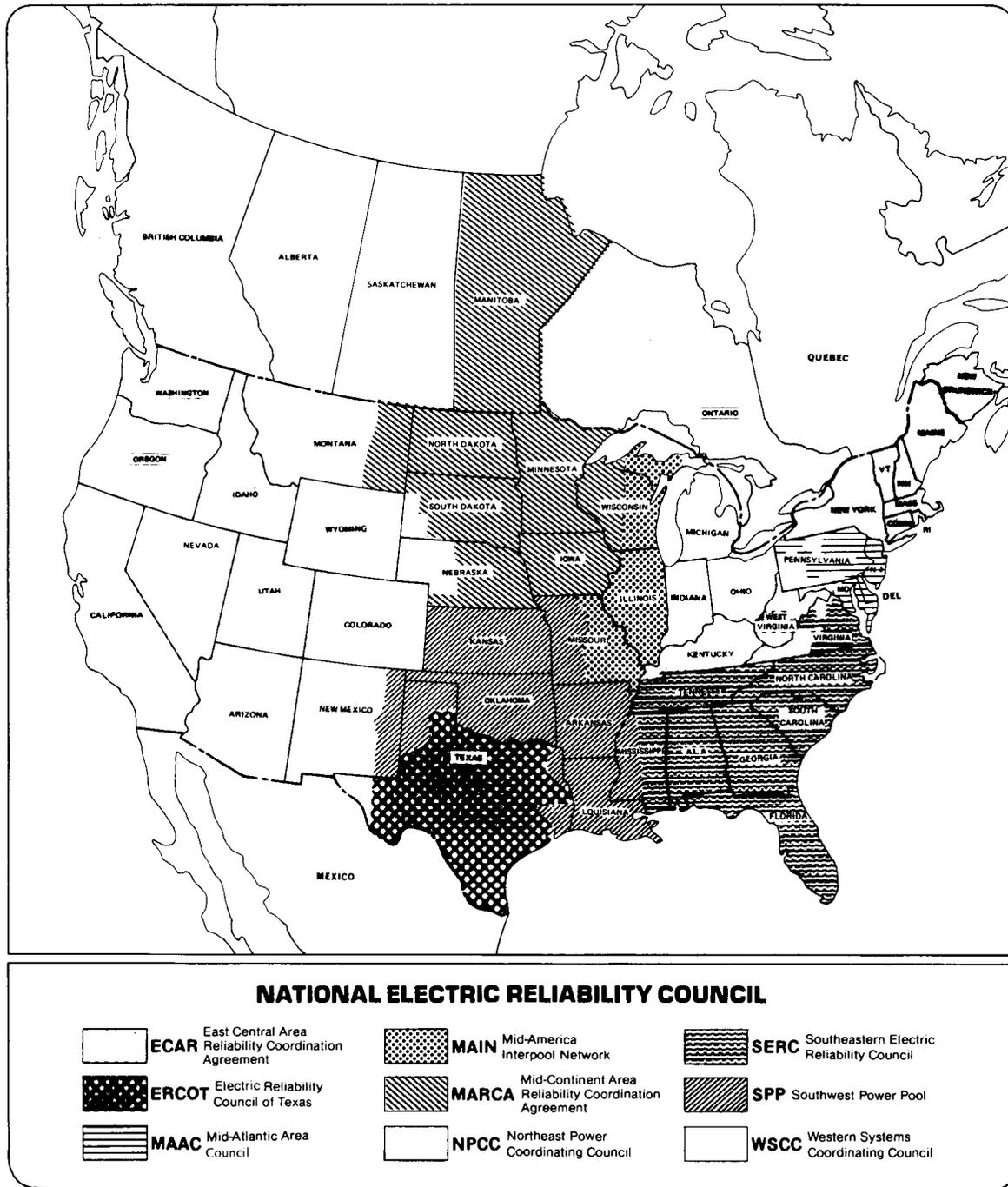


Fig. 1. National electric reliability council regions.

Table 3. Regional Reliability Council state coverage

	ERCOT	SPP	WSCC	ECAR	MARCA	MAIN	SERC	MAAC	NPCC	Number of councils in the states
Alabama							X			1
Arizona			X							1
Arkansas		X								1
California			X							1
Colorado			X							1
Connecticut									X	1
Delaware								X		1
D.C.								X		1
Florida							X			1
Georgia							X			1
Idaho			X							1
Illinois					X	X				2
Indiana				X						1
Iowa					X					1
Kansas		X								1
Kentucky				X			X			2
Louisiana		X								1
Maine									X	1
Maryland				X				X		2
Massachusetts									X	1
Michigan				X		X				2
Minnesota					X					1
Mississippi		X					X			2
Missouri		X				X				2
Montana			X		X					2
Nebraska			X		X					2
Nevada			X							1
New Hampshire									X	1
New Jersey								X	X	2
New Mexico		X	X							2
New York									X	1
North Carolina							X			1
North Dakota					X					1
Ohio				X						1
Oklahoma		X								1
Oregon			X							1
Pennsylvania				X				X	X	3
Rhode Island									X	1
South Carolina							X			1
South Dakota			X		X					2
Tennessee				X			X			2
Texas	X	X	X							3
Utah			X							1
Vermont									X	1
Virginia				X			X	X		3
Washington			X							1
West Virginia				X			X			2
Wisconsin					X	X				2
Wyoming			X							1
Total	1	8	14	9	8	4	10	6	9	

There are a number of advantages to using the Electric Reliability Council Regions as the regions to be analyzed. These regions are the basic components used by the Federal Power Commission and the NERC in doing planning on a nationwide basis for electricity generation and distribution. The geographical scope of the regional councils is a logical, voluntary, grouping of interrelated utility systems set up to deal with the problem of improving the adequacy and reliability of bulk electrical power supply in a given region. Memberships of the regional councils comprise essentially all of the electric power systems in the United States and portions of Canada.

As is often the case, the by-products of the survey may turn out to be as useful as the primary purpose for which it was designed. For example, the survey produced valuable information on how the utilities view the future of nuclear power, the problems and difficulties which they face across the board on the siting of electricity generating stations in general, and nuclear plants in particular, the frustrations and heavy penalties being imposed upon the utilities and through them to the consumer by the uncertainties of the overall situation and what actions they see as being needed from the government. These will be discussed in the analyses and conclusions sections of the report.

3. ANALYSIS OF RESPONSES

3.1 Tabulations

Many of the responses to the survey were found to lend themselves to tabulation, even though the survey was loosely structured and the responders were encouraged to talk about their thoughts and concerns whether or not they were directly responsive to the questions. Often similar comments were received from a number of utilities, and these recurring comments have been tabulated along with the replies to specific questions in the accompanying Table 4. In addition, certain comments which seemed unique, or especially interesting or appropriate, were selected by region and either summarized or given verbatim in Sect. 3.2.2.

Since the tables are necessarily terse, some additional explanation and amplification seems in order. As has been explained, the responses were obtained in a loosely structured form, and the fitting of the responses to the tabulation therefore represents our interpretation. It is believed that more significant results were obtained by allowing the responder maximum flexibility to discuss what he considered to be important.

On the first question, the availability of sites, most utilities discussed this question in reference to their present siting needs and practices, i.e., for dispersed siting. Several also responded in the context of availability of multiple-unit or NEC sites. The responses have been arranged into five graded categories ranging from "ample" to "practically unavailable" on the basis of dispersed siting in the "foreseeable future," i.e., looking ahead 15-20 years.

On the question of predesignated sites, it was usually easy to categorize the utility response as either in favor or not in favor. Some utilities made perceptive comments pro and con but did not take a position, while others had not given predesignated sites much thought but were willing to go along with any reasonable siting plan and are listed as neutral. As is true of all the questions, only those utilities that made no reply or comment at all were listed in the "no comment" category.

The comments pro and con received on all questions are listed in decreasing order of frequency of response (as can be seen in Table 4). The comments in the category "Government cooperation needed to acquire future sites" often included the idea that government-sponsored site banks were becoming the only means by which future sites could be acquired in some regions. The category "Ineffectual . . ." often included the idea that by the time a predesignated site was needed, various changing conditions might render it no longer acceptable. The category "Various difficulties with utility-owned site banks . . ." often included the idea that proposed sites get "shot down" as fast as they are put up because of public opposition and/or agency objections. Further factors in this category include segments of public opposition to power growth, difficulty in justifying future need to the state utility commissions, and the lack of a legal purchase or option mechanism

for predesignated sites. Several utilities believe that site-banking is not possible for utilities but will require preemptive action by states, regions or even the federal government.

The responses to the questions on developing large sites were fairly clear, although there was some overlapping of the category "Possible future interest" with both the other categories. The most frequent comment, "Insufficient system power demand," generally implied that the utility was not interested in power generation on a regional basis. Only a handful of utilities are large enough to support an NEC entirely on their own system. The opposite comment, "Considered feasible with power pooling," generally implied that the utility was or would be willing to participate in regional power generation. The comment, "Lack of public acceptance," often implied an anti-growth feeling in the region which might lead to public opposition focused on an NEC.

The responses to the question on co-locating fuel cycle facilities in NECs was also fairly clear. The comment, "Appear to be uneconomic," generally implied that fuel cycle facilities closely linked to power generating facilities are likely to be smaller than the economic optimum size. The comment, "Increased risks," included perceived financial risks of a large project as well as physical risks due to possible common disasters or accidents.

The responses to the question on coastal zone management all indicated some restriction on siting and were subdivided into the three indicated categories. The question did not elicit much comment. The tabulation on the "State roles desired by utility" question, focuses on the role as desired by the utility, although several responses merely described the roles now played by the state in power plant siting. The "Cooperation . . ." response often implied that the state was presently seen in a position of opposition rather than cooperation. The "Stable regulation" comment often included the thought that changes in regulations and uncertainty about future regulations were major obstacles to siting. The "Balanced . . . environment" comment often included protests of unreasonable or even ridiculous environmental restrictions.

On federal help, the "firm policy" comments often included protests on the frequent changes and uncertainty in regulations. The "research"

comments often included the thought that federal research could be used to clarify and settle many issues and thus reduce the uncertainty in regulation. On "Public education . . ." the thoughts included the federal government presenting the facts of nuclear energy to the public and taking the heat off the utilities. While most utilities have public information programs, they are seen as representing the utility interests, whereas a government information program might be seen as relatively impartial.

The "Reduce federal intervention" comments included thoughts that federal regulation was excessive, expensive and time-consuming. The "Assist in selection . . . of sites" comments looked to federal help in overcoming tight state and local restrictions and local opposition to sites.

3.2 Analysis by ERC Regions

For each reliability region, the analysis consists of tabulated responses (Table 4), comments selected from the responses (Sect. 3.2.2) and a brief discussion. The comments are numbered, in order, for each Electric Reliability Region (ERC) and in each case refer to Sect. 3.2.2.

3.2.1 Highlights, differences between regions

Northeast Power Coordinating Council (NPCC)

The northeast region (Table 4, Col. 1), consisting of New York and New England, is heavily committed to nuclear power, no doubt spurred by severe winters and a paucity of fossil fuels. Perhaps these are reasons that the responses from this region include many of the lengthier and more substantial comments that were received. The region is diverse, and population densities range from very dense to sparse. The availability of sites ranges correspondingly from "ample" to "limited." Predesignated sites are strongly favored and not one utility opposed this concept. Many felt that predesignating sites would be the only way that sites could be obtained in the future.

There was great interest in multiple-unit sites up to about 5 GW(e), but practically no interest in larger sites. Only two utilities thought

an NEC might be even of future interest, and one respondent flatly rejected the concept of the NEC (comment 5). Frequently cited factors against NECs were transmission problems and land, water and population limits. A special problem in New England is the legal barrier to transporting large blocks of power across state lines (comments 1 and 8). The utilities are pessimistic about cooperation between the states.

There was a great silence on the question of co-locating fuel cycle facilities with power generation.

Frequently mentioned was a desire for greater cooperation from the states. From the federal government, the establishment of a firm policy and the improvement of federal and state interaction were repeatedly cited.

Mid-Atlantic Area Council (MAAC)

The Mid-Atlantic region (Table 4, Col. 2) includes densely-populated sections of the east coast megopolis, as well as the rural areas of Maryland and Pennsylvania. It is one of three regions (NPCC, MAAC and WSCC) where a substantial fraction of utilities reported site availability as already limited. However, about half the utilities responding still regarded site availability as sufficient for the foreseeable future.

On the question of predesignated sites, feelings were mixed. This region includes Maryland, the only state so far to embark on a program of state-purchased power plant sites. Utility comment was very restrained on this issue. It seems apparent, however, that the state is having difficulty in obtaining acceptable sites for much the same reasons as private and public utilities.

With two exceptions, the utilities in this region expressed no interest in developing large sites, not even up to 5 GW(e). However, several utilities believe that good potential sites for NECs exist in their service areas if the proper conditions could be obtained for the development of NECs.

There was little interest in including fuel cycle facilities with power generation and almost no comment on coastal zone management.

The region has been outstanding for its interest in proposed innovations in power generation in the areas of new reactor types (HTGRs),

offshore siting (New Jersey), and NEC studies (Pennsylvania). The utilities are uniformly discouraged with the results of efforts at innovation (comment 5).

Among the most frequent comments were that the federal government should establish a firm energy policy and that federal-state interaction be improved with one-step licensing if possible.

Eastern Central Area Reliability (ECAR)

The east-central region (Table 4, Col. 3) is centered roughly on Ohio. The utilities in this region generally have sufficient sites and do not favor predesignated sites. Many of them are interested in multiple-unit sites up to 5 GW(e) and there is considerable future interest in NECs. On the Great Lakes, floating nuclear plants are considered as an alternative (comment 3). A majority favor co-locating fuel cycle facilities in NECs, but note comment 1.

Better cooperation with the states was mentioned often, as was federal help with public education toward public acceptance.

The factor of technological and other changes was seen as a major obstacle to NECs so that the concept is seen as premature (comment 1).

