04/26/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	Docket No. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

NRC STAFF'S UPDATED ANSWERS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB NINTH SET OF INTERROGATORIES TO NUCLEAR REGULATORY COMMISSION STAFF

Pursuant to the Licensing Board's Prehearing Conference Order of February 11, 1982, the Nuclear Regulatory Commission Staff (Staff) hereby updates its June 15, 1976 response to Intervenors' Natural Resources Defense Council, Inc. and the Sierra Club Ninth Set of Interrogatories to the Nuclear Regulatory Commission Staff filed on May 7, 1976. Attached hereto are the Staff's answers to NRDC's interrogatories, together with the affidavits of the individuals who prepared the responses to the interrogatories.

The NRC Staff has determined that previous interrogatory responses to #3, #4, #9 and #12 are still applicable and need no updating.

On March 4, 1982, the parties in this proceeding developed a Protocol for Discovery. NRDC has requested that answers to interrogatory questions be provided in six parts. The following six parts are:

A) Provide the direct answer to the question.

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B) Identify all documents and studies, and the particular parts thereof, relied upon by the Staff, now or in the past, which serve as the basis for the answer. In lieu thereof, at Staff's option, a copy of such document and study may be attached to the answer.

C) Identify principal documents and studies, and the particular parts thereof, specifically examined but not cited in (b). In lieu thereof, at Staff's option a copy of each such document and study may be attached to the answer.

D) Identify by name, title and affiliation the primary Staff employee(s) or consultant(s) who provided the answer to the question.

E) Explain whether the Staff is presently engaged in or intends to engage in any further, on-going research program which may affect the Staff's answer. This answer need be provided only in cases where Staff intends to rely upon ongoing research not included in Section 1.5 of the PSAR at the LWA or construction permit hearing on the CRBR. Failure to provide such an answer means that Staff does not intend to rely upon the existence of any such research at the LWA or construction permit hearing on the CRBR.

F) Identify the expert(s), if any, which the Staff intends to have testify on the subject matter questioned, and state the qualifications of each such expert. This answer may be provided for each separate question or for a group of related questions. This answer need not be provided until the Staff has in fact identified the expert(s) in question or determined that no expert will testify, as long as such answer provides reasonable notice to Intervenors.

For all the responses to interrogatories in this set the following are the answers to the requested parts in the Protocol for Discovery.

B) Amendment 65 to the PSAR was relied upon in answering interrogatory questions #1, #2, #5, #6, #7 and #8b. All other documents and studies, and the particular parts thereof, relied upon by the Staff now or in the past which serve as the basis for the answer are mentioned in the direct answer to the question.

C) There were no principal documents and studies specifically examined but not cited in (b) unless otherwise noted.

D) The name, title and affiliation of the Staff employee(s) or consultant(s) who provided the answer to the question are available in the affidavits.

E) The Staff is not presently engaged in nor intends to engage in any further, on-going research program which may affect Staff's answer unless otherwise noted.

F) At this time, the Staff has not determined who will testify on the subject matter questioned. Reasonable notice will be given to all parties after the Staff has made this determination. At that time, a statement of professional qualifications will be provided for each witness.

In the April 14, 1982 Order Following Conference With Parties, the Licensing Board renumbered NRDC's contentions. When an old contention number appears in the interrogatory question or answer, the new contention number will be indicated in parentheses.

Respectfully submitted,

Geary S. Mizuno
Counsel for NRC Staff

Dated at Bethesda, Maryland
this 26 day of April, 1982

NRC STAFF ANSWERS TO NRDC'S AND
THE SIERRA CLUB'S INTERROGATORIES

The following interrogatories are related to Contention 6 (renumbered as 5):

Interrogatory 1

Provide the following as it relates to the CRBR at the presently proposed CRBR site:

a) site boundary -- the X/Q values and the Pasquill stability classes for the 95% and 50% cases.

b) low population zone boundary -- the X/Q values and the Pasquill stability classes for the 95% and 50% cases.

Response

A) Since NRDC issued its ninth set of interrogatories, the NRC has developed new criteria for use by applicants for CP or OL and the NRC Staff to determine the appropriate meteorological atmospheric dilution factors (X/Q) for use in determining the consequences of potential accidental releases.[1/] Two probabilistic analyses are performed using a minimum of one year of meteorological data collected on-site at or near the plant facility to be evaluated. The first analysis requires the development of the X/Q values for each of the 16 cardinal point sectors that is not exceeded 0.5% of the total time. The highest of each of these 16 sector X/Q values is defined as the maximum sector X/Q value.

1/ Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants" August 1979.

This maximum sector X/Q value is compared with the overall site X/Q that is exceeded no more than 5% of the total time. Whichever value is higher is used to determine the consequences of accidental releases at the exclusion area boundaries and the outer boundaries of low population zones. For the purpose of responding to interrogatories 1 through 5 related to contention 6, this X/Q value will be called the design basis meteorology (DBM). The DBM values, rather than 95% data, will be provided in the Staff responses to NRDC interrogatories 1 through 5.

(a & b) The Staff has calculated preliminary DBM values using on-site meteorological data for the period 2/17/77 to 2/17/78 with wind speed and direction data collected at the 33 foot level and temperature difference data collected between the 33 and 200 foot levels on the permanent CRBR tower.

The DBM values at the exclusion distance of 670 meters and the outer boundary distance of the low population zone of 4023 meters, respectively, are tabulated in Table 1 along with the X/Q values which are not exceeded 50% of the time for each of these distances.

Table 1
X/Q Values for CRBR Site

Zone	Distances (meters)	Time Period	DBM (sec/m^3)	50% (sec/m^3)
Exclusion	670	0-2 Hours	1.22×10^{-3}	1.3×10^{-4}
Low Population	4023	0-8 Hours	1.2×10^{-4}	1.1×10^{-5}
	4023	8-24 Hours	8.4×10^{-5}	1.0×10^{-5}
	4023	1-4 Days	3.9×10^{-5}	8.0×10^{-6}
	4023	4-30 Days	1.4×10^{-5}	5.7×10^{-6}

The staff does not calculate 95% and 50% Pasquill stability classes.

Interrogatory 2

Provide the following as it relates to the FFTF located at the Hanford reservation:

a) site boundary -- the X/Q values and the Pasquill stability classes for the 95% and 50% cases.

b) low population zone boundary -- the X/Q values and the Pasquill stability classes for the 95% and 50% cases.

Response

A) The DBM values (1) at the FFTF exclusion distance of 2400 meters was calculated to be 1.4×10^{-4} seconds per cubic meter and (2) at the FFTF low population zone distances of 7200 meters were calculated to be for 0-8 hours, 8-24 hours, 1-4 days, and 4-30 days, 2.7×10^{-5}, 1.9×10^{-5}, 6.9×10^{-6}, and 3.0×10^{-6}, seconds per cubic meter, respectively. These values were provided in the Staff's Safety Evaluation Report for the operational licensing of the FFTF. The X/Q values which are not exceeded 50% of the time were not calculated for the FFTF.

Interrogatory 5

Provide the values of the following that apply to each of the LWR's that are currently operating or under construction.

a) site boundary -- the X/Q values and the Pasquill stability classes that represent the 95% and 50% cases.

b) low population zone boundary -- the X/Q values and the Pasquill stability classes that represent the 95% and 50% cases.

Response

A) (a & b) Table 5 which is Exhibit A lists the DBM values for the LWR's that are operating or under construction. Table 5 is from the Safety Evaluation Report or the Systematic Evaluation Program Report.

The Staff has not routinely calculated X/Q values that are not exceeded 50% of the time for each light water reactor that is currently operating or under construction, since such values were not used in the Staff's Safety Evaluation. For assessing environmental effects of accidents for a NEPA analysis, the Staff's practices regarding X/Q values is stated in section 7.1 of Regulatory Guide 4.2, Revision 1 as follows:

> "Applicants may, for purposes of environmental reports, take the option in the calculation of X/Q values of using either of two meteorology assumptions for all accident cases:
>
> 1. X/Q values may be determined from onsite meteorological data at the 50% probability level or
>
> 2. X/Q values may be determined at 10% of the levels in Regulatory Guide 1.3 or 1.4.
>
> Accordingly, the latter procedure can be utilized to obtain a close approximation of the 50% X/Q value at a desired distance."

X/Q values can be represented by an infinite number of combinations of atmospheric stability classes and wind speeds. Because of the numerous possible combinations, the Staff does not relate the X/Q values that are not exceeded 50% of the time to an "equivalent" Pasquill type stability and associated wind speed. (This response is also applicable to Interrogatories 1 through 4).

The Staff agrees that Holzworth's data indicates that eastern Tennessee is in a region of the United States in which atmospheric

dispersion conditions are not as favorable as in some other regions of the country.

(2) Neither the Staff nor the applicant estimated the 95% Pasquill stability class. However, both the applicant and the Staff have utilized Regulatory Guide 1.145 models and methodology to estimate appropriate DBM X/Q values for the CRBRP site. As can be seen from Table 5 provided in response to interrogatory 5, the diffusion conditions at the site are among the poorest determined for LWR sites. The conditions at the CRBRP are better than some of the LWR conditions that have already been permitted or licensed, however, and are comparable to LWR sites in the general region (Catawba, Cherokee, McGuire, Perkins, Robinson, Sequoyah, Bellefonte, Yellow Creek, and Phipps Bend). Summer, Hartsville, and Watts Bar would have had comparable DBM X/Q values with a 670 meter exclusion zone boundary.

b) The previous statement in the PSAR concerning Holzworth's data evidently refers to information interpreted from the publication, "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States," AP101, by Mr. Holzworth. It must be realized that the information in this publication (AP101) is based upon data collected at widely spaced locations (approximately 400 km between stations, according to Holzworth in his Introduction), and should be recognized as being only generally applicable to the appraisal of the atmospheric dispersion characteristics over large areas of the country. For example, the size of the two pollutant sources considered by Holzworth are a city 10 km across (i.e., 100 km) and a city looking across (i.e., 10,000 km). Even the smaller of these two

sources is larger than the entire area within the low population zone at most nuclear power plant sites.

A careful reading of this publication indicates that the information presented cannot be used to characterize dispersion conditions over small areas such as a nuclear power plant site. This fact is generally recognized within the meteorological community. An adequate description of local atmospheric dispersion conditions requires a more detailed data collection and evaluation program such as the onsite meteorological program recommended in Regulatory Guide 1.23.

Figure 71, on page 96 of AP-101 (enclosed as Exhibit B) shows that large areas in the western United States have dispersion conditions potentially less favorable than even those in the Appalachian Mountain Region of the eastern U.S. This figure indicates that dispersion conditions over the regions in which Idaho Falls, Idaho, Hanford, Washington and Las Vegas, Nevada are located are no more favorable than those over eastern Tennessee.

Thus, neither of the two statements quoted in the interrogatory can be extrapolated to characterize the Staff's conclusions with regard to the local dispersion conditions at the Clinch River site. The atmospheric dispersion conditions at the CRBRP site are comparable to those at other previously approved sites located within the region and in other parts of the country.

Interrogatory 6

Does the Staff believe the Applicant's meteorological data complies precisely with Regulatory Guide 1.23? If not, identify fully all

discrepencies. Does the Staff have reason to believe that these discrepencies will be rectified in the foreseeable future? If so, explain how and by when.

Response

A) Regulatory Guides provide for acceptable procedures and practices and do not necessarily preclude alternatives. Regulatory Guide 1.23, "Onsite Meteorological Programs" (February 1972), provides guidance for acceptable onsite meteorological measurements programs. The present onsite meteorological measurements program at the CRBRP site as described in the PSAR appears to meet the recommendations and intent of Regulatory Guide 1.23, and the measurements program is comparable to similar programs at other nuclear power plant sites. In addition, the joint data recovery of wind speed and direction and temperature difference with height, during the measurement period (February 17, 1977 to February 17, 1978) which was used by the applicant and the Staff as a basis of their diffusion analyses, was 97%. This recovery rate is well in excess of the guideline 90% recovery rate stated in the guide.

Interrogatory 7

The following appears on page 2.3-5 and 2.3B-5 of the PSAR:

> "Holzworth's data indicate that eastern Tennessee is in a region of unfavorable dispersion with respect to the frequency of occurrence of high air pollution potential meteorology."

and on page 2.3B-14 of the PSAR it is indicated that the 95 per cent X/Q value was found to occur in Pasquill stability class G.

a) Does the Staff agree with these observations?

b) Given these unfavorable meteorological conditions at the Clinch River site, how does the Staff propose that these unfavorable local conditions be accommodated?

i) Explain your answer fully relative to design features and license conditions.

Response

A) Interrogatory 7 quotes portions of the PSAR that no longer appear in the revised PSAR sections. a) (1) The applicant's revised Section 2.3.1.2.6, which follows, provides proper perspective of the impact of high air pollution on potential releases from the CRBRP.