Southeastern Electric Reliability Council (SERC)

The southeast (Table 4, Col. 4) is one of two regions (SERC and WSCC) in which at least one utility expressed an active interest in NEC siting. It is probably significant that both regions expect above average economic growth, including power demand, over the next several decades. Site availability is as good in the southeast as anywhere in the country; in view of this, it was somewhat surprising that the utilities which expressed an opinion unanimously favored predesignated sites. Ease and speed of licensing was given as a reason. However, comments were 2 to 1 against government-reserved sites. Several utilities expressed the thought that government-reserved sites might later be diverted to other uses, a thought which was not expressed in any other part of the country.

A number of utilities expressed interest in developing sites up to 5 GW(e) and several up to 10 GW(e). However, with one exception, there was no interest in larger NECs; insufficient system power demand was the

most common reason. A closely related response is that the availability of sites suitable for NECs is away from the regions of growing electricity demands. A preponderance did not favor co-locating fuel cycle facilities with power generation, giving economics as the reason.

On federal help, most often cited were reducing overlapping federal regulation and a better balance between further energy development and protection of the environment.

Mid-America Interpool Network (MAIN)

The Mid-America region (Table 4, Col. 5) in Illinois, Missouri and Wisconsin includes both highly-industrialized and largely rural areas. Site availability in this region is very good, although some good sites have been rejected for political reasons. In Wisconsin in particular, a strong no-growth philosophy has created difficulties in siting large power plants (comment 3).

There is interest in developing large sites up to 5 GW(e) and 10 GW(e), but larger NECs are considered premature (comment 1).

Several comments indicated that overlapping state regulation should be reduced.

Mid-Continent Area Reliability Coordinating Agreement (MARCA)

The Mid-Continent region (Table 4, Col. 6) consists of the north central states and is generally sparsely populated with few major load centers. Coal and lignite are available by barge on the Missouri River or by rail and will meet most of the region's power needs for some years to come.

Several utilities favored predesignated sites; however, there is some feeling that both federal and state involvement in site selection will only further impede the process (comment 3). There is practically no interest in developing large sites, in NECs or in co-locating fuel cycle facilities. This region has experienced an upsurge of anti-power growth, opposition to large sites, and opposition to transmission lines, etc., which has strongly influenced the attitudes on the siting of nuclear power stations.

Southwest Power Pool (SPP)

The Southwest region (Table 4, Col. 7) is centered in the Lower Mississippi valley, and most of the utilities serving this region have sufficient sites along the Mississippi River and its tributaries. There is considerable interest in developing large sites up to 5 GW(e) and to 10 GW(e), but there is no perceived need for larger NECs in the foreseeable future. One utility suggested a federally-owned facility as a possible NEC site (comment 1).

Several of the respondents indicated that they were reasonably happy with state regulation (which tends to be laissez-faire in this region) and that there was already too much federal intervention in power plant siting. One utility noted that the River Bend NEC study in 1974 had aroused considerable public opposition (comment 3). Some of the points raised by the opposition were that the impacts of an NEC were unfairly concentrated in one locality and that an excessively large transmission network would be required.

Electric Reliability Council of Texas (ERCOT)

The ERCOT region (Table 4, Col. 8) is entirely within the state of Texas, which probably simplifies the administration of the Reliability Council and which could also simplify the administration of an NEC if one were planned for this region. The availability of sites in Texas ranges from ample to future limited, where the primary limitation is the availability of water. There is presently no interest in developing large sites even up to 5 GW(e), although one utility mentioned the possibility of a future NEC on the Gulf. At present, Gulf waters are not widely used for power plant cooling (comment 1).

Feelings on federal help appear to be mixed; one utility thought that federal regulation was excessive while another expressed a desire to cooperate with ERDA in the area of nuclear waste storage (comment 1).

Western Systems Coordinating Council (WSCC)

The Western region (Table 4, Col. 9) is large and diverse. It includes all the Rocky Mountain and Pacific coast states, and covers

nearly 1.6 million square miles, which represents more than 1/2 of the contiguous land area of the United States. The region is tied together in an elaborate transmission network dating back to the early federal hydropower projects. From the standpoint of power coordination, it is subdivided into four natural subregions resulting from concentration of natural resources and economic influences.

- I. The Northwest Power Pool
- II. The Rocky Mountain Power Area
- III. New Mexico Power Pool
- IV. The Pacific Southwest Power Area

Based on the geographic features of the region, it is logically considered as three large subareas:

1. The inland mountain, high plains and desert region
2. The Pacific Northwest
3. California

The inland subregion is sparsely populated, has few major load centers and, in fact, exports hydro and fossil power to the other subregions. Water is very scarce, and the water in the major rivers like the Colorado is completely allocated. The utilities in this region generally report that sites are limited by the availability of water.

The Pacific Northwest utilities report that site availability is sufficient. The Columbia River is a major source of water and several smaller rivers are also available on the west side of the Cascade Mountains.

California is without doubt the major problem area in power plant siting in the United States. Power demand and load growth are high, water is scarce and, in Southern California, almost nonexistent; the use of the cold waters of the Pacific has been seriously restricted by the Coastal Zone Management Act, and the region is the most seismically active in the nation. The utilities in this region report sites as limited or practically unavailable.

Utilities in the entire Western region favor predesignated siting. Oregon has already established the country's first state pre-approved site (comment 10), and the state of Washington has an active state power plant siting commission which is working closely with the utilities in

identifying good sites. A number of comments mention predesignated sites as a means of easing and speeding the licensing process. There is active interest in developing large sites all the way up to NECs, particularly in the Pacific Northwest. The mountain states generally see no need for large stations and the lack of water limits the development of large sites.

Opinion is divided on co-locating fuel cycle facilities with power generation. Most utilities would prefer to ship their fuel to a regional reprocessing center. One utility favors a satellite concept in which the fuel recycle center is the hub of a wheel with the nuclear power centers being located along the spokes within easy transportation distance to the hub. Several utilities reported that coastal zone management was restricting sites and that non-coastal sites were limited. Several utilities believe that ocean water can and should be used for power plant cooling (comment 5).

Concerning federal help, the most frequent comments mentioned the need to shorten the time required for licensing, the need for improved federal-state interaction and the need to close the fuel cycle. Several utilities thought that making federal lands available for power plant siting could be helpful.

3.2.2 Selected comments by regions

The following comments were taken directly from responses of the individual utilities in each region. Where written responses were obtained, the comments are presented verbatim. Where telephone responses were obtained, the comments are taken from the interviewer's summary of the conversation.

NPCC selected comments

1. There are many suitable sites in Maine, but one has to distinguish between suitability and availability. The main limitations on suitability are cooling water and transmission. However, acceptability is something else again. The number of sites

that are suitable and acceptable are very small. Many sites are available that have suitable characteristics but cannot be purchased because the owners have sufficient money and do not want to sell the land. Maine does not have a law of eminent domain; therefore, the sites cannot be condemned for use by the utilities.

A national standardization policy for public service commissions is very necessary. This is needed to assure the utilities that they will not go bankrupt because of failure to get a public service commission approval or the approval of any other regulatory body, such as NRC, over which they have no control. Some of the construction work now in progress should be folded into the rate base.

Another problem concerns the individual states trying to impose moratoria against nuclear power or any other source of power. These are problems of nationwide concern and go beyond any one state; therefore, it seems to be the type of problem that the federal government should take on. If any state succeeds in proposing a moratorium; and this could come about, it would create uncertainty and confusion that would only add to the present problems now faced by the utilities. The problem would be helped and difficulty avoided if Congress or the courts could say that the states could not do this and whatever actions are taken in this area must be done by the federal government because of nationwide implications.

Another ERDA undertaking would be to establish a mandate whereby generic issues could be resolved generically. The issue here is why must each utility and each different state prove that a given number of GW(e) proposed to be generated from nuclear plants cannot be produced more effectively or efficiently by windmill, solar or whatever. At present, every utility in every state has to go through this exercise. Whereas, it seems to be a common problem that could be solved if some federal agency would assume this task. This seems to be a good

role for ERDA; and, if they could accomplish it, it would be a major contribution.

2. Four-unit sites would carry the utility into the 1990's, at which time they would hope to put in off-shore ocean siting.

Regarding site banks--the New York Power Pool Survey comments to the effect that it could lead to the banking of sites and that they are interested in accumulating an inventory of sites and seeing if they can be obtained. The utility thinks that this should be done at the pool level with joint planning by all of the utilities. The utilities can do load flow and other studies to determine what are the best sites, which is a capability that does not exist with either the federal or the state governments. The federal and state governments should be involved in a regulatory role only. This banking of sites by the New York Power Pool would not be a heavy investment, and the utilities can handle it.

3. Their pool operates as a free-flowing integrated system; and, when they go to get state permits, there is a real problem in getting the states to look at it as a region. Instead, they insist on viewing the situation on a selfish individual state basis.
4. There are very few, if any, sites where a station of four to six units could be developed; and we have no plans for such development. Offshore stations may be a technical possibility for the distant future.

The federal government could encourage the states to take a regional approach to site banking. An example would be for the states to work with NEPLAN to establish site banks for the New England area.

5. Since development of the "site bank" would occur prior to the need for such sites, the NRC must agree to review designated sites prior to the need for power being demonstrated.

One aspect of state involvement which should be avoided is financing of the project. The tax implications of large state financed power generating facilities would arouse substantial

public criticism. In addition, the general financial condition of certain states would render this all but impossible.

The institutional problems of ownership, responsibility, participation and liability are also complex and will be difficult to resolve. If private utilities are permitted to participate, will participation be available to all of them and on what schedule? Who will be responsible for financing the NEC? Can both private industry and the government share in the ownership and revenues? How would New England react to a proposed federal "Connecticut Valley Authority?"

The most helpful thing that ERDA could do for this situation is to openly acknowledge the institutional impracticalities and technical infeasibility of the Nuclear Energy Center concept. Based on available studies and information, the NEC concept should be rejected and, in its place, a more practical and feasible long range development program should be implemented.

6. Safeguarding plutonium is the prime and major argument for nuclear energy centers. We do not foresee nuclear energy centers developing for at least 20 years; and, at that time, the plutonium would be the prime moving force forcing us to nuclear energy centers.

ERDA should be trying to do something to establish when releases of such heat would be beneficial. For example, they should do some research and development to determine what really happens in a large lake or ocean. There surely must be some beneficial effects to be obtained from the large amounts of reject heat and the effects are not necessarily all bad. This whole area needs further attention and study.

7. Transmission corridor banks would make more sense than having generating site banks. Since the federal government is involved in the building of highways and the establishment of rail corridors, there is no reason why they could not also establish transmission corridors for the transport of electricity.

How waste heat can be used effectively: One thought is that it could be applied to the heating and cooling of

metropolitan areas in a similar way as to what is being done in Europe. Large amounts of energy are involved, and large amounts of money could be saved. Hot water at 200°F, should be usable for cities.

8. It makes sense to go to as many as four units if they are spaced in time so that 50% of the power produced serves the state. If more than 50% is exported outside of the state, changes in the state law would have to be made, and perhaps in the federal law. The reason is that the right of public domain is permitted by the State of New Hampshire and applies only if it benefits the people of the state. It is difficult to see how this applies for the use of power generated within the state for people outside the state. For example, in Maine, there are lots of available sites; but it is extremely difficult under present laws for them to export the power to users outside the state.

ERDA should be working to reduce the problem of determining what constitutes acceptable effluent discharges to oceans, lakes and rivers. These different media should not be bound by the same set of rules because there is certainly less environmental impact if the water is discharged a mile out into the ocean in contrast to being discharged on shore or being discharged into a lake or river. This needs to be recognized and a different set of rules drawn up to cover these different situations. At the present time, there is no incentive for the utilities to exercise ingenuity and try to minimize the problem because the regulations will not permit them to do so.

MAAC selected comments

1. The southern tip of the Delmarva Peninsula has potential as a good NEC site. Due to the scarcity of good land-based sites in their section of the country, utilities should be interested in NECs that would meet their common needs. The development of NECs should also help in reducing the tremendous efforts required to get all of the local, state and federal permits required.

Suitable land-based sites are scarce. Offshore plants might help alleviate the situation.

2. The state should also provide some arrangements to assure that proper technical evaluations are used in looking at nuclear plants and the siting of these plants to make sure that correct judgments are exercised in imposing additional licensing requirements. The states must recognize that there are energy needs that go beyond the state's boundaries.
3. One of the primary roles for ERDA is to move in such a way as to establish nuclear as a sound energy alternative.

ERDA needs to move rapidly and decisively to resolve the safety issues, those relating to the reactor, to the whole fuel cycle and to the fuel recycle. The security of plutonium is a particularly important issue in this regard.

These issues are a combination of technical and public acceptance problems. For example, on the reactor safety, it is important to get out the results from the Idaho test and do more if necessary in this area. This would help immensely in eliminating some of the public's concerns.

Expediting development of the reprocessing centers: It has gotten to the point where the federal government needs to provide guidance in this area. The private industry cannot cope with the situation and ERDA needs to lead the way.

Expedite the breeder program and guide this program to where it will be in line with operating characteristics of reactors that utilities will need. The reactor following the CRBR should be 800-1000 MW(e) and provide a prototype that can be used by the utilities for ordering reactors for their systems.

Concerning transportation, much of this is in the nature of a public relations problem; technically, it seems to be in good shape. This is an area in which good and effective use could be made of television to demonstrate the tests to which these carriers are exposed and how rugged and well-built they really are.

The utility would like to see more support for the thorium cycle converters, the gas-cooled reactor, both the HTGR and the fast gas-cooled breeder.

4. The idea of site banks is a good one, but it is difficult for the utilities to carry out without help. This must be done on an entire state (or perhaps regional) basis, and a number of utilities would have to be involved. Regions involving several states make more sense than individual states. The intrastate problem is difficult; the federal government may have to become involved to solve the interstate problem, which is even more difficult.
5. Land sites are scarce in New Jersey. Offshore sites are a possibility; and, in the long run, utilities may have to go to the ocean; there are a number of good ocean sites. Otherwise, they must detach themselves from water and go to dry cooling which is less efficient.

Something new (i.e., offshore) adds time and money to the costs and drives people to old methods, even though they frequently are not as good.

The federal government should study the cooling tower problem as many good potential sites will be degraded by requiring cooling towers where they are not needed.

The concentration of cooling towers is a limitation to the capacity of large sites.

The states must take firm positions on where plants can be sited. At present, the utility must get a federal license before the state will even look at the site. This involves about sixteen months. After that, individuals can take the issue to court causing further delays. The state must be willing to look at the interests of the state as a whole and override local interests where necessary.

ECAR selected comments

1. It would take at least 10 years to develop an 8-10 GW(e) site. By then, the conditions might have changed and would create a

new set of problems. For example, should all the units be the same or should they be different units; should they be by the same manufacturer or by different manufacturers? Experience indicates that great changes may take place over the periods of time which are being discussed.

Extensive transmission systems would be required which would demand high voltages. This, in turn, leads to economic issues. Nuclear energy centers are a long time off, as system loads can be handled up to the late 1990's with 3-4 unit sites.

In general, putting the nuclear fuel cycle within the nuclear center adds another dimension to an already complex problem; and there may be no way of doing it easily. Otherwise, the idea is attractive in theory.

2. Predesignated sites for which "----ology" studies have been completed and for which approval has been provided by state and federal agencies may become necessary because of competing uses for desirable sites. These approved sites should be reviewed periodically to determine whether they are still viable. Sites could be predesignated for less than ten units; there should be several predesignated sites in a region, as it would probably be undersirable to concentrate a great amount of capacity in one site to the exclusion of other sites.

Apparently the lawmakers and courts have been trying to sort out the responsibilities of the federal government and the state governments since the day the Constitution was signed. There will probably be conflicts in the power plant siting area if both the states and the federal government are involved in site determination. We hope that the utilities and their customers will not be caught in the middle.

3. State approval of sites is already required. The state should develop a more equitable formula for distribution of tax revenue from power stations.

There is considerable enthusiasm for offshore siting of floating nuclear plants (FNP) in the central Great Lakes (Huron, Michigan and Erie). More than enough power plants must be built

in this area over the next 25 years to support an FNP industry. This would require commitments from several area utilities. This is seen as a solution to environmental problems; however, the FNP proposal for the East Coast has drawn considerable opposition from environmentalists.

4. Having cooling towers on the lakes, such as Lake Erie, does not make any sense; and, yet, the utilities see the EPA and other regulatory agencies going further and further in this direction without first checking the alternatives and the pros and cons of the various alternatives.

SERC selected comments

1. The FEA could educate the unions so that they would have a better understanding of the problems. This is a large group who have every interest for supporting nuclear power, and they should be told what the facts are.

With respect to ERDA, the problem of spent-fuel storage is the greatest potential threat to nuclear power in this country. Unless it is solved, nuclear power will come to a stop. ERDA should get the reprocessing moving so that the utilities know where they stand with respect to the cost of recovering uranium and plutonium.

2. The utility prefers wholly-owned projects and does not want the administrative problems of large NECs.

The utility has a number of company-owned sites on lakes or streams that can be dammed. They believe in and would like to develop cooling ponds, but EPA is forcing cooling towers which raise more problems than they solve.

3. There is a definite need to establish procedures, regulations, etc., for predesignated sites. Presently, the Nuclear Regulatory Commission is addressing this subject and the State of Florida has, to some degree, addressed this subject in the Electrical Power Plant Siting Act. Much work, however, needs to be done before this concept of early site designation becomes useful to utility planners.

Utilization of cooling towers should increase the number of good sites available. Development of salt water cooling towers would make it possible to pipe salt water to sites located outside the "coastal" zone.

4. The federal government could develop a strong backbone of 500 or 765 kV transmission lines.

The utilities are very reluctant to endorse the concept of nuclear energy centers because of the real possibility that it would introduce control and implementation by the federal government.

MAIN selected comments

1. Nuclear energy centers of more than ten units will not be desirable for at least 25 years or more because of the very heavy concentration of generating capacity that would result. As a general rule, we try to have no more than 15% of system capacity at any one location. Consequently, our system capacity would have to grow to about 70,000 MW before a fully developed NEC site would be acceptable.

Cooling towers on large lakes and oceans create more problems than they solve.

2. There should be some generic studies on alternate sources of power, and each utility and each state should not have to do these studies independently. At the present, we are spending a lot of money and time on reinventing the wheel and reinventing it in a number of different places. The federal government could do a great deal to eliminate this confusion and organize a program which would obtain answers to these problems. Seismology is a case in point. A great deal of information is needed on what can be tolerated in the way of seismic characteristics for an area in order to locate a plant in the area. There are many other problems of a similar nature.
3. There are people in their state utility commission who order them not to build large power plants of any kind. Instead, the utility commission is pushing for 300 MW(e) plants which can be

built quickly and at dispersed locations. The state people do not like long-range planning, and nuclear in any size is not popular in Wisconsin. Also, dispersed sites are more environmentally acceptable to the public utility commissions than concentrated sites. They want no part of the fuel storage, fuel reprocessing or waste management in the state; therefore, NECs in any form or size are verboten in Wisconsin. The environmental issues make any site suspect, and the utilities are uncertain in what direction to go to find future sites to meet their needs.

Some states will not accept federal preemption, federal cooperation or federal control. The State of Wisconsin is pushing for more and more authority in the areas of radiological control, environmental issues, cooling water, land use and other environmental matters. States are looking at their own self interests and are not inclined to cooperate. What the federal agencies need to do is to establish some sort of standards and impose them by preemption on the state.

MARCA selected comments

1. The utility has accepted a state-chosen site over their own choice.

The state agency is supposed to develop an inventory of sites but hasn't gotten around to it yet.

2. The utility is afraid to request a second plant for one site because it might lead to the demand to retrofit the existing plant with whatever (seismic) is decided necessary for the new plant.
3. In building either fossil or nuclear sites, the state agencies are voicing concerns about too many transmission lines and too much concentration of generating facilities with too much environmental impacts coming from large plants, so they are raising the question as to why not move the plants in to the load center and eliminate the long transmission lines and the environmental impacts from the large sites--forget the economy

of scale and try to move more in the direction of satisfying the environmental requirements. Thus, in spite of the technical arguments, the political climate is unfavorable to the concentration of electric generating facilities and is moving in the direction of dispersed siting.

Site banks are not practical without federal legislation. Without federal preemption, federal restrictions would only pile on top of state restrictions, further impeding the site-selection process.

4. The utility will rely on local coal for the foreseeable future. Transmission lines required for large power developments are very objectionable to the farm community.

SPP selected comments

1. The utility has been pushing for the nuclear fuel assurance act, and they are looking at one of their sites as a possible location for a centrifuge separation plant. A site considered suitable for an NEC is the NASA Mississippi Test Facility, with 84,000 acres in Hancock County.
2. The utility was caught up in the moratorium of licensing sites by the Nuclear Regulatory Commission, and they now do not know where they stand. They have 100 construction workers on site but are just holding, waiting to try to get some decision from NRC. They do not understand and find it hard to believe that NRC would stop the plant which is under construction because of the court decision and not stop other plants which are in operation. They think that NRC has some flexibility in this regard and that they are being overly conservative.
3. The AEC-Gulf States study on River Bend in 1974 aroused a lot of opposition around Baton Rouge. People got the impression that we were planning two to four plants per year to a level of 30 to 40 units, and they were opposed to this much concentration of nuclear power at one location. The load growth will dictate the rate at which plants are added to the system and that the system with plenty of good sites will disperse the plants to

avoid long transmission distances. We foresee the heavily populated sections of the country going to NECs faster than other parts of the country; but, even under the best circumstances, NECs will be a long time developing.

ERCOT selected comments

1. Sites of 8 to 10 GW(e) would be feasible only on the Gulf of Mexico and probably would require the cooperation of several utilities. We are not familiar with the problems of using Gulf water for cooling but believe that they would be substantial.

Finding a solution to the nuclear waste disposal problem which is acceptable to the public should receive a high priority with ERDA. If ERDA has plans to investigate nuclear waste storage areas in Texas, we would like to be informed of them in advance and would welcome an opportunity to participate in discussions with state and local officials.

WSCC selected comments

1. Suggest NECs as part of preplanned system with preestablished transmission corridors.

The fact that an American engineer-contractor can construct a nuclear plant, using U.S. developed technical knowledge and NRC approved standards, in approximately half the time on foreign soil than it takes to build the same plant in the U.S. is strong proof that siting and other regulatory approval is taking an unreasonable amount of time.

2. The utility industry in the state is in chaos and will fall apart unless something is done soon.
3. Place responsibility for environmental assessment at the state or regional level.
4. ERDA must push the breeder demonstration faster.

ERDA should give a receptive ear to the development of the gas-cooled concept and both the HTGR and the fast gas reactor. This opens other options, such as dry-cooling and gas turbines,

which could have a very beneficial effect on the electrical power generating industry.

5. However, a Western regional fuel cycle facility including co-location of fuel fabrication, reprocessing plants and waste treatment facilities seems to make a lot of sense. For example, one such center located in Nevada could readily serve all Western U.S. reactors. We do not regard the fuel transport problems significant enough to warrant the much greater risks associated with also locating large numbers of power reactors at the same site with the fuel cycle facility.

This comprehensive land use planning effort is required to maintain the unique beauty of the Oregon Coast and at the same time allow for orderly multiple-use development including access to the cold ocean water resource for power plant cooling. Once-through cooling with ocean water is still regarded as feasible in Oregon.

6. We believe the state should have complete authority over site screening and certification. The federal government should simplify the process of safety certification on predesignated sites similar to what is proposed in the current federal legislation.
7. The Coastal Zoning Act has forced utilities, who would prefer to locate on the coast, inland to the central valley. This imposes additional water needs on the already water-short central valley.
8. Two major problems to NECs in Southern California are: lack of water except along the ocean, and opposition to transmission lines; the latter being a very serious limitation.

The "bank" could be controlled by a consortium of utilities or by the federal government but not the state.

Develop a national siting plan.

Establish and provide for transmission corridors.

Federal and state should come up with a program that will eliminate duplications. Would like for the "feds" to take over

state utility commissions in order to provide uniformity and eliminate confusion, contradictory requirements and duplications.

9. We do not see any advantages to the NEC concept for the southwest. Plants in the range of 5-6 GW(e) or less appear to be adequate for the remainder of this century.
10. The federal government must move very carefully in its consideration of nuclear energy centers. Any conclusions or policy decisions recommending NECs could have a serious negative impact on present and future utility licensing proceedings. A long and complicated transition would be required to go from the present dispersed siting practices to something as complex as an NEC.

The much-needed "one-stop" concept for permits, reviews, etc., is vital to reduce the costs in dollars, manpower and schedule of site prequalification and plant licensing. Maximum flexibility and efficiency in generation resource allocation and implementation can only be achieved through reducing the number and frequency of utility-government interfaces to the absolute minimum.

The first state to qualify a predesignated site is Oregon, which has prequalified the Boardman site for both fossil and nuclear power plants. However, if it is to be used for a nuclear site, NRC approval must still be obtained since there is as yet no federal mechanism for prequalifying sites.

The utilities can proceed to develop predesignated sites in a planned and logical manner up to a certain point. However, the orderly step-by-step resource planning process is interrupted by the uncertainties associated with the acquisition process including the uncertainties of permits, hearings, licensing and public reactions. Removal of these uncertainties is one of the major requirements of all thermal power plant site prequalification efforts.

The costs of prequalifying a site are large and represent a substantial investment on which the utility expects to show a return in providing assurance that future generating resource additions can be brought on line with minimum delays.

A principal difficulty that was encountered in the certification of the "blanket" Boardman site stemmed from the desire of permit-granting agencies to review and base permit issuance on a complete plant design. Agencies involved are not prepared to limit review for permit issuance to just the plant design criteria compared to allowable impacts at the specific site. Since the basic premise underlying prequalification efforts is to "decouple" the site qualification proceedings from the rigid engineering design and construction schedules, it is implicit that a complete design will not exist at the time the site is being qualified.

3.3 Supplementary Information

While no attempt has been made to do a complete literature survey, a number of miscellaneous documents that are pertinent to the subject of the survey have been reviewed. Several of these appear to be of sufficient value to the purpose of the survey to be described in this section. Three of the documents are reproduced in full in the Appendices.

3.3.1 Massachusetts Office of Environmental Affairs

Evelyn F. Murphy, Secretary of the Executive Office of Environmental Affairs, the Commonwealth of Massachusetts, stemming from her review of the final environmental impact statement on the proposed Pilgrim II nuclear power plant, wrote a letter (November 29, 1976) to then President-elect Carter, concerning the urgent need for a national energy policy by the federal government. This letter was co-signed by government, environmental and business leaders of Massachusetts. Although the letter addresses a much broader issue, the comments are pertinent to the subject of this report, and the letter is presented in Appendix A.

3.3.2 New England Electric System

In connection with the same issue, Guy W. Nichols, President of the New England Electric System, also wrote a letter (November 26, 1976) to then President-elect Carter, in which he urged the development of an

energy policy which would: (a) promote environmental and economic balance; (b) address the key problems in the field of nuclear energy, including construction at a government site of an integrated complex of facilities for spent fuel storage, reprocessing, fuel fabrication and waste storage; and, (c) continue the development of the breeder reactor. A copy of this letter is attached as Appendix B.

3.3.3 Washington Public Power Supply System (WPPSS)

WPPSS commissioned Woodward-Clyde Consultants to do a siting report dealing primarily with nuclear power plant sites but with an appendix on fossil-fired plants.³ This study identified, analyzed and ranked a number of potential sites on the WPPS system. This report would be an excellent reference on potential sites in the WPPSS region.