2.3.1.2.6 High Air Pollution Potential

According to a study Holzworth (Reference 21), high air pollution potential can be expected to occur about 5 to 10 days annually. Holzworth's results are based upon the frequency of occurrence of calculated mixing heights combined with concurrent calculated wind speeds. However, since CRBRP releases can be expected to be ground level, the frequency of stable atmospheric conditions in combination with low wind speeds should be more reflective of dispersion conditions at or near the site. For the year of record from the onsite CRBRP permanent tower, stable conditions (Pasquill stability classes E, F, and G) with wind speeds of about 5 miles per hour or less were reported for about half of the hours.

Interrogatory 8

In a letter of October 31, 1974 from R.P. Denise to P.S. Van Nort, Mr. Denise stated:

> "Based on our experience with other reactor types of this size, we anticipate that it will be difficult to meet calculated dose limits with the design presented in the Reference Design Report because of the poor meteorological conditions and the site size."

a) Does the Staff believe this statement is still valid when applied to the current designs (Reference and Parallel) described in the PSAR? Explain in detail the basis for the answer.

b) Does the Staff still believe the meteorological conditions at the site are poor?

Response

A) (b) Based on our preliminary examination of the NOAA tracer tests and the more recent onsite meteorological data collected at the CRBRP site and provided in the PSAR, the currently calculated dispersion conditions indicate more favorable conditions than previously assumed for the Siting Examinations.

Interrogatory 11

In a March 13, 1975 letter from Stephen H. Hanauer to Commissioner Gilinsky, Mr. Hanauer stated with regard to Siting (p. 3):

> "b. Our population siting criteria are indefinite at best. The applicant is required to study population distributions around a site and to project them for the life of the plant which, of course, he can do only very crudely, but our criterion for population distribution surrounding the plant are very vague. Recent attempts to be more quantitative in this area met with great resistance from the industry and from the old AEC. They tend to be oversimplified, but I believe we could

> do better than has been done. A related problem is our present total lack of control over what goes in near the plant after the site is approved. We have some vague words about the licensee's responsibility to stay informed about subdivisions, ammunition plants, LNG terminals and other post construction materialization of things that would have made the site unacceptable if known before licensing. Someday some operating reactor is going to have a new neighbor of a really abominable kind and we are going to have trouble coping with it.
>
> "c. I believe we are not being serious enough about siting alternatives that may offer substantial safety improvements. An obvious example is underground siting about which we are just starting a study in RES."

a) Does the Staff agree with each of these statements? Explain fully the basis for any disagreement with Mr. Hanaver's statements above.

Response

A) The statements cited in Interrogatory #11 are taken from an internal memorandum of March 13, 1975 from Stephen Hanauer, then Technical Advisor to the Executive Director for Operations, to Commissioner Gilinsky which expresses personal views regarding recommended subjects for Commission consideration in the future. The reference in Interrogatory 11 to a letter is interpreted to mean this memorandum.

(a) With regard to statement "b". The Staff issued its position on these subjects on 11/24/75 in NUREG-75/087. This was updated in July 1981 as NUREG-0800. The following sections appear to address the issues in question.

1. 2.1.1 "Site Location and Description"
2. 2.1.2 "Exclusion Area Authority and Control"
3. 2.1.3 "Population Distribution"

4. 2.2.1-2.2.2 "Identification of Potential Hazards in Site Vicinity"

(Copies of these are attached)

Following the accident at Three Mile Island, a Staff Task Force (NUREG-0625) recommended revisions to siting policy. In July 1980, the Commission issued an Advance Notice of Rulemaking (ANR) requesting comment on the recommendations in NUREG-0625. In December 1980, a Notice of Intent (NOI) to prepare an environmental impact statement was issued. In November 1981, a Scoping Summary Report (NUREG-0833) was issued which identified those items of the NUREG-0625 recommendations were still under consideration for rulemaking. In December, 1981 the Commission in its "Policy and Planning Guidance for 1982" (NUREG-0885) directed that the Staff defer the issuance of new siting criteria pending a better characterization of the radioactive source term as well as a better definition of its safety objectives.

Regarding statement "c." the Staff has issued guidance regarding the early consideration of safety matters in an Applicant's site selection process. Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations" Revision 1, was issued November 1975 and Appendix A of that document specifically addresses the matter. WASH-1361, "Safety-Related Site Parameters for Nuclear Power Plants" was issued January 1975 and also addresses the matter.

The underground siting study carried out by RES basically concluded that there was relatively little risk reduction to be gained from underground siting.

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NUCLEAR REGULATORY COMMISSION

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In the Matter of	)	
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U.S. DEPARTMENT OF ENERGY	)	Docket No. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF CHARLES FERRELL

I, Charles Ferrell, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Site Analyst, Siting Analysis Branch, Division of Engineering, Office of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatories #11 and #12 of the 9th Set and I hereby certify that the answers given are true to the best of my knowledge.

Charles Ferrell
Charles Ferrell

Subscribed and sworn to before me
this 22nd ~~day~~ of April, 1982.

Patricia T. Maloney
Notary Public

My Commission expires: 7/1/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF IRWIN SPICKLER

I, Irwin Spickler, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as the Chief of Section C of the Accident Evaluation Branch, Division of Systems Integration, Office of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatories #1 through #7, #8b, and #9 of the 9th Set and I hereby certify that the answers given are true to the best of my knowledge.

Irwin Spickler

Irwin Spickler

Subscribed and sworn to before me
this 22nd day of April, 1982.