3.3.4 The Pacific Power & Light Company (PP&L)

PP&L commissioned Woodward-Clyde Consultants to do a power plant site evaluation on the West Roosevelt site located on the Columbia River in central Washington about 65 miles southeast of Richland, Washington and across the river from the Oregon border.⁴ This site has excellent characteristics with NEC potential.

3.3.5 Portland General Electric Company (PGE)

PGE has evaluated⁵ an energy facility (coal and nuclear) site near Boardman, Oregon (~40 miles WNW of Pendleton) about 12 miles from the Columbia River. This site with the current 5000 acre reservoir has a heat rejection capacity of 10,000 MW(t). The site has been approved with certain administrative stipulations by the Oregon Energy Facility Siting Council. With additional cooling capacity and land, this appears to be an excellent candidate site for an NEC.

3.3.6 State of New York

In 1975, the Public Service Commission of the State of New York directed the member systems of the New York Power Pool to undertake a statewide siting survey for the purpose of conducting a statewide selection of acceptable power plant sites. The preliminary New York Power

Pool Statewide Selection Guide report was submitted in May 1976.⁶ The guide is divided into four stages enumerated below:

- a. Identification of candidate areas
- b. Identification of candidate sites
- c. Identification of preferred sites
- d. Identification of recommended sites

The statewide survey is being conducted by the member system to identify potentially suitable sites. Only stages a and b will be utilized. The latter two stages will be implemented when a member system(s) is attempting to identify a site for a specific need at a specific point in time.

The final Site Selection Guide and Survey is scheduled to be submitted to the Public Service Commission in December 1977.

This report is an example of actions taken or being taken by several states (e.g., Maryland, Pennsylvania, Minnesota and others) to survey and characterize potential power plant sites within their states.

3.3.7 State of Minnesota

The State of Minnesota enacted in 1973 the Minnesota Power Plant Siting Act which directs utilities to do 15-year advance forecasts on plans to own or operate large electric power generating plants or high voltage transmission lines and to identify the tentative regional location of these facilities. The Act also directs the Minnesota Environmental Quality Council to assemble and publish (before July 1, 1975) an inventory of potential large electric power generating plant sites and high voltage transmission line corridors. However, the timetable has slipped; and, as of December 1976, this inventory had not yet been published. The text of the Act is given in Appendix C.

3.3.8 East Central Area Reliability Council (ECAR)

ECAR is presently engaged in making an overall assessment of siting requirements within their region for the next 10-20 years. The timetable for completion of the study has not yet been established.

3.3.9 Federal Energy Administration

An Energy Facility Siting Workshop sponsored by the Federal Energy Administration was held at Williamsburg, Virginia in December 1976. The Summary of Proceedings has been issued.⁷ Much of the contents of these proceedings, especially the recommendations, are very relevant to the subject of this report.

3.3.10 Iowa Utilities

The utility owners of the proposed Vandalia, Iowa Nuclear Plant recently announced (The Energy Daily, February 22, 1977) suspension of plans for the plant until perhaps mid-1979. The reason given for the suspension was that regulatory uncertainties have reached such proportions that the utilities feel it highly improbable that the unit could be completed within an acceptable time frame and at a predictable cost.

This is a specific example of a siting problem due to regulatory uncertainties.

3.3.11 Wisconsin Utilities

Four Wisconsin Electric Utility Companies announced (Wall Street Journal, January 19, 1977) plans to evaluate a new site for a proposed nuclear power plant to replace the former Koshkonong site. The decision to reconsider relocation of the plant followed rejection by the states' Department of Natural Resources of the Koshkonong site. The U.S. Nuclear Regulatory Commission announced in November 1975 a preliminary staff evaluation which was favorable. This is a specific example of contradictory federal and state regulatory actions.

3.3.12 U.S. Nuclear Regulatory Commission (NRC)

The U.S. Nuclear Regulatory Commission announced in October 1976 that they, in cooperation with other federal agencies, were undertaking a study designed to improve procedures for federal and state review and approval of sites for proposed nuclear facilities. The purpose of the NRC study is to eliminate duplication or overlapping of site review procedures without infringing on the rights of other federal or state agencies.

One phase of the study is to consider the need for site "banks."
The study is expected to be completed by mid-1977.

3.3.13 Lovins vs Forbes

A recent article, "Energy Strategy: The Road Not Taken," by Amory Lovins⁸ proposes a move away from large central power stations to more reliance on diverse, decentralized technologies. This strategy, if accepted, would eliminate the need for large electric generating plant sites.

This argument was rebutted in an article, "Energy Strategy: Not What But How," by Ian Forbes,⁹ in which he suggests that Lovins is raising false hopes for simple utopian solutions to our energy problems.

3.3.14 Utility Dispatch Areas

Although there are hundreds of individual utilities throughout the country, the Federal Power Commission advises that there are only about 130 power dispatch areas and that all of the utilities feed their generated power into one of these dispatch areas. This suggests that looking at these power dispatch areas might be the first approach at examining the regionalization pattern which is necessary to the development of NECs.

4. NATIONAL SUMMARY AND ANALYSIS

The survey uncovered differences in utility interests and attitudes toward reactor siting within regions and between regions. On the other hand, certain opinions and comments were obtained from such a preponderance of the responses as to constitute a national concensus of the utilities on several issues.

The tabulated responses to the survey are summarized by regions in Table 4. On the availability of sites, the utilities saw themselves as either "haves" or "have nots" with few in between. Despite the prevalence of siting problems in recent years, fully two-thirds of the utilities responding reported sufficient sites for the foreseeable future. The acute problems in siting appear to be subregional; in several instances, one or more utilities have reported sites as limited when other

utilities in the same region reported site availability as sufficient or even ample.

Most of the utilities were asked for their opinion on the effect of the requirement for cooling towers on the capacity of sites. We have evaluated their responses qualitatively (following an unsuccessful attempt at constructing a meaningful tabulation). Several utilities noted that the capacity of sites on medium-sized lakes and rivers can be greatly increased by the use of cooling towers. This is because moderate-sized water bodies, while not having sufficient heat capacity to absorb large quantities of heat without reaching high temperatures destructive to natural life, can generally supply sufficient water for evaporative cooling devices such as cooling towers, which then discharge the heat directly to the atmosphere. However, a number of utilities point out that under some conditions cooling towers are not the best method of heat dissipation and if used would reduce the capacity of a site. For some sites, cooling ponds are preferred, especially in water-short regions where the consumptive use of water by cooling towers becomes significant. Cooling ponds may consume less water than towers because part of the heat is dissipated by back-radiation, especially at night, rather than by evaporation. Of course, ponds are subject to natural evaporation losses (due to insolation), but many sites require a large reservoir to provide a dependable year-round water supply; and, therefore, natural evaporation losses would occur in any event. For sites on large water bodies, such as the ocean, once-through cooling may be preferred. The NECSS-75 study has postulated that the cooling towers for an NEC might have to be widely spaced (e.g., 2 1/2 miles between clusters of four) to avoid undesirable atmospheric effects. Such large sites would be difficult to obtain; with once-through cooling, a smaller site could serve the same capacity. Many utilities believe that the environmental effects of carefully designed once-through cooling systems will be acceptable for large water bodies.

A large majority of the utilities expressing an opinion favored predesignated sites. Most hoped that this would ease and speed licensing; while in several regions, there was a strong feeling that government cooperation would be necessary to obtain any future sites. Some utilities were strongly opposed to predesignated sites, and even those

who favored them or were neutral made some negative comments. The most universal reservation was that the idea might be unworkable because of the changes in regulations, in the design of power plants and in the surrounding land use during the time that the site would be held.

A substantial majority of the respondents indicated interest in developing sites up to about 5 GW(e). Stations with three, four or five 1200 MW(e) units appear to be an imminent evolutionary development on many systems. There is presently only scattered interest in developing sites approaching NEC size; seven utilities were interested in sites up to 10 GW(e) and three in NECs of 10 GW(e) or more. However, 14 additional utilities expressed possible future interest in NECs; many of them felt that NECs might be of interest to them beyond their present planning horizon, i.e., in about 20 years. A number expressed the thought that it was premature to concern themselves with NECs now because they did not anticipate sufficient load growth on their systems to support NECs and, further, that they had sufficient dispersed sites available for the foreseeable future. In some parts of the country (e.g., Wisconsin) there is a strong segment of opinion in state agencies favoring dispersed power generation to avoid (if possible) the necessity for additional transmission corridors. Several utilities saw the provision of an adequate transmission network as a more difficult siting problem than the siting of generating stations; some recommended strong federal participation in upgrading the grid nationwide, pointing out that the national interest may have to take precedence over local interests in the siting of transmission corridors.

On the question of co-locating fuel cycle facilities in NECs, most utilities have not concerned themselves with fuel processing; and a large majority made no comment. Of the comments received, over half did not favor co-location. Most saw this as an unnecessary complication to the already complex problems that would arise in siting and operating an NEC. Of the comments favoring co-location, several looked ahead to the time of plutonium-fueled reactors such as the LMFBR, where they saw advantages in improved safeguards and reduced transportation of fuel.

Barely half of the utilities along the coasts offered any comment on the impact of coastal zone management, probably because many states

are not active in this area. Three utilities, all in California, reported that they were seriously restricted by coastal zone management in that the availability of noncoastal sites was limited. Several utilities felt that it was important that the oceans remain accessible as a source of cooling water.

Many interesting comments on the relationship of the utilities with their state and the federal government were received. In general, but with notable exceptions, they were happier with their state than with the federal government. Many utilities wanted better communications with and more cooperation from their state agencies, and several complained that their states took a role of opposition to them rather than giving the cooperation that they desired. There was considerable complaint about overlapping state regulation, but this was mentioned even more frequently with federal regulation.

Not too many utilities ventured to comment on whether the states should reserve sites (for site banks), and opinion was divided. In some regions, generally characterized by limited availability of acceptable sites, the utilities were resigned to or even welcomed a large role for the state in the selection and reserving of power plant sites. In other regions, generally where good sites were available, the utilities saw no need for the government to become involved. In only one instance (where state regulation was seen as oppressive) did a utility want the federal government to reserve sites.

The most frequent comment concerning the federal government was the desire for a firm energy policy and stable regulation. The utilities felt that they could live with any reasonable degree of regulation if they only could know what it would be. In at least one instance, the uncertainty over future regulation has led a utility to cancel a proposed nuclear station. The utilities are particularly distressed by changes in regulation that cause delays in the construction and startup of plants, delays which can cost the utilities (and their customers) thousands of dollars per day. The first four (most frequent) comments under "federal help" in Table 1 are concerned with streamlining the licensing process and reducing unpredictable regulatory delays.

The next most frequent comments concerned closing the fuel cycle; a number of utilities indicated the need for federal leadership and prompt decisions in the fields of spent fuel processing and waste disposal. Several utilities thought that more federal research would be helpful, particularly as applied to safety and environmental problems on which future regulatory decisions will be based.

There were few comments on environmental restrictions, which at first might appear surprising considering the public attention that environmental problems have received in recent years. However, it must be remembered that this was not one of the questions posed to the utilities, hence the responses were spontaneous and voluntary. Twelve utilities commented on federal environmental restrictions and eight on state regulation. The general feeling was that environmental protection was out of balance with the need to develop energy sources and facilities. Several utilities mentioned unreasonable or even ridiculous restrictions with costs that greatly exceeded any apparent environmental benefits.

Several utilities suggested that the federal government could help with stronger efforts in public education concerning nuclear power in order to obtain greater public acceptance. It was felt that government efforts in this area would be more appropriate and have greater credibility than similar efforts by the utilities.

Several utilities pointed out the waste of effort in having to address generic questions in individual licensing actions. For example, one utility suggested that the federal government make a generic analysis of alternative energy sources (i.e., solar, fusion, geothermal, etc.) rather than each utility doing this for each plant.

About the same number of utilities wanted the federal government to assist in the selection and development of sites as thought the federal government was already too involved. Some utilities, especially in strong states-rights states, were opposed to federal intervention in the siting process. On the other hand, several respondents thought it would help for the government to make federal lands available for power plant sites. Several mentioned that the government should get their nuclear plant replication and standardization policies working effectively before attempting to proceed with NECs. Many utility representatives found it

difficult to think about NECs and other long-range policies because they felt overwhelmed by current problems.

5. CONCLUSIONS

The major conclusions which can be drawn from the survey of utilities on Nuclear Power Plant Siting are as follows:

5.1 Interest in Developing Nuclear Energy Centers (Including Fuel Cycle Facilities)

1. Many of the utilities evidenced little or no interest in the development of NECs. The reasons given for this lack of interest were:

No need for NECs

Load imbalance and reduced system reliability resulting from over-concentration of generating facilities

System demand inadequate to support NECs until much later in the future

Long transmission distances resulting in high costs and public opposition to the transmission lines

Lack of regulatory guidelines prerequisite to planning and building NECs

NECs may focus public opposition from anti-nuclear and anti-growth elements

Large front-end capital requirements for NECs

Changing technology and regulatory requirements which would make NECs obsolete before they are finished

Lack of suitable sites for NECs

Lack of thought about NECs because of overwhelming short-term problems

Incompatibility of state laws and regulations and state and local agency attitudes with NECs

2. A small number of utilities believe that NECs will come but that it will be an evolutionary development taking place over an extended period of time.
3. In contrast to their attitude on NECs, most utilities are thinking of multi-unit sites containing two to six units. Many

such sites will be developed cooperatively to serve several utilities.

4. Many utilities see evolutionary growth leading to multiple-unit sites up to 5 GW(e), but few see this extending to the 5 to 10 GW(e) range in the immediate future. A greater number expressed interest in the long-range future development of large NECs [greater than 10 GW(e)].
5. Varying degrees of interest were indicated by several utilities in moving toward, or becoming involved in, the development of NECs. There are recognized sites on utility systems which with the acquisition of more land could accommodate NECs.
6. The utilities showed no interest in co-locating fuel cycle facilities with power generating facilities. Several favored regional fuel processing centers. Some were willing to consider co-located fuel cycle facilities in future NEC planning.
7. The issue of confining plutonium-fueled reactors and their fuel cycle facilities to NECs was not included as part of this survey. However, several utilities volunteered the opinion that, while they saw no immediate need for NECs, the plutonium proliferation issue might be a strong motivation for future development of NECs. On the other side, some utilities believe that the long-range development of nuclear power would be jeopardized by restricting plutonium to NECs.

5.2 Siting of Nuclear Power Stations in General

1. Utilities are becoming increasingly concerned about the difficulties of obtaining approval of what they consider to be good and acceptable nuclear power station sites. These concerns derive from:

Ever-changing regulatory requirements

Uncertainty in the regulatory process from the local to the national level

Deeper involvement by more federal, state and local regulatory agencies leading to uncertainty, confusion and contradictory requirements with consequent longer schedules and higher costs

Increased opposition by interventionists and environmental groups leading to long drawn-out regulatory delays and often times court hearings

A growing tendency in some states to require consideration of state selected sites

A move in several states to discourage large plant sites in favor of smaller sites serving local regions

The increasing risks being imposed upon utilities through selecting and developing sites which later may not be approved

2. As indicated by the analyses of Sect. 3, most of the electric reliability regions have an ample number of sites for the next 20 to 30 years, but there are areas (e.g., the mid-Atlantic Seaboard) where there is a great dearth of sites. In these areas, utilities are pursuing alternatives including sites outside of their geographical region, off-shore sites or importation of electric power.
3. There is an increasing tendency for utilities to cooperatively develop sites upon which they will build even single unit nuclear power stations to serve several utility systems. Thus, there is a trend toward cooperative projects of the type involved on a large scale in the development of NECs.
4. Utilities exhibited considerable interest in developing "banks" of predesignated sites, and some believed this to be an essential step in order to assure a sufficiency of sites for future needs.

The things working against predesignated sites are the:

Lack of regulatory criteria and procedures for judging and approving predesignated sites

High front-end capital costs of selecting, developing and preserving predesignated sites

Lack of financial incentives for the utilities to develop predesignated sites; and considerable financial risk in the selection and licensing of predesignated sites

Concern about speculative entrepreneurs getting control of a site area before the utility can gain control of the land

Danger of sites becoming unacceptable because of changes in technical and regulatory requirements or changes in land use

Longer time provided for opposition to develop to a site which is known well in advance of the time of need

5. There were generally expressed concerns about the state or federal governments having control of predesignated site "banks" because it was feared that the sites would not, for one reason or another, be available when needed (tied up in red tape or even diverted to other uses). At the same time, the utilities were firm in their opinions that the full cooperation of all levels of government will be essential to the development of site "banks."
6. Some states are moving ahead with the planning and development of potential sites (e.g., Maryland, New York and Minnesota) either through the utilities or by the state itself acquiring the sites. Maryland and New York appear to be progressing rapidly in this direction. However, comments indicate that Minnesota is moving slowly and the utilities in general have no confidence that identification of sites by the state will expedite the siting process.

5.3 Limitations to Existing Sites

1. Existing sites are being gradually degraded with respect to their potential capacity due to changing criteria and public attitudes (which influence the regulatory bodies) on what constitutes an acceptable site. These changes are often related to intangible factors such as opposition to growth.
2. Only a few states have established criteria under the Coastal Zone Management Act; but, in most cases where such criteria have been established, the siting of power plants within the coastal zone has been severely limited.
3. The use of cooling towers may in some cases increase and in other cases reduce the potential capacity of a site. Other cooling alternatives, particularly cooling ponds and once-through ocean cooling, may be environmentally and economically more desirable for some sites.

5.4 Role of the States

As might be expected, there is a wide divergence in the roles of the various states now and the roles which they might be expected to assume in the future. Some of the conclusions in this regard are:

1. The states, in general, are assuming a more direct and aggressive role in the review and regulation of nuclear power plant sites.
2. Many states are moving independently of and, in some states, are knowingly moving in opposition to various federal regulatory agencies. Often, states are applying more stringent regulatory requirements; and, in most cases, increased state involvement is adding to the uncertainties of what is required from the utilities in the development of nuclear power station sites.
3. There is a strong agreement among practically all of the utilities on the need from the state of:
 - Cooperation and free and open communications
 - The need for firm and clear state siting policies
 - The need for a stable regulatory environment
 - Better cooperation between the state and federal governments
 - Reduction in the number of agencies from whom the utilities must obtain approvals
4. The political atmosphere and attitudes in some states are incompatible with the establishment of regional electric power generating sites which serve to meet power needs of several states.

5.5 Role of the Federal Government — Ways in which the Federal Government (i.e., ERDA) Can Help

This question elicited a wide range of responses, some related directly to siting and some not. Most of the responses pertained to the political or regulatory role of the federal government, rather than the technical role, which is the primary area of ERDA's responsibility. However, the responses which were received on the technical role of ERDA were substantive and informative. The following conclusions are related

to these two different aspects of the survey. Concerning the regulatory role:

1. Underlying all other issues for the utilities is the important and urgent need to establish a clear and coherent national policy on energy, in general, and on nuclear energy, in particular.
2. The most stifling influences which the utilities perceive as inhibiting the siting of nuclear power stations in particular, and all types of electric generating facilities in general, are the multitudinous and diverse uncertainties which abound throughout the siting process. These exist at both the state and federal levels, but the utilities want the federal government to take the lead in acting to eliminate these. This would help to establish a state environment in which plans could be made and actions taken in compliance with a known set of requirements which would not be subject to constant capricious changes.
3. Closely related to the above is the need for closer cooperation between the federal and the state governments with the objective of delineating and clarifying the proper role of each. Federal-state interaction should be undertaken to eliminate unnecessary regulatory redundancies, move toward the goal of one-stop siting approval and, as a consequence, shorten the licensing time and cut the costs of constructing electric generating stations.
4. Utilities are greatly concerned that a serious imbalance has been created between desires to protect the environment and the public's need for electrical energy. While generally accepting the need for environmental regulations, they feel that some restrictions are unreasonable and ineffective and that the public is paying for restrictions from which they receive little or no benefit.

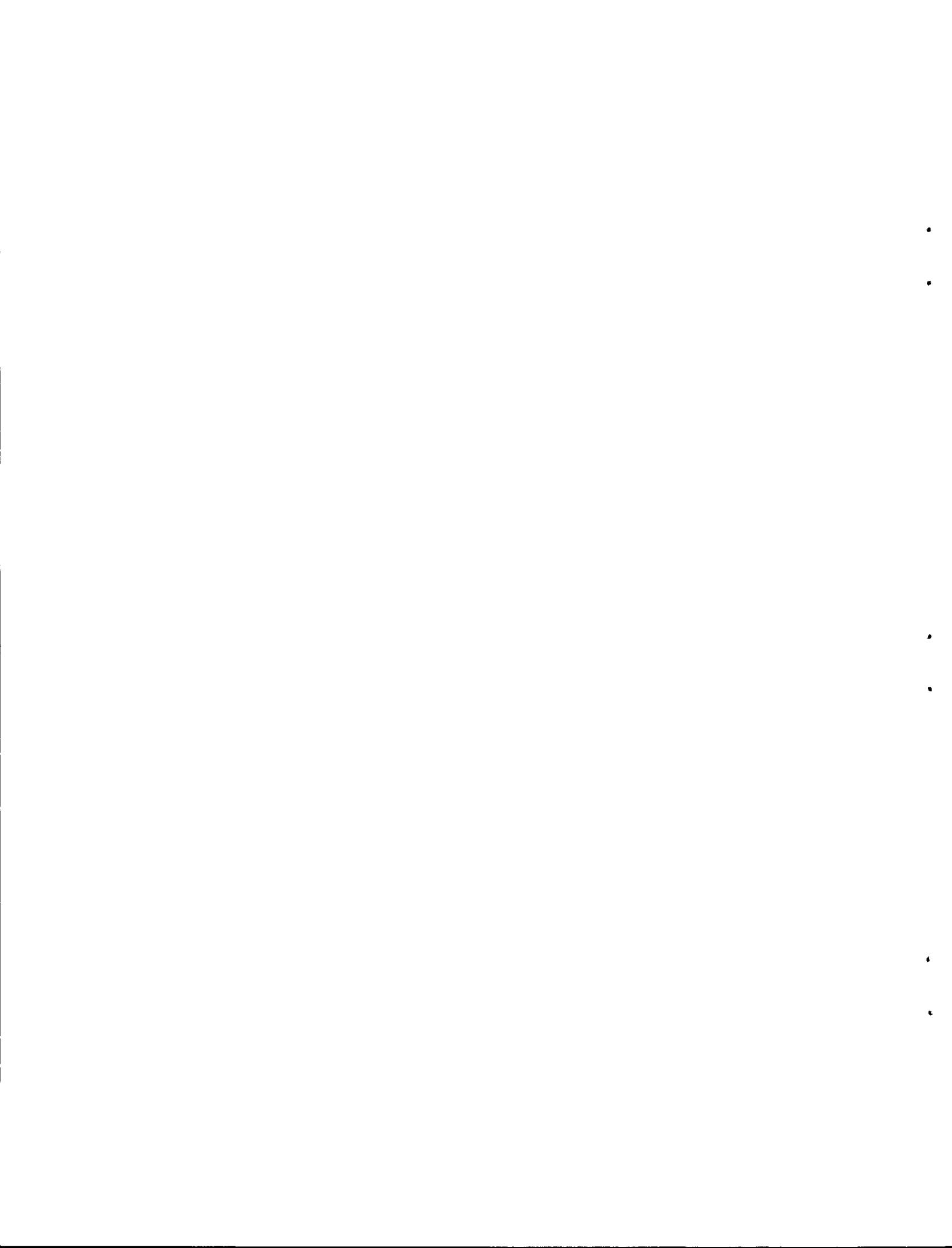
In the technical areas, some of the more important conclusions are:

5. Public acceptance is the critical issue for nuclear power, and ERDA should take the lead in developing a strong program to inform the public. This includes doing something to get a more balanced presentation of the issues by the communications media.
6. ERDA should give aid in the adoption of rules which will provide the utilities an incentive to "bank" good sites.

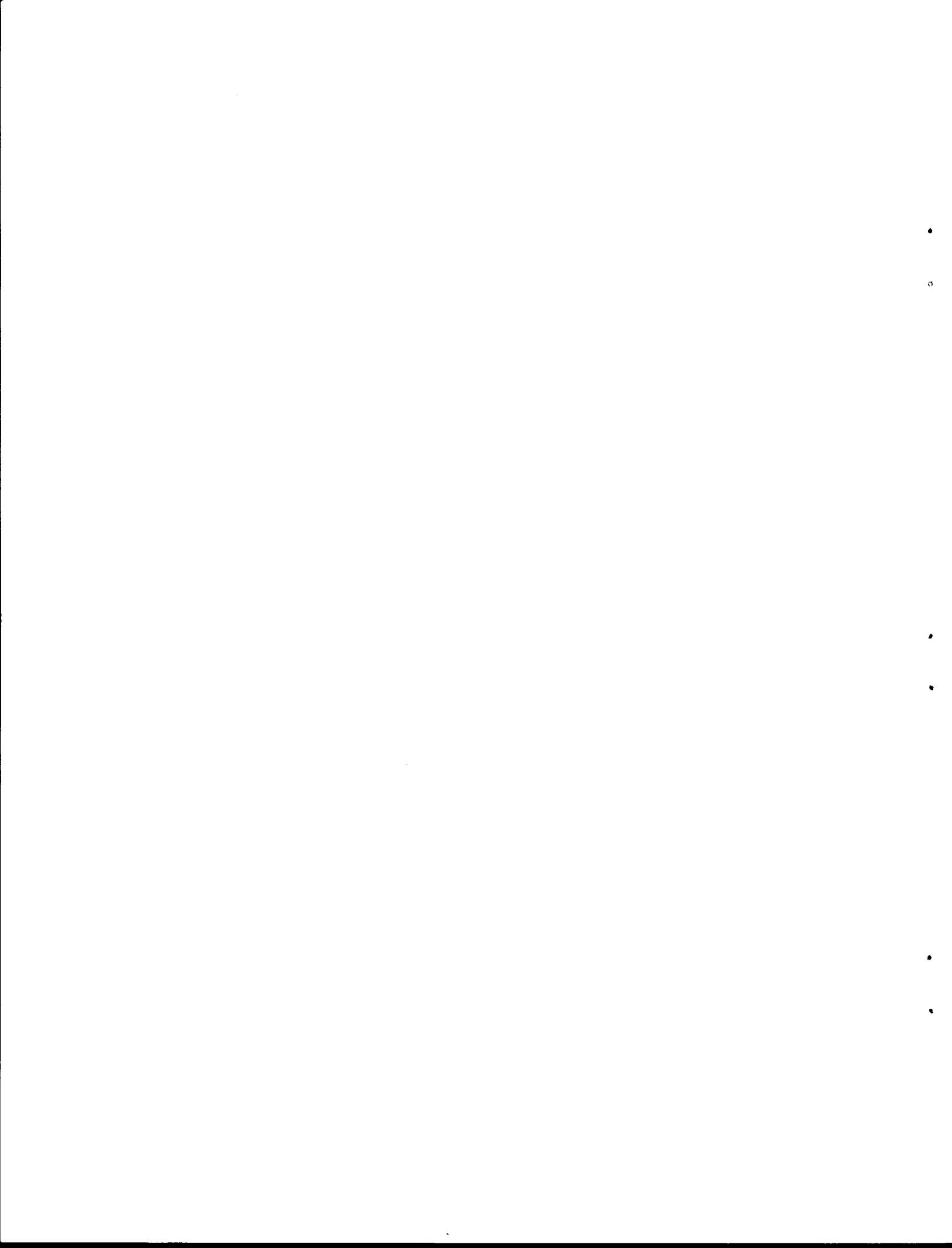
7. ERDA should move promptly and decisively on the R&D and other actions needed to close the nuclear fuel cycle.
8. ERDA, EPA and NRC should study the different effects of cooling water discharges to rivers, lakes or oceans. At present, the same criteria apply in all cases and logically it would seem that different criteria should apply to these different situations. In addition, R&D should be done to determine the benefits versus the penalties of using once-through cooling instead of cooling towers, particularly on large bodies of water such as the oceans, the Great Lakes and large rivers.
9. R&D should be conducted on how to better characterize a site with respect to potential seismic activity. This should include research on the conditions under which soil liquification occurs and how the results can be applied to any specific site.