Patricia L. Maloney

Notary Public

My Commission expires:
7/1/82

Table 5

Design Basis X/Q Values+

Plant	EAB Distance (meters)	0-2 Hr. (sec/m^3)	LPZ Distance (meter)	0-8 Hr. (sec/m^3)	8-24 Hr. (sec/m^3)	1-4 Day (sec/m^3)	4-30 Day (sec/m^3)
Allens Creek 1	1320	3.0 E-4	5632	2.7 E-5	1.8 E-5	7.5 E-6	2.1 E-6
Arkansas 1/2	1109	3.2 E-4	4183	7.0 E-5	4.6 E-5	1.8 E-5	4.9 E-6
Beaver Valley 1/2	610	1.4 E-3	5795	7.4 E-5	5.1 E-5	2.2 E-5	7.0 E-6
Big Rock Point	840	6.0 E-4	4800	6.4 E-5	1.3 E-5	4.2 E-6	9.5 E-7
Braidwood 1/2	457	7.7 E-4	1810	7.9 E-5	5.2 E-5	2.1 E-5	5.6 E-6
Browns Ferry 1/2/3*	1488	3.4 E-4	3218	1.3 E-4	2.4 E-5	6.0 E-6	1.8 E-6
Brunswick 1/2*	914	1.0 E-3	3219	2.8 E-4	3.1 E-5		
Byron 1/2	460	6.8 E-4	4827	2.3 E-5	1.5 E-5	6.4 E-6	1.9 E-6
Callaway 1/2	1100	1.5 E-4	4023	2.1 E-5	1.4 E-5	5.9 E-6	1.7 E-6
Calvert Cliffs 1/2	1150	3.3 E-4	3218	6.0 E-5	4.2 E-5	1.9 E-5	6.0 E-6
Catawba 1/2	762	1.4 E-3	6097	1.9 E-4	1.4 E-5	6.6 E-6	2.1 E-6
Cherokee 1/2/3	594	2.5 E-3	8045	5.9 E-5	3.8 E-5	1.5 E-5	4.0 E-6
Clinton 1/2	975	1.8 E-4	4023	4.2 E-5	8.2 E-6	3.3 E-6	1.6 E-6
Comanche Peak 1/2	2206	1.5 E-4	6640	2.3 E-5	1.5 E-5	6.0 E-6	1.6 E-6
Cook 1/2	675	2.1 E-4	3219	1.8 E-5	1.2 E-5	5.3 E-6	1.6 E-6
Cooper*	808	5.3 E-4	1609	2.9 E-4	6.3 E-5	2.4 E-5	5.3 E-6
Crystal River 3	1340	2.4 E-4	8047	9.1 E-6	6.0 E-6	2.4 E-6	6.7 E-7
Davis-Besse	634	2.1 E-4	3200	3.0 E-5	2.1 E-5	1.0 E-5	3.4 E-6
Diablo Canyon 1/2	800	5.3 E-4	9656	2.4 E-5	4.8 E-6	1.5 E-6	3.4 E-7
Dresden** 1/2/3	805	7.1 E-6	8045	1.3 E-6	9.0 E-7	4.3 E-7	1.5 E-7
Duane Arnold	540	2.2 E-3	9656	8.9 E-5	3.6 E-5		

Plant	EAB Distance (meters)	0-2 Hr. (sec/ m^3)	LPZ Distance (meter)	0-8 Hr. (sec/m^3)	8-24 Hr. (sec/m^3)	1-4 Day (sec/m^3)	4-30 Day (sec/m^3)
Farley 1/2	1235	3.9 E-4	3218	8.3 E-5	5.5 E-5	2.4 E-5	6.9 E-6
Fermi 2	915	1.7 E-4	4828	1.4 E-5	9.3 E-6	3.7 E-6	1.0 E-6
Fitzpatrick*	975	1.3 E-4	5470	1.5 E-5	3.2 E-6		
Fort Calhoun	910	2.8 E-4	4827	2.9 E-5	2.0 E-5	8.2 E-6	2.4 E-6
Ginna	450	1.2 E-3	4828	3.5 E-5	2.4 E-5	1.0 E-5	3.0 E-6
Grand Gulf	696	1.5 E-3	3218	1.6 E-4	1.0 E-4	4.2 E-5	1.2 E-5
Haddam Neck	530	1.0 E-3	11265	1.5 E-5	1.0 E-5	4.4 E-6	1.3 E-6
Harris 1/2	2133	7.0 E-4	4827	1.4 E-4	8.8 E-5	3.1 E-5	7.0 E-6
Hatch 1/2*	1250	1.4 E-4	1250	7.0 E-5	5.0 E-5	2.3 E-5	8.0 E-6
Hope Creek 1/2	792	3.1 E-4	8045	2.2 E-5	3.9 E-6	1.4 E-6	2.8 E-7
Indian Point 1/2/3	330	1.1 E-3	1100	1.4 E-4	1.2 E-4	8.8 E-5	5.5 E-5
Kewaunee	1200	4.6 E-4	4800	3.5 E-5	2.3 E-5	7.9 E-6	2.4 E-6
LaSalle 1/2*	515	3.0 E-4	6400	2.4 E-5			
Maine Yankee	610	7.7 E-4	9650	2.0 E-5	1.3 E-5	4.4 E-6	1.0 E-6
Marble Hill 1/2	670	7.1 E-4	3218	5.7 E-5	3.7 E-5	1.5 E-5	4.3 E-6
McGuire 1/2	762	9.5 E-4	8850	2.6 E-5	1.7 E-5	6.6 E-6	1.6 E-6
Midland 1/2	500	5.5 E-4	1600	5.2 E-5	3.6 E-5	1.6 E-5	5.0 E-6
Millstone 1/2*	600	4.3 E-4	3940	2.4 E-5	1.6 E-5	6.6 E-6	1.8 E-6
Monticello*	500	7.0 E-4	1608	2.3 E-4	5.3 E-5	1.9 E-5	3.9 E-6
Nine Mile Pt 1/2*	1555	5.9 E-4	6115	9.2 E-6			
North Anna 1/2	1350	4.2 E-4	9656	1.7 E-5	1.1 E-5	4.0 E-6	1.0 E-6
Oconee 1/2/3	1609	2.0 E-4	9645	2.0 E-5	1.5 E-5	7.1 E-6	2.5 E-6
Oyster Creek*	414	7.7 E-4	1208	9.6 E-5	3.8 E-5	2.1 E-5	1.0 E-5
Palo Verde 1/2/3	900	3.1 E-4	5600	5.1 E-5	3.8 E-5	2.0 E-5	8.3 E-6