REFERENCES

1. D. F. Cope and H. F. Bauman, *Expansion Potential of Existing Nuclear Power Station Sites*, ORNL/TM-5927 (to be published).
2. Provided by National Electric Reliability Council, Princeton, New Jersey.
3. Washington Public Power Supply System's "Executive Summary Siting Study" by Woodward-Clyde Consultants, December 1975.
4. Pacific Power & Light Company's "Power Plant Site Evaluation" by Woodward-Clyde Consultants, March 1, 1975.
5. Portland General Electric Company's "Boardman Site Certificate Application," filed with the State of Oregon's Nuclear and Thermal Energy Council (now The Energy Facility Siting Council), 1973-74.
6. Report of Member Electric Systems of The New York Power Pool and The Empire State Electric Energy Research Corporation, 1976.
7. Energy Facility Siting Workshops - Summary of Proceedings, Federal Energy Administration, Williamsburg, Virginia, December 13-15, 1976.
8. Amory Lovins, "Energy Strategy: The Road Not Taken," *Foreign Affairs* 55(1), 65-96 (October 1976).
9. Ian Forbes, "Energy Strategy: Not What But How," Energy Research Group, Inc., Farmington, Mass., March 21, 1977.



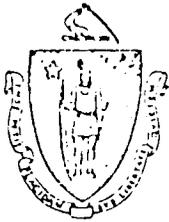
APPENDICES



Appendix A

MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS LETTER
TO PRESIDENT-ELECT CARTER

C O P Y



MICHAEL DUKAKIS
GOVERNOR

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

EVELYN F. MURPHY
SECRETARY

November 29, 1976

President-elect James E. Carter
Plains, Georgia

Dear President-elect Carter:

On Monday, November 22, 1976, I completed my review of the environmental impact report for the proposed nuclear power plant, Pilgrim II. After careful consideration I have found it adequate within what I believe to be the limits of the Massachusetts Environmental Policy Act. However, there are serious questions which I urge you to address and resolve as a matter of high priority by the federal government.

In NRDC vs NRC, the District of Columbia Court of Appeals quoted with approval from the administrative record: "The impression is inescapable, in view of the present imprecise state of affairs, that no convincing statements exist regarding the long term environmental impact attending the storage and/or disposal of wastes from fuel reprocessing." (9 ERC 1149, at 1163, DC. Cir., July 21, 1976.) Although the NRC has recently decided to continue issuing permits and licenses, the problem of waste disposal still remains. It is beyond the resources of either the Commonwealth or Boston Edison Company, the proponent of Pilgrim II, to resolve this matter. Since well over 90% of the nuclear waste produced is associated with our defense efforts, I urge you to place high priority on the development of a solution to this problem which by logic, as well as law, must be solved at the federal government level.

I further feel that while states may deal with individual plants, as you have often stated, the lack of an overall federal energy policy greatly reduces our ability to make these decisions in a manner that will bring about a compatible balance between available sources of power generation, conservation and research and development. A prompt and in-depth study and policy formation for energy on the federal level in line with your expressed concerns will provide the necessary guidelines for coherent state and regional decisions.

President-elect Carter
November 29, 1976
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If the nation is to place heavy reliance on nuclear facilities to meet our future power needs, the decision to do so must be founded in public confidence that the decision is prudent. It cannot be based on a series of incremental decisions. "As more and more reactors producing more and more wastes are brought into being, 'irretrievable commitments (are) being made and options precluded.'" (NRDC vs NRC 9 ERC 1149, at 1153, DC. Cir., July 21, 1976.) We must now undertake an examination of nuclear power and other alternatives so that we can assure ourselves and our progeny that our choices will always be the correct ones.

I believe that state governments, the business community and environmentalists together share the hope that your administration will move aggressively to undertake such a review in the context of adopting a national energy policy. The lead times and financial commitments necessary to construct major generating facilities require a national policy that is appropriate for and may be relied upon for decades. The serious environmental consequences of competing alternatives for base-load power both coal and nuclear, must be thoroughly explored. Conservation must be viewed as a national imperative; and the promise of solar energy must be pursued with major financial support.

The future economic health of this nation, as well as this Commonwealth, is dependent upon adequate supplies of energy at reasonable costs. I, together with labor, management, users and environmentalists, normally adversaries on many issues, urge that a national energy policy be given high priority in your administration and pledge our combined support, cooperation, and participation in the development and implementation of such a policy.

Sincerely yours,

/s/

Evelyn F. Murphy
Secretary

Kevin B. Harrington, President
Massachusetts Senate

Thomas W. McGee, Speaker
Massachusetts House of Representatives

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November 29, 1976
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Richard J. Dwinell, House Chairman
Joint Committee on Natural
Resources & Agriculture

John W. Olver, Senate Chairman
Joint Committee on Natural
Resources & Agriculture

Allen H. Morgen, Executive Vice-President
Massachusetts Audubon Society

Albert H. Bonfatti, President
Associated General Contractors of
Massachusetts, Inc.

Felix J. Conti, Chairman
Massachusetts Construction
Advancement Program

Robert E. Dickenson, Secretary
Massachusetts Labor Management
Construction Committee

C. Edward Belanger, President
Massachusetts Council of
Construction Employers, Inc.

Thomas S. Gunning, Executive Director
Building Trades Employers Association
of Boston and Eastern
Massachusetts, Inc.

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November 29, 1976
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J. Philip Mitchell
Executive Director
Construction Industries of Massachusetts, Inc.

Norton H. Nickerson
President
Massachusetts Association of Conservation Commissions

Kemp Maples
Past President and Executive Board
Massachusetts Wildlife Federation

Nancy Clayton Anderson
Executive Director
Massachusetts Forests and Parks Association

Thomas B. Arnold
Chairman, Executive Committee
Sierra Club, New England Chapter

Warren M. Little
Chairman
Massachusetts Conservation Council

President-elect Carter
November 29, 1976
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William J.P. Cleary, Executive Vice President
Massachusetts State AFL-CIO Council

Frank R. Joslin, Executive Coordinator
New England Construction Users Council

Norris K. McClintock, Executive Director
Conservation Law Foundation of New England, Inc.

Sylvia S. Field, President
New England Coalition on Nuclear Pollution

R. Lisle Baker, Chairman
Environment Committee
Boston Bar Association

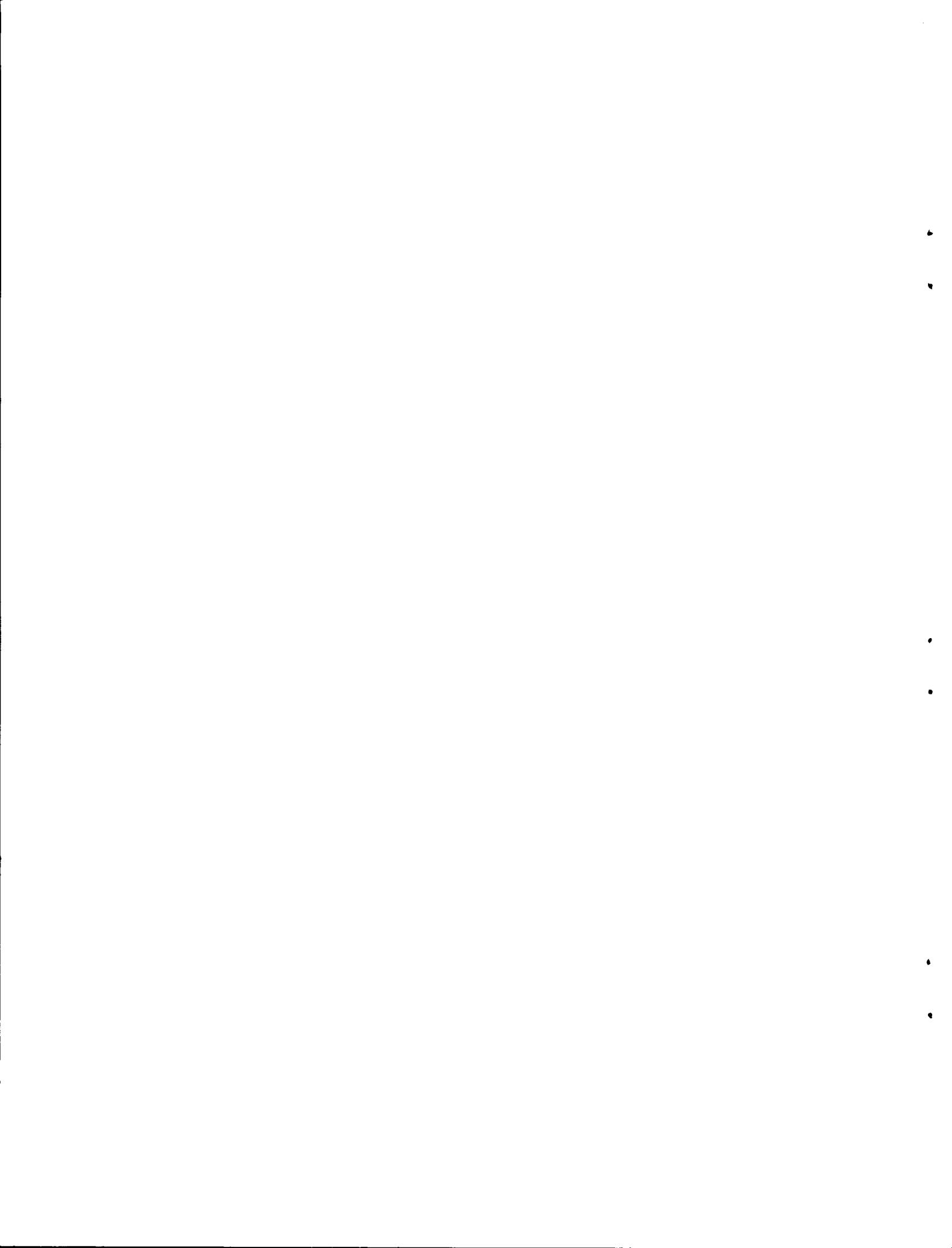
Henry E. O'Donnell, Jr., President
Massachusetts State Building and
Construction Trades Council

Thomas J. Galligan, Jr., President
Boston Edison Company

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November 29, 1976
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Joseph J. Struzziery, Jr., Executive Director
Utility Contractors Association of New England, Inc.

Thomas S. Deans, Executive Director
Appalachian Mountain Club



Appendix B

NEW ENGLAND ELECTRIC SYSTEM LETTER TO PRESIDENT-ELECT CARTER

C O P Y

NEW ENGLAND ELECTRIC SYSTEM
 20 TURNPIKE ROAD
 WESTBOROUGH, MASSACHUSETTS 01581
 TELEPHONE 617-366-9011

November 26, 1976

President-elect James E. Carter
 Plains, Georgia

Dear President-elect Carter,

The Secretary of Environmental Affairs of the Commonwealth of Massachusetts has written urging you to resolve a number of questions relating to an overall federal energy policy. I join with the Secretary in urging your new administration to give the highest priority to the formulation of a national energy policy which would ensure that as a nation we have available an adequate and reasonably priced supply of energy in all forms, provided under sound business principles with minimum adverse impact on the environment.

It now takes ten to twelve years to construct a nuclear power plant and a period nearly as long is needed for a major fossil-fueled power plant. Decisions regarding major financial commitments are made today in the face of a lack of a national energy policy.

In particular, I urge the development of an energy policy which would:

Promote environmental and economic balance. This should be done to ensure that environmental regulations are established on the basis of reliable evidence and that a reasonable relationship exists between costs and benefits. For example, water quality regulations should permit the use of the ocean for electric power generation, restricted only to avoid demonstrably adverse effects. Regulations concerning land use should include specific provisions for the siting and operation of energy supply facilities.

Address the key problems in the field of nuclear energy. In view of public concerns and existing uncertainties about nuclear power, serious consideration should be given to the construction at a government site of an integrated complex of facilities for spent fuel storage, reprocessing, fuel fabrication and waste storage. Of equal importance is the prompt selection by the federal government of

President-elect James E. Carter

November 26, 1976

the method for ultimate storage of this radioactive material. This would deal with the major short-term problems of the fuel cycle and provide public reassurance that the most sensitive issues are being dealt with under government control. Delay in making this decision has caused public misunderstanding of industry and concern over the government's ability to deal with these problems.

Continue the development of the breeder reactor pending the development of a total national energy policy. The assessment of the role of nuclear power in our national energy future should not be penalized by the lack of development of the breeder reactor.

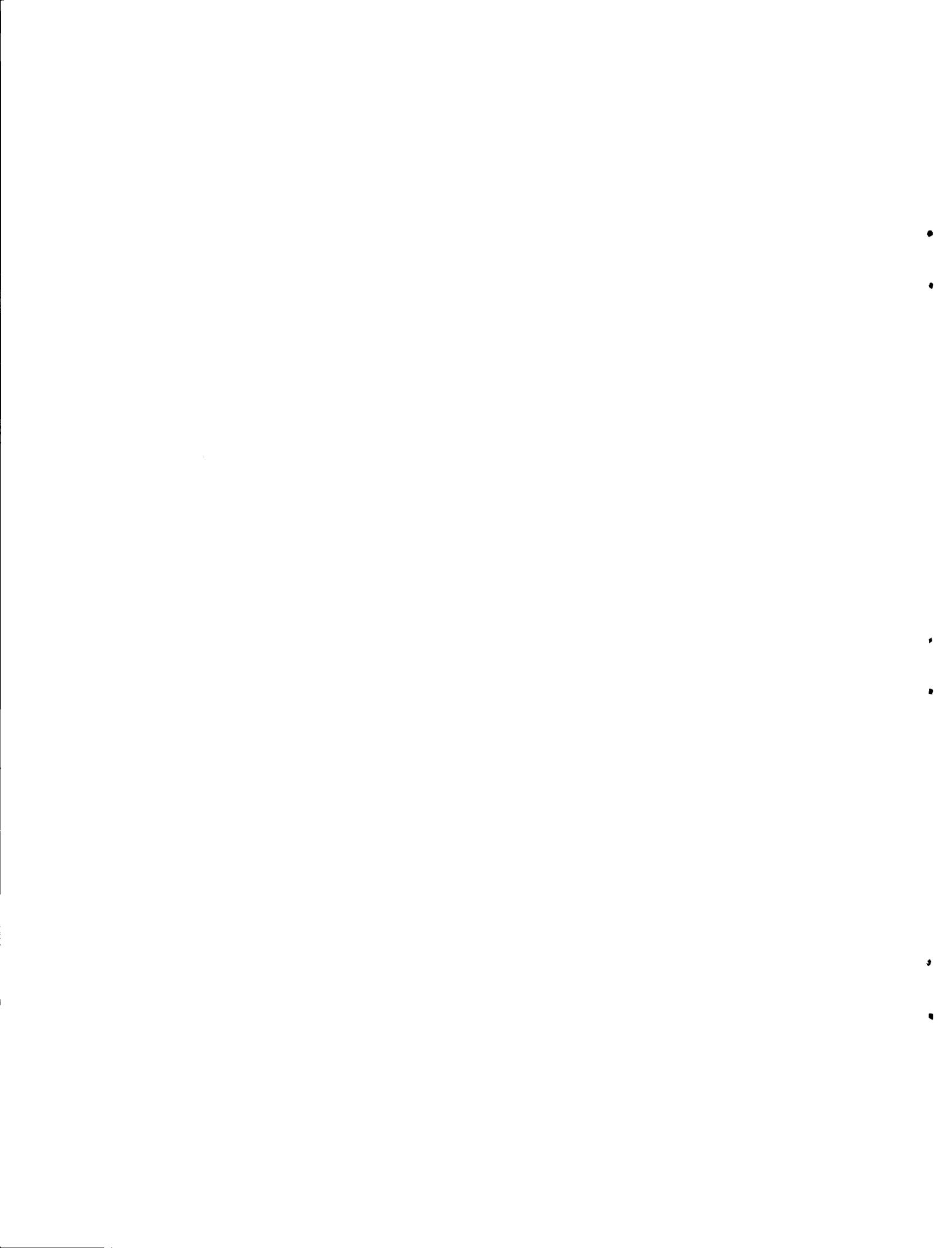
Due to the long lead times required to plan and construct facilities in our industry, decisions made today will have their impact in the mid-1980's or later. Also, current disruptions in planning or construction, such as with the Seabrook, N. H. plant, will not have their greatest impact for some years to come. Our nation needs to move promptly in order to ensure energy self-sufficiency in the 1980's and to assess rationally the roles that various forms of energy will play in the future.

I hope that your administration will move aggressively to develop and adopt a national energy policy and that such a policy will consider seriously these recommendations.

Very truly yours,

/s/

Guy W. Nichols
President



Appendix C

MINNESOTA POWER PLANT SITING ACT 1973

POWER PLANT SITES [NEW]

116C.51 Citation

Sections 116C.51 to 116C.69 shall be known as the Minnesota power plant siting act.

Laws 1973, c. 591, § 1.

Laws 1973, c. 591, § 20, provided:
 "This act is effective the day following its final enactment." (Governor's approval, May 23, 1973)

116C.52 Definitions

Subdivision 1. As used in sections 116C.51 to 116C.68, the terms defined in this section have the meanings given them, unless otherwise provided or indicated by the context.

Subd. 2. "Council" shall mean the Minnesota environmental quality council.

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Subd. 3. "High voltage transmission line" shall mean a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 200 kilovolts or more, except that the council, by regulation, may exempt lines under one mile in length.

Subd. 4. "Large electric power generating plant" shall mean electric power generating equipment and associated facilities designed for or capable of operation at a capacity of 50,000 kilowatts or more.

Subd. 5. "Person" shall mean an individual, partnership, joint venture, private or public corporation, association, firm, public service company, cooperative, political subdivision, municipal corporation, government agency, public utility district, or any other entity, public or private, however organized.

Subd. 6. "Utility" shall mean any entity engaged in this state in the generation, transmission or distribution of electric energy including, but not limited to, a private investor owned utility, cooperatively owned utility, and a public or municipally owned utility.

Subd. 7. Construction shall be deemed to have started or commenced as a result of significant physical alteration of a site or route but not including activities incident to preliminary engineering or environmental studies.

Laws 1973, c. 591, § 2.

For effective date see note under § 116C.51.

116C.53 Siting authority

The Minnesota environmental quality council is hereby given the authority to provide for power plant site and transmission line corridor and route selection.

Laws 1973, c. 591, § 3.

For effective date see note under § 116C.51.

116C.54 Advance forecasting

Every utility which owns or operates, or plans within the next 15 years to own or operate large electric power generating plants or high voltage transmission lines shall develop forecasts as specified in this section. On or before July 1 of each even-numbered year, every such utility shall submit a report of its forecast to the council. Such report may be appropriate portions of a single regional forecast or may be jointly prepared and submitted by two or more utilities and shall contain the following information:

(1) Description of the tentative regional location and general size and type of all large electric power generating plants and high voltage transmission lines to be owned or operated by such utility during the ensuing 15 years or such longer period as the council deems necessary;

(2) Identification of all existing generating plants and transmission lines projected to be removed from service during such 15 year period or upon completion of construction of such large electric power generating plants and high voltage transmission lines;

(3) Statement of the projected demand for electric energy for the ensuing 15 years and the underlying assumptions for this forecast, such information to be as geographically specific as possible where this demand will occur;

(4) Description of the capacity of the electric power system to meet such demands during the ensuing 15 years;

(5) Description of the utility's relationship to other utilities and regional associations, power pools or networks; and

(6) Other relevant information as may be requested by the council.

Laws 1973, c. 501, § 4.

For effective date see note under § 116C.51.

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116C.55 Development of power plant siting and transmission line routing criteria; public hearings; inventory

Subdivision 1. Policy. The legislature hereby declares it to be the policy of the state to site large electric power facilities in an orderly manner compatible with environmental preservation and the efficient use of resources. In accordance with this policy, the environmental quality council shall choose sites that minimize adverse human and environmental impact while insuring continuing electric power system reliability and integrity and insuring that electric energy needs are met and fulfilled in an orderly and timely fashion.

Subd. 2. Inventory criteria; public hearings. The council shall promptly initiate a public planning process where all interested persons can participate in developing the criteria and standards to be used by the council in preparing an inventory of potential large electric power generating plant sites and high voltage transmission line corridors and to guide the site suitability evaluation and selection process. The participatory process shall include, but should not be limited to public hearings. Before substantial modifications of the initial criteria and standards are adopted, additional public hearings shall be held. Such criteria and standards shall be promulgated on or before July 1, 1974.

Subd. 3. Inventory of potential large electric power generating plant sites and high voltage transmission line corridors. On or before July 1, 1975, the council shall assemble and publish an inventory of potential large electric power generating plant sites and high voltage transmission line corridors. The inventory report of potential large electric power generating plant sites and high voltage transmission line corridors shall set forth the criteria and standards used in developing the potential site and corridor inventory. After completion of its initial inventory of potential sites and corridors, the council shall have a continuing responsibility to evaluate, update and publish its inventory and if, due to changed circumstances or information, a site or corridor is inconsistent with prescribed criteria or does not meet prescribed standards, such site or corridor shall be removed from the inventory of potential sites and corridors.

Laws 1973, c. 591, § 5.

For effective date see note under § 116C.51. **Cross References**
Designation of sites and corridors, see § 116.57.

116C.56 Facility development plans

After publication by the council of its initial inventory of potential sites and corridors, and the criteria by which such sites and corridors were selected, every utility which owns or operates or plans within the next five years to start construction, own or operate large electric power generating plants or high voltage transmission lines shall develop and annually submit to the council its plans for facilities to meet and fulfill the expected future demands for electric energy during the period covered by such report. Such plans may be appropriate portions of a single regional plan or may be jointly prepared and submitted by two or more utilities, and shall contain the following information:

(1) Description of the general size and type of all large electric power generating plants and high voltage transmission lines to be owned and operated by such utility;

(2) Identification of all existing generating plants and transmission lines intended to be removed from service upon completion of construction of such large electric power generating plants and high voltage transmission lines;

(3) Identification of the location of the tentative preferred site and at least one alternative site for all large electric power generating plants, and the tentative preferred corridors and at least one alternative corridor for all high voltage transmission lines on which construction is intended to be commenced, and preliminary indication of the potential impact of the planned plants and lines on existing environmental values, and how potential adverse effects on such values will be avoided or minimized at least detriment to the public and

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to the total environment. Such site and corridor identification shall be made from the inventory published by the council pursuant to section 116C.55 or from sites or corridors offered by the utility. In the event a utility identifies a plant site or transmission line corridor not contained in the council's inventory of potential sites and corridors, the utility shall set forth the reasons for such identification and shall make an evaluation of such identified sites and corridors using the council's plant siting and routing criteria.

Laws 1973, c. 591, § 6.

For effective date see note under § 116C.51.

116C.57 Designation of sites and corridors; approval of transmission line routes and facility construction; emergency certification; responsibilities

Subdivision 1. Designation of sites and corridors suitable for specific facilities; reports. Following publication of the inventory of potential sites for large electric power generating plants or corridors for high voltage transmission lines and the submission of the five year development plans of the utilities, a utility must apply to the council in a form and manner prescribed by the council for designation of a specific site or corridor for a specific size and type of facility. No large electric power generating plant or high voltage transmission line shall be constructed except on a site or route designated by the council pursuant to sections 116C.51 to 116C.69. Following the study, evaluation, and hearings, as provided in this section and sections 116C.58 to 116C.60, on any site or corridor proposed by the utilities and such other sites and corridors as the council deems necessary from the inventory the council shall designate a suitable site or corridor for a specific size and type of facility. This designation by the council shall be made in accordance with the site selection criteria and standards established in section 116C.55 and shall be made in a timely manner in a finding with reasons for such choice, and published no later than one year after the request for designation of a site by the utility or no later than 180 days after the request for designation of a corridor by the utility. The time for designation of a site may be extended for six months by the council for just cause. No site or corridor designation shall be made in violation of the site selection standards established in section 116C.55. The council shall indicate the reasons for any refusal and indicate changes in size or type of facility necessary to allow siting in compliance with the standards. Upon designation of the site or corridor, the council shall issue to the utility a certificate of site compatibility.

Subd. 2. Approval of specific high voltage transmission line facilities, designs and routes within a designated corridor. No later than two years after the issuance of a certificate of site compatibility the utility shall apply to the council for a permit for the construction of a high voltage transmission line within the approved corridor. Following study, evaluation and hearings on the type, design, routing, right-of-way preparation and facility construction as identified in the utility's application and alternatives to the utility's corridor development proposal as provided in subdivision 4, the council shall issue a permit for the construction of high voltage transmission lines within the designated corridor. This permit issuance by the council shall be made in a timely manner and published no later than 180 days after the application for a permit by the utility.

Subd. 3. Emergency certification. Any utility whose electric power system requires the immediate construction of a large electric power generating plant or high voltage transmission line may make application to the council for an emergency certificate of site compatibility or permit for the construction of high voltage transmission lines, which certificate or permit shall be issued in a timely manner and published no later than 180 days of the application and upon a finding by the council that a demonstrable emergency exists which requires such immediate construction, and that adherence to the procedures and time schedules set forth in sections 116C.54 to 116C.57 would jeopardize

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such utility's electric power system. A public hearing shall be held within 90 days of the application. The council shall, after notice and hearing, promulgate regulations setting forth the criteria for emergency certification.

Subd. 4. Responsibilities, procedures, considerations in designating sites and corridors; approval of transmission line facility construction. To facilitate the study, research, evaluation and designation of sites and corridors for large electric power generating plants and high voltage transmission lines and the approval of specific transmission line facilities and their routes the council shall be guided by, but not limited to, the following responsibilities, procedures, and considerations:

(1) Evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high voltage transmission line corridors and routes and the effects of water and air discharges from such plants on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and monitoring of the water and air mass at proposed sites and sites of operating large electric power generating plants, evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment;

(2) Environmental evaluation of large electric power generating plant sites and high voltage transmission line corridors and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state;

(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects;

(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants;

(5) Analysis of the direct and indirect economic impact of proposed large electric power generating plants and high voltage transmission lines;

(6) Evaluation of adverse direct and indirect environmental effects which cannot be avoided should the proposed site and transmission line corridor or route be accepted;

(7) Evaluation of alternatives to the proposed site and transmission line corridors and routes;

(8) Evaluation of irreversible and irretrievable commitments of resources should the proposed site and transmission line corridor or route be approved;

(9) Where appropriate, consideration of problems raised by other state and federal agencies and local entities.

(10) Where rules and regulations of the council as set forth in sections 116C.51 to 116C.69 are substantially similar to existing rules and regulations of a federal agency to which the utility in the state is subject, the federal rules and regulations shall be applied by the council.

Laws 1973, c. 591, § 7.

For effective date see note under § 116C.51. **Cross References**
Public hearings, see § 116C.58.

116C.58 Public hearings; notice

The council shall hold an annual public hearing at a time and place prescribed by regulation in order to afford interested persons an opportunity to be heard regarding its inventory of potential sites and corridors and any other aspects of the council's activities and duties or the policies set forth in sections 116C.51 to 116C.69. The council shall hold at least one public hearing

in each county where a site or route is being considered for designation pursuant to section 116C.57 as suitable for construction of a large electric power generating plant or a high voltage transmission line. Notice of public hearings shall be given by the council at least ten days in advance but no earlier than 45 days prior to such hearings. Notice shall be by publication in a legal newspaper of general circulation in the county in which the public hearing is

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to be held and by mailed notice to chief executives of the regional councils, county and the incorporated municipalities therein.