Plant	EAB Distance (meters)	0-2 Hr. (sec/m^3)	LPZ Distance (meter)	0-8 Hr. (sec/m^3)	8-24 (sec/m^3)	1-4 Day (sec/m^3)	4-30 Day (sec/m^3)
Peach Bottom 2/3*	820	7.5 E-4	7300	1.2 E-5			
Perkins 1/2/3	594	2.3 E-3	8000	5.7 E-5	3.5 E-5	1.2 E-5	2.8 E-6
Perry 1/2	915	5.8 E-4	6437	2.4 E-5	1.4 E-5	4.8 E-6	1.0 E-6
Pilgram 1/2	441	4.0 E-4	2414	2.3 E-5	1.5 E-5	5.6 E-6	1.4 E-6
Point Beach 1/2	1200	3.4 E-4	9000	1.4 E-5	1.0 E-5	4.3 E-6	1.3 E-6
Rancho Seco	640	3.6 E-4	8000	1.3 E-5	8.8 E-6	3.6 E-6	9.8 E-7
River Bend 1/2	914	1.3 E-3	4023	9.8 E-5	7.2 E-5	3.7 E-5	1.4 E-5
Robinson 2	425	1.7 E-3	7240	3.6 E-5	2.3 E-5	9.0 E-6	2.3 E-6
Salem 1/2	765	2.4 E-4	8045	2.2 E-5	3.9 E-6	1.4 E-6	2.8 E-7
San Onofre 1/2/3	283	9.5 E-4	2900	2.6 E-5	1.8 E-5	8.2 E-6	2.7 E-6
Seabrook 1/2	914	1.4 E-3	2413	2.6 E-4	1.8 E-4	7.4 E-5	2.1 E-5
Sequoyah 1/2	585	1.4 E-3	4827	6.4 E-5	4.5 E-5	2.1 E-5	6.9 E-6
Shoreham	285	1.6 E-3	3218	3.9 E-5	2.8 E-5	1.3 E-5	4.4 E-6
South Texas 1/2	1430	1.7 E-4	4830	2.1 E-5	1.4 E-5	5.8 E-6	1.6 E-6
St. Lucie 1/2	1555	1.6 E-4	1609	6.7 E-5	4.4 E-5	1.8 E-5	5.0 E-6
Summer	1630	3.3 E-4	4827	4.1 E-5	2.6 E-5	1.0 E-5	2.6 E-6
Surry 1/2	520	1.6 E-3	4828	7.3 E-5	4.8 E-5	2.0 E-5	5.6 E-6
Susquehanna 1/2	540	1.1 E-3	4800	5.2 E-5	3.6 E-5	1.6 E-5	5.3 E-6
Three Mile Is. 1/2	610	8.3 E-4	3718	6.9 E-5	4.8 E-5	2.3 E-5	7.5 E-6
Trojan	630	6.9 E-4	4020	4.3 E-5	2.9 E-5	1.3 E-5	3.8 E-6
Turkey Point 3/4	1269	1.4 E-4	8047	1.1 E-5	7.5 E-6	3.0 E-6	8.0 E-7
Vermont Yankee*	277	4.0 E-3	8045	3.5 E-5	2.1 E-5	7.0 E-6	1.5 E-6
WNP 1	1950	3.0 E-4	6440	2.8 E-5	1.9 E-5	8.3 E-6	2.5 E-6
WNP-2	1950	1.7 E-4	4829	3.8 E-5	2.8 E-5	1.4 E-5	5.3 E-6

Plant	EAB Distance (meters)	0-2 Hr. (sec/ m^3)	LPZ Distance (meter)	0-8 Hr. (sec/m^3)	8-24 Hr. (sec/m^3)	1-4 Day (sec/ m^3)	4-30 Day (sec/m^3)
Waterford 3	915	5.1 E-4	3218	6.9 E-5	4.5 E-5	1.8 E-5	4.9 E-6
Wolf Creek	1200	1.9 E-4	4023	2.7 E-5	1.8 E-5	7.4 E-6	2.0 E-6
Yankee Rowe	945	1.9 E-4	1551	6.2 E-5	4.5 E-5	2.3 E-6	8.3 E-7
Zimmer 1	250	7.1 E-3	4827	9.2 E-5	6.4 E-5	2.8 E-6	9.5 E-6
Zion 1/2	400	8.4 E-4	1609	6.2 E-5	3.6 E-5	1.8 E-5	5.3 E-6
Bellefonte 1/2	914	1.8 E-3	3219	1.8 E-4	1.2 E-4	4.8 E-5	1.3 E-5
Hartsville 1/2/3/4	1220	4.9 E-4	4828	5.9 E-5	4.1 E-5	1.9 E-5	6.2 E-6
Phipps Bend 1/2	760	1.8 E-3	4827	1.2 E-4	8.0 E-5	3.5 E-5	1.1 E-5
Watts Bar 1/2	1100	4.0 E-4	4828	5.4 E-5	3.7 E-5	1.6 E-5	4.6 E-6
Yellow Creek 1/2	695	1.5 E-3	4828	6.4 E-5	3.5 E-5	1.2 E-5	2.4 E-6

+Table Values are expressed as follows: 2.3 E-3 = 2.3×10^{-3}
*Ground releases for a plant with a stack
**Stack releases only available

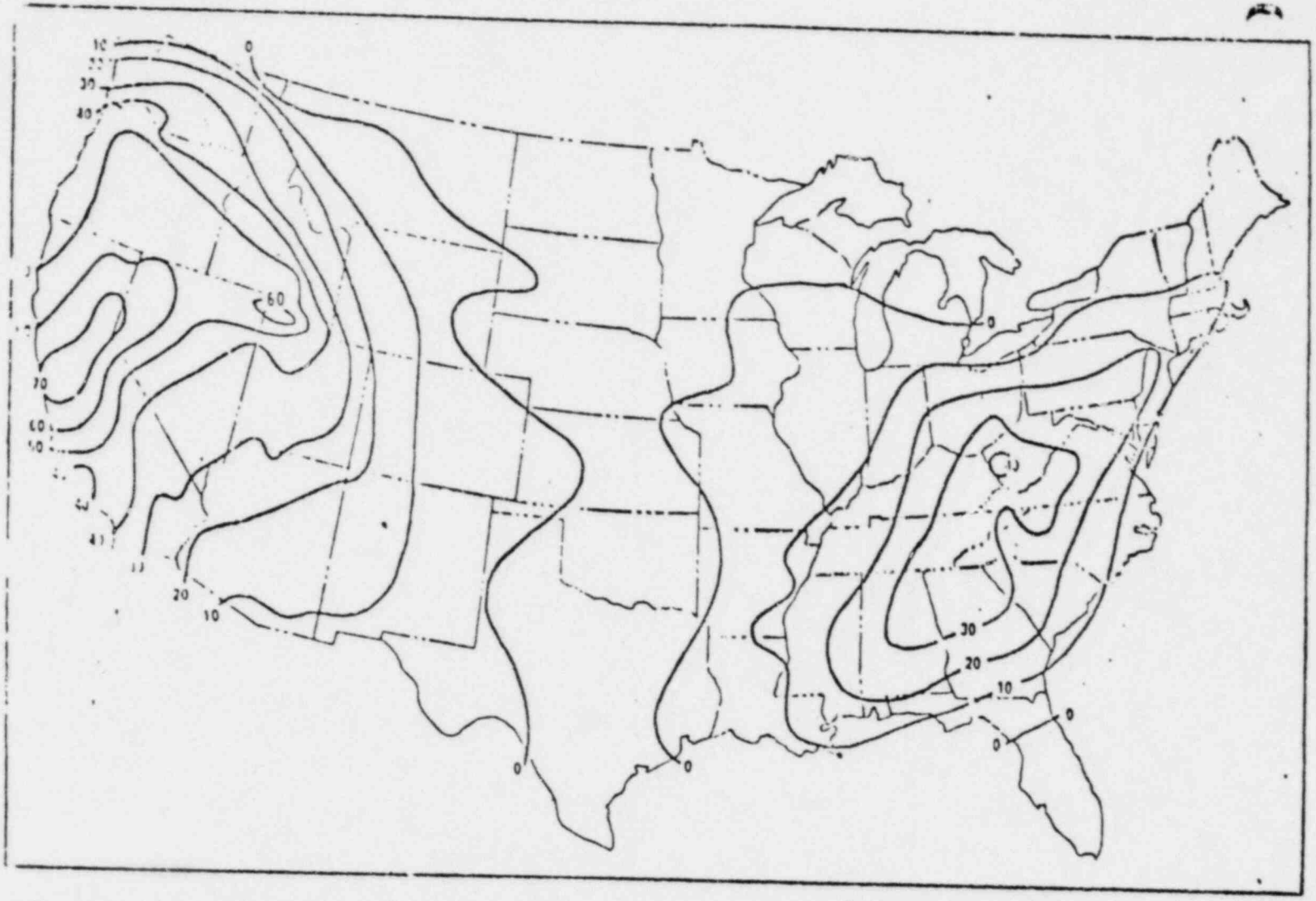


Figure 71. Isopleths of total number of forecast-days of high meteorological potential for air pollution in a 5-year period. Data are based on forecasts issued since the program began, 1 August 1960 and 1 October 1963 for eastern and western parts of the United States, respectively, through 3 April 1970.

EXHIBIT B

2.1.1 SITE LOCATION AND DESCRIPTION

REVIEW RESPONSIBILITIES

Primary - Siting Analysis Branch (SAB)

Secondary - None

I. AREAS OF REVIEW

Reactor location is reviewed (1) as identified by latitude and longitude and by the UTM* coordinate system; (2) with respect to political subdivisions; and (3) with respect to prominent natural and man-made features of the area to ascertain the accuracy of the applicant's safety analysis report (SAR) description and for use in independent reviews of the exclusion area authority and control (SRP Section 2.1.2), the surrounding population (SRP Section 2.1.3) and nearby man-made hazards (SRP Section 2.2.3).

The site area which contains the reactors and associated principal plant structures is reviewed to determine the distance from the reactor to boundary lines of the exclusion area, including the direction and distance from the reactor to the nearest exclusion area boundary line. A scaled plot plan of the exclusion area is reviewed which permits distance measurements to the exclusion area boundary in each of the 22-1/2 degree segments centered on the 16 cardinal compass points. The location and orientation of plant structures within the exclusion area are reviewed to identify potential release points and their distances to exclusion area boundary lines. The location, distance, and orientation of plant structures with respect to highways, railways, and waterways which traverse or lie adjacent to the exclusion area are reviewed to assure that they are adequately described to permit analyses (SRP Section 2.2.3) of the possible effects on the plant of accidents on these transportation routes.

II. ACCEPTANCE CRITERIA

The acceptance criteria for site location and description are based on meeting the relevant requirements of 10 CFR Part 50, §50.34 and 10 CFR Part 100, §100.10. The relevant requirements of these regulations are:

*Universal Transverse Mercator coordinate system as found on USGS topographical maps.

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

1. 10 CFR Part 100, §100.10 as it relates to site acceptance being based on the consideration of factors relating to the proposed reactor design and the characteristics peculiar to the site.

2. 10 CFR Part 50, §50.34 as it relates to the applicant submitting in its preliminary and final safety analysis reports (PSAR and FSAR) information needed for evaluating factors involving the use characteristics of the site environs.

The information submitted by the applicant is adequate and meets the 10 CFR Part 50, §50.34 requirements if it satisfies the following criteria:

The site location including the exclusion area and the location of the plant within the area are described in sufficient detail to allow a determination (in SRP Sections 2.1.2, 2.1.3, and those in Section 15) that 10 CFR Part 100 is met.

Highways, railways, and waterways which traverse the exclusion area are sufficiently distant from plant structures so that routine use of these routes is not likely to interfere with normal plant operation (Ref. 1).

Information included in this SAR section should allow two types of safety analyses to be conducted. The first addresses the consequences in the unlikely event that a serious release of radioactive material should occur. The second addresses the effect that accidents on, or routine use of, routes on or near the site will have on the operation of the plant.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this SAR section will be made by the reviewer on each case. The judgment on the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

The information in this section of the SAR forms the basis for evaluations performed in various other sections. The purpose of this review is to establish the validity of the basic data, to check the UTM coordinates to assure that they include the zone number, and that the Northing and Easting are presented to within 100 meters. The latitude and longitude should be checked to assure that they are expressed to the nearest second.

Cross-check the exclusion area distances with distances used in the Accident Analyses, SAR Section 15. Scale the map provided to check distances specified in the SAR and to determine the distance-direction relationships to exclusion area boundaries, roads, railways, waterways, and other significant features of the area. At the operating license stage, the location and orientation of plant structures and effluent release points with respect to the exclusion area and plant property boundaries, transportation routes and political subdivisions will be reviewed to identify any changes since the construction permit (CP) review. Where changes have occurred, new analyses may be required to ensure that the findings reached during the CP review are not affected by these changes.

If, in the reviewer's judgment, maps of larger scale are desirable, they may be obtained from the U.S. Geological Survey (USGS). The USGS map index should be consulted for the specific names of the 7-1/2 minute quadrangles that bracket

the site area. If available, these maps provide topographic information in addition to details of prominent natural and man-made features in the site area. This information may be supplemented by updated information as available, e.g., aerial photographs or information obtained on the site visit. Check the plant layout to determine that the orientation of plant structures with respect to nearby roads, railways, and waterways is clearly shown. Check to see that there are no obvious ways in which transportation routes which traverse the exclusion area can interfere with normal plant operations.