Laws 1973, c. 591, § 8.

For effective date see note under § 116C.51.

1. Review

Environmental quality council's decision not to require an environmental impact statement for construction of

exploratory copper-nickel mine was subject to judicial review under the Environmental Policy Act. *Minnesota Public Interest Research Group v. Minnesota Environmental Quality Council*, 1975, 237 N.W.2d 375.

116C.59 Public participation

Subdivision 1. Advisory committee. The council shall appoint one or more advisory committees to assist it in carrying out its duties. Committees appointed to evaluate plant sites or transmission line corridors considered for designation shall be comprised of as many persons as may be designated by the council, but shall include a majority of public representatives; at least one representative from each of the following: A public or municipally owned utility, a private investor owned utility and a cooperatively owned utility; one representative from the regional council and one from each county and municipal corporation in which a large electric power generating plant site and high voltage transmission line corridor are proposed to be located. Reimbursement for expenses incurred shall be made pursuant to the rules governing state employees.

Subd. 2. Other public participation. The council shall adopt broad spectrum citizen participation as a principle of operation. The form of public participation shall not be limited to public hearings and advisory committees and shall be consistent with the council's rules, regulations and guidelines as provided for in section 116C.66.

Laws 1973, c. 591, § 9.

For effective date see note under § 116C.51.

116C.60 Public meetings; transcript of proceedings; written records

Meetings of the council, including hearings, shall be open to the public. Minutes shall be kept of council meetings and a complete record of public hearings shall be kept. All books, records, files, and correspondence of the council shall be available for public inspection at any reasonable time. The council shall also be subject to section 471.705.

Laws 1973, c. 591, § 10.

For effective date see note under § 116C.51.

116C.61 Local regulations; state permits; state agency participation

Subdivision 1. Regional, county and local ordinances, rules, regulations; primary responsibility and regulation of site designation, improvement and use. To assure the paramount and controlling effect of the provisions herein over other state agencies, regional, county and local governments, and special purpose government districts, the issuance of a certificate of site compatibility or transmission line construction permit and subsequent purchase and use of such site or route locations for large electric power generating plant and high voltage transmission line purposes shall be the sole site approval required to be obtained by the utility. Such certificate or permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose government.

Subd. 2. Facility licensing. Notwithstanding anything herein to the contrary, utilities shall obtain state permits that may be required to construct and operate large electric power generating plants and high voltage transmission lines. A state agency in processing a utility's facility permit application shall be bound to the decisions of the council, with respect to the site designation for the large electric power generating plant or the corridor or route

designation for the high voltage transmission line, and with respect to other matters for which authority has been granted to the council by sections 116C.51 to 116C.69.

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Subd. 3. State agency participation. State agencies authorized to issue permits required for construction or operation of large electric power generating plants or high voltage transmission lines shall participate in and present the position of the agency at public hearings and all other activities of the council on specific site, corridor or route designations of the council, which position shall clearly state whether the site, corridor, or route being considered for designation or permit approval for a certain size and type of facility will be in compliance with state agency standards, regulations or policies. No site or route shall be designated which violates state agency regulations.

Laws 1973, c. 591, § 11.

For effective date see note under § 116C.51.

116C.62 Improvement of acquired large electric power generating plant sites and high voltage transmission line route locations

Utilities which have acquired a power plant site or transmission line route in accordance with sections 116C.51 to 116C.69 may proceed to construct or improve such site or route for the intended purposes at any time, subject to section 116C.61, subdivision 2, provided that if such construction and improvement commences more than four years after a certificate or permit for the site or route has been issued then the utility must certify to the council that such site or route continues to meet the conditions upon which the certificate of site compatibility or transmission line construction permit was issued.

Laws 1973, c. 591, § 12.

For effective date see note under § 116C.51.

116C.63 Eminent domain powers; right of condemnation

Nothing herein shall abrogate or invalidate the right of eminent domain vested in utilities by statute or common law existing as of May 24, 1973. Such right of eminent domain shall continue to exist for utilities and may be used according to law to accomplish any of the purposes and objectives of sections 116C.51 to 116C.69.

Laws 1973, c. 591, § 13.

For effective date see note under § 116C.51.

116C.64 Failure to act

In the event the council fails to designate in a timely manner large electric power generating plant sites and high voltage transmission line corridors or routes as provided for herein, any affected utility may seek an order of the district court requiring the council to designate a site, corridor, or route.

Laws 1973, c. 591, § 14.

For effective date see note under § 116C.51.

116C.65 Judicial review

Any utility, party or person aggrieved by the issuance of a certificate or emergency certificate of site compatibility or transmission line construction permit from the council or a certification of continuing suitability filed by a utility with the council or by a final order in accordance with any rules and regulations promulgated by the council, may appeal therefrom to any district court where such large electric power generating plant or high voltage transmission line is to be located. Such appeal shall be made and perfected within 60 days after the issuance of the certificate or permit by the council or certification filed with the council or the filing of any final order by the council. The notice of appeal to the district court shall be filed with the clerk of the district court and a copy thereof mailed to the council and affected utility. Any utility, party or person aggrieved by a final order or judgment rendered on appeal to the district court may appeal therefrom to the supreme court in the manner provided in civil actions.

Laws 1973, c. 591, § 15.

For effective date see note under § 116C.51.

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116C.66 Rules and regulations

The council, in order to give effect to the purposes of sections 116C.51 to 116C.69, shall adopt rules and regulations consistent with sections 116C.51 to 116C.69, including promulgation of plant siting and transmission line routing criteria, the description of the information to be furnished by the utilities, establishment of minimum guidelines for public participation in the development, revision, and enforcement of any regulation, plan or program established by the council. Chapter 15, shall apply to the appeal of rules and regulations adopted by the council to the same extent as it applies to review of rules and regulations adopted by any other agency of state government.

Laws 1973, c. 591, § 16.

For effective date see note under § 116C.51.

116C.67 Savings clause

The provisions of sections 116C.51 to 116C.69 shall not apply to the site for the large electric power generating plant evaluated and recommended by the governor's environmental quality council prior to the date of enactment, and also to high voltage transmission lines, the construction of which will commence prior to July 1, 1974; provided, however, that within 90 days following the date of enactment, the affected utility shall file with the council a written statement identifying such transmission lines, their planned location, and the estimated date for commencement of construction.

Laws 1973, c. 591, § 17.

For effective date see note under § 116C.51.

116C.68 Enforcement, penalties

Subdivision 1. Any person who violates sections 116C.51 to 116C.69 or any rule or regulation promulgated hereunder, or knowingly submits false information in any report required by sections 116C.51 to 116C.69 shall be guilty of a misdemeanor for the first offense and a gross misdemeanor for the second and each subsequent offense. Each day of violation shall constitute a separate offense.

Subd. 2. The provisions of sections 116C.51 to 116C.69 or any rules or regulations promulgated hereunder may be enforced by injunction, action to compel performance or other appropriate action in the district court of the county wherein the violation takes place. The attorney general shall bring any action under this subdivision upon the request of the council.

Subd. 3. When the court finds that any person has violated sections 116C.51 to 116C.69, any rule or regulation hereunder, knowingly submitted false information in any report required by sections 116C.51 to 116C.69 or has violated any court order issued under this chapter, the court may impose a civil penalty of not more than \$10,000 for each violation. These penalties shall be paid to the general fund in the state treasury.

Laws 1973, c. 591, § 18.

For effective date see note under § 116C.51.

116C.69 Biennial report; budget; appropriation; funding

Subdivision 1. The council shall prepare and submit to the legislature biennially a report of its power plant and transmission siting operations, activities, findings, recommendations, and undertakings. The report shall also contain information on the council's biennial expenditures, its proposed budget for the following biennium, and the amounts paid in certificate and permit application fees pursuant to subdivision 2 and in assessments pursuant to subdivision 3. The proposed budget for the following biennium shall be subject to legislative review.

Subd. 2. Every applicant for a site certificate or transmission line construction permit shall pay to the council a fee in an amount equal to \$500 for each \$1,000,000 of production or transmission line plant investment in the

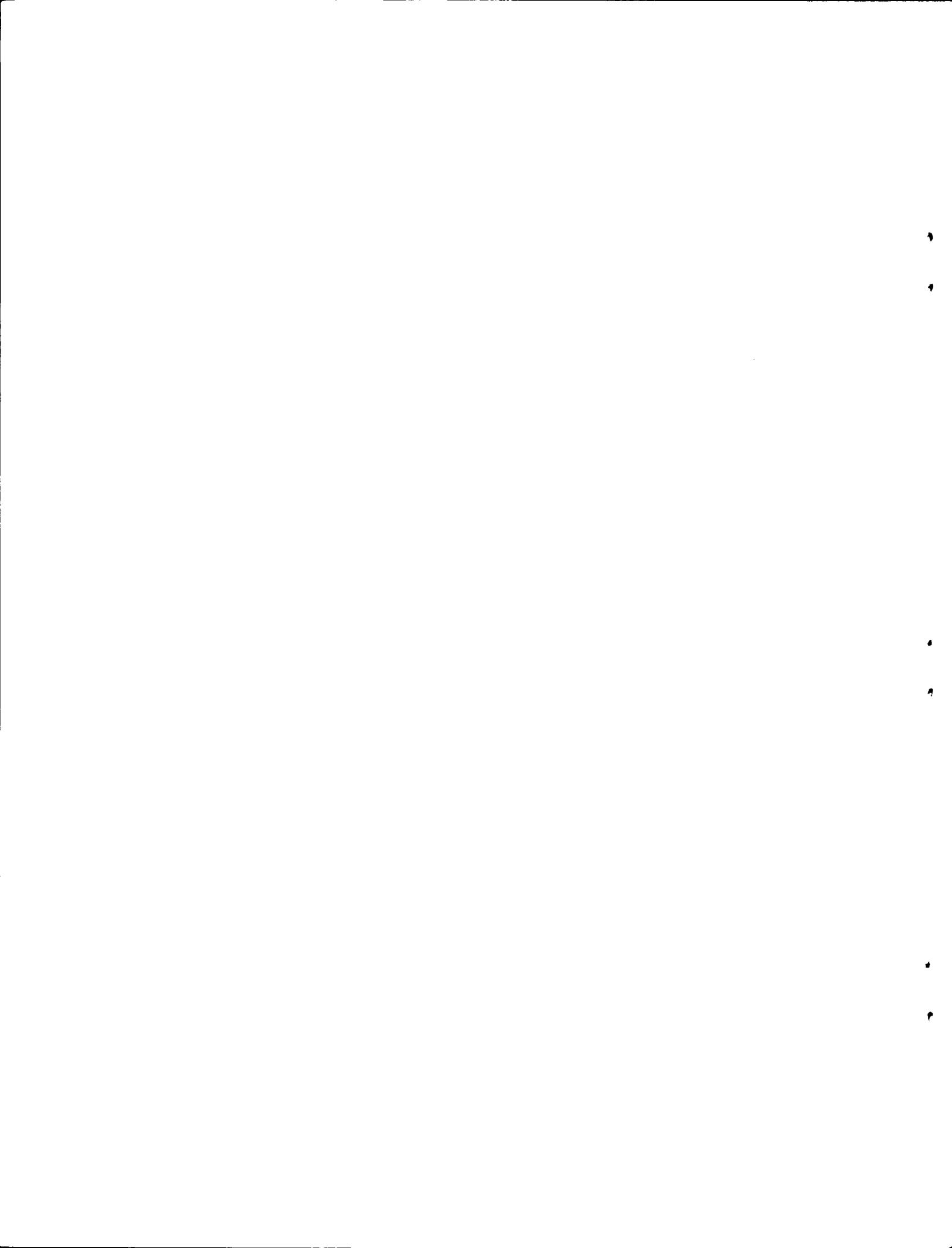
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proposed installation as defined in the Federal Power Commission Uniform System of Accounts. The council shall specify the time and manner of payment of the fee. If any single payment requested by the council is in excess of 25 percent of the total estimated fee, the council shall show that such excess is reasonably necessary. The applicant shall pay within 30 days of notification such additional fees as are reasonably necessary for completion of the plant site, transmission line corridor or route evaluation and selection process by the council. In no event shall the total fees required of the applicant under this subdivision exceed an amount equal to 0.001 of said production or transmission line plant investment (\$1,000 for each \$1,000,000) except that the minimum application fee shall not be less than \$5,000. All money received pursuant to this subdivision shall be deposited in the general fund. So much money as is necessary is annually appropriated from the general fund to pay expenses incurred in processing applications for certificates or permits in accordance with the provisions of sections 116C.51 to 116C.69 and in the event such expenses are less than the fee paid, to refund the excess to the applicant. This annual appropriation shall not exceed the fees to be paid during such period.

Subd. 3. The council shall finance its base line studies, general environmental studies, development of criteria, inventory preparation and all other work, other than specific site, corridor, and route selection, from an assessment made annually by the council against all utilities. Each share shall be determined as follows: (1) the ratio that the annual retail kilowatt-hour sales in the state of each utility bears to the annual total retail kilowatt-hour sales in the state of all such utilities, multiplied by 0.667, plus (2) the ratio that the annual gross revenue from retail kilowatt-hour sales in the state of each utility bears to the annual total gross revenues from retail kilowatt-hour sales in the state of all such utilities, multiplied by 0.333, as determined by the council. Such assessment shall be credited to the general fund and shall be paid to the state treasury within 30 days after receipt of the bill, which shall constitute notice of said assessment and demand of payment thereof. The total amount which may be assessed to the several utilities under authority of this subdivision shall not exceed the annual budget of the council for carrying out the purposes of this subdivision.

Laws 1973, c. 591, § 19.

For effective date see note under § 116C.51.



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