Site Visit

A visit to the site under review permits a better understanding of the physical characteristics of the site and its relationship to the surrounding area. It permits the reviewer to gather information, independent of that supplied in the Safety Analysis Report, which is useful in confirming SAR data.

Site visits should be made after initial review of the site data in the SAR has been completed and the reviewer has become generally familiar with the site and surrounding areas. Since one of the purposes of the site visit is to discuss the preliminary review findings with the applicant, the reviewer should plan to be in the site area one or two days in advance of the scheduled meeting with the applicant. This will permit gathering information from visits to local offices of Federal, State, and county governments, industries, military facilities, etc. Specific visits to these offices should be made on the basis of the particular site characteristics and is left to the judgment of the individual reviewer. The reviewer should note that some of the local offices may have been contacted by the environmental reviewer. Generally, information sought by the respective reviewers is similar in scope but will differ in emphasis. To avoid duplication of visits to local officials, the reviewer should contact the Project Manager and, where feasible, arrange for a joint visit to those local offices in which there is a common interest. Sources investigated should include such State and local agencies as those concerned with population and land use and land use controls (zoning boards). County engineers are sources of information on public roads and traffic volumes. Local Councils of Government may have information on population growth, proposed new industries or transportation routes. Information sought should encompass, whenever possible, data in support of the review procedures for SRP Sections 2.1.3, 2.2.1, 2.2.2, and 2.2.3.

If information gathered indicates the need for clarification of data contained in the SAR, this should be discussed with the applicant in the subsequent meeting on preliminary review findings.

IV. EVALUATION FINDINGS

The reviewer verifies that the information submitted by the applicant is in accordance with 10 CFR Part 50, §50.34 requirements so that compliance with 10 CFR Part 100, §100.10 can be evaluated.

Summary descriptions of the site location, the site itself, and transportation routes on or near the site will be prepared for the staff safety evaluation report. Any deficiencies of site parameters with respect to the proposed plant will be noted.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

VI. REFERENCES

1. 10 CFR Part 100, "Reactor Site Criteria."

2. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.34.

3. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

2.1.2 EXCLUSION AREA AUTHORITY AND CONTROL

REVIEW RESPONSIBILITIES

Primary - Siting Analysis Branch (SAB)

Secondary - None

I. AREAS OF REVIEW

The applicant's legal authority to determine all activities within the designated exclusion area is reviewed. 10 CFR Part 100, § 100.3(a) requires that a reactor licensee have authority to determine all activities within the designated exclusion area, including the exclusion and removal of personnel and property.

In any case where the applicant does not own all the land, including mineral rights, within the designated exclusion area, assistance may be required of the Office of the Executive Legal Director (OELD) in determining whether or not the designated exclusion area meets the requirements of 10 CFR Part 100. Also, in some cases public roads which lie within the proposed exclusion area may have to be abandoned or relocated to permit plant construction. OELD assistance may be required to assure that no legal impediments to such abandonment or relocation are likely to ensue. Part 100 permits the exclusion area to be traversed by a highway, railway, or waterway provided arrangements are made to control these areas in event of an emergency.

Activities that may be permitted within the designated exclusion area, and that will not be related to routine operation of the plant, are reviewed. Review should include the type of activity, its specific location within the exclusion area, the number and kinds of persons engaged in the activity, and the frequency and length of time the activities are to be permitted. The Accident Evaluation Branch (AEB), upon request, will determine whether individuals associated with plant unrelated activities within the exclusion area can be evacuated prior to receiving doses in excess of the guideline values of 10 CFR Part 100.

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

II. ACCEPTANCE CRITERIA

SAB acceptance criteria are based on meeting the relevant requirements of 10 CFR Part 100 with respect to the applicant's legal authority with the designated exclusion area. 10 CFR Part 100 (Ref. 1) in Section 100.3(a) states as follows:

"Exclusion area" means that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety....Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result."

To meet the requirements of 10 CFR Part 100 the applicant must demonstrate, prior to issuance of a construction permit or limited work authorization, that it has the authority within the exclusion area as required by Section 100.3(a), or must provide reasonable assurance that it will have such authority prior to start of construction. Absolute ownership of all lands within the exclusion area, including mineral rights, is considered to carry with it the required authority to determine all activities on this land and is acceptable.

Where the required authority is contingent upon future procurement of ownership (e.g., by eminent domain proceedings), or by lease, easement, contract, or other means, the exclusion area may be acceptable if OELD can determine that the information provided by the applicant provides reasonable assurance that the required authority will be obtained prior to start of construction. In cases where ownership and control is to be acquired or completed during a construction period, a special review by OELD will be required. Also, in cases of proposed public road abandonment or relocation, OELD should determine that there is sufficient authority or that sufficient arrangements have been made to accomplish the proposed relocation or abandonment. At the OL stage of review, the applicant must have completed arrangements to determine all activities within the exclusion area. The applicant will not be permitted to load fuel until exclusion area authority and control, including all transfers of title, easements, lease arrangements, public road abandonments or relocations, as applicable, are completed.

Activities unrelated to plant operation within the exclusion area are acceptable provided:

(a) Such activities, including accidents associated with such activities, represent no hazard to the plant or have been shown to be accommodated as part of the plant design basis (see SRP Section 2.2.3) (Ref. 2).

(b) The applicant is aware of such activities and has made appropriate arrangements to evacuate persons engaged in such activities, in the event of an accident, and

(c) There is reasonable assurance that persons engaged in such activities can be evacuated without receiving radiation doses in excess of the guideline values given in 10 CFR Part 100.

Where the designated exclusion area extends into bodies of water such as a lake, reservoir, or river which is routinely accessible to the public, the reviewer must determine that the applicant has made appropriate arrangements with the local, state, Federal, or other public agency having authority over the particular body of water and the arrangements made provide for the exclusion and ready removal in an emergency, by either the applicant or the public agency in authority, of any persons on those portions of the body of water which lie within the designated exclusion area.

References 3, 4, and 5 contain pertinent decisions made by Atomic Safety and Licensing Boards (ASLB) and Atomic Safety and Licensing Appeal Boards (ASLAB) which deal with exclusion area determinations in contested cases.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this standard review plan section will be made by the reviewer on each case. The judgment on the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

The reviewer should determine the basis on which the applicant claims authority within the exclusion area. If absolute ownership of all lands, including mineral rights, within the area is demonstrated, the acceptance criteria are satisfied. If any other method is claimed as providing the required authority, a memorandum should be prepared for OELD containing all of the appropriate information in the SAR, including copies of applicable SAR pages and figures, and requesting a written response as to whether or not the applicant's claimed authority meets the requirements of 10 CFR Part 100, § 100.3(a). In any case where there are technical reasons which the reviewer believes make the applicant's proposed method unacceptable, these reasons should be described and discussed in the memorandum. If the exclusion area extends into a body of water such as a lake, reservoir, or river, the area of the body of water encompassed should be reviewed against the guidelines of Part 100 regarding control of access and activities unrelated to operation of the reactor. The extent of the exclusion area over a waterway must be reviewed on a case-by-case basis.

The memorandum should also include information in the PSAR which describes the applicant's plans, procedures, and schedule for obtaining any abandonment or relocation of public roads which may be required. At the operating stage, review will emphasize those areas where the applicant did not possess absolute authority at the construction permit review.

If the designated exclusion area is traversed by a highway, railway, waterway, or other transportation route accessible to the public, the reviewer should determine that the applicant's emergency plan includes adequate provisions for control of traffic on these routes in the event of an emergency. At the construction permit stage, a finding that such provisions are feasible is adequate.

If activities unrelated to plant operation are to be permitted within the exclusion area, it will be nesessary to determine that the potential radiation exposures to persons engaged in these activities resulting from the design basis accidents postulated and evaluated in SAR Section 15 do not exceed the guidelines of 10 CFR Part 100. The reviewer should request the assistance of the AEB for this review area.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided, and that his evaluation is sufficiently complete and adequate to support conclusions of the following type, to be included in the staff's safety evaluation report:

The staff concludes that the applicant's exclusion area is acceptable and meets the requirements of 10 CFR Part 100. This conclusion is based on the applicant having appropriately described the plant exclusion area, the authority under which all activities within the exclusion area can be controlled, and the methods by which access and occupancy of the exclusion area can be controlled during normal operation and in the event of an emergency situation. In addition, the applicant has the required authority to control activities within the designated exclusion area, including the exclusion and removal of persons and property, and has established acceptable methods for control of the designated exclusion area.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

VI. REFERENCES

1. 10 CFR Part 100, "Reactor Site Criteria."

2. NUREG 75/087, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 2.2.3.

3. The Cleveland Electric Illuminating Company, et al. (Perry Nuclear Power Plant, Units 1 and 2), "Supplemental Partial Initial Decision, Site Suitability and Environmental Matters," LBP-74-76, 8 AEC 701 (October 20, 1974).

4. Southern California Edison Company, et al. (San Onofre Nuclear Generating Station, Units 2 and 3), "Decision," ALAB-248, 8 AEC 951 (December 24, 1974).

5. Southern California Edison Company, et al. (San Onofre Nuclear Generating Station, Units 2 and 3), "Decision," ALAB-268 1-NRC 383 (April 25, 1975).

U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

2.1.3 POPULATION DISTRIBUTION

REVIEW RESPONSIBILITIES

Primary - Siting Analysis Branch (SAB)

Secondary - Emergency Preparedness Licensing Branch (EPLB)

I. AREAS OF REVIEW

The SAB reviews the population data in the site environs as presented in the applicant's SAR, to determine whether the exclusion area, low population zone and population center distance for the site comply with the requirements of 10 CFR Part 100, and (at the CP stage) to determine whether the population density is such, as given in Position C.3 of Regulatory Guide 4.7, that consideration should be given by the applicant to alternate sites with lower population density.

A secondary review is performed by EPLB and the written results are used by SAB to complete the overall evaluation of the facility.

The EPLB reviews the low population zone (LPZ), to determine whether there is reasonable assurance that appropriate protective measures can be taken in this area, in the event of emergency. The results of the analysis are transmitted to SAB for inclusion in the safety evaluation report.

II. ACCEPTANCE CRITERIA

SAB acceptance criteria are based on meeting the relevant requirements of the following regulations:

1. 10 CFR Part 50, §50.34 as it relates to having each applicant provide a description and safety assessment of the site in his SAR, with special attention to the site evaluation factors identified in 10 CFR Part 100.

2. 10 CFR Part 100, §100.10 as it relates to determining the acceptability of a site for a power or testing reactor. The staff will take the following item, among others, into consideration:

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

Population density and use characteristics of the site environs, including the exclusion area, low population zone, and population center distance.

10 CFR Part 100 also provides definitions and other requirements for determining an exclusion area, low population zone, and population center distance in Sections 100.3 and 100.11, respectively.

The requirements of 10 CFR Part 50, §50.34 and 10 CFR Part 100 are deemed to have been met if the population density and use characteristics of the site meet the following:

1. Either there are no residents in the exclusion area, or if so, such residents are subject to ready removal, in case of necessity.

2. The specified low population zone is acceptable if it is determined that appropriate protective measures could be taken in behalf of the enclosed populace in the event of a serious accident.

3. The nearest boundary of the closest population center (as defined in 10 CFR Part 100) is at least one and one third times the distance from the reactor to the outer boundary of the low population zone.

4. The population center distance is acceptable if there are no likely concentrations of greater than 25,000 people over the plant lifetime closer than the distance designated by the applicant as the population center distance. The boundary of the population center shall be determined upon considerations of population distribution. Political boundaries are not controlling.

5. The population data supplied by the applicant in his SAR is acceptable if (a) it contains population data for the latest census, projected year of plant startup and projected year of end of plant life, all in the geographical format given in Section 2.1.3 of Reference 3, (b) it describes the methodology and sources used to obtain the population data, including the projections, (c) it includes information on transient populations in the site vicinity, and (d) the population data in the site vicinity, including projections, is verified by other means such as U.S. Census publications, publications from state and local governments, and other independent projections, to be reasonable.

6. If the population density at the CP stage exceeds the guidelines given in Position C.3 of Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations" (Ref. 4), the applicant will be required to give special attention to the consideration of alternative sites with lower population densities. A site that exceeds the population density guidelines of Position C.3 of Regulatory Guide 4.7 can nevertheless be selected and approved if, on balance, it offers advantages compared with available alternative sites when all of the environmental, safety, and economic aspects of the proposed and alternative sites are considered.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this SRP section will be made by the reviewer on each case. The judgment on the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

Determine that the population data contained in the SAR is in the detail and in the format described in Reference 3, Section 2.1.3.

Compare the SAR present population data against whatever independent population data is available (e.g., Census Bureau CED tapes, special census which may have been conducted, local and state agencies, Councils of Government, etc). Note any significant differences which require clarification.

Compare the SAR population projections against whatever independent population projections are available (e.g., local and state agencies and Councils of Government, Census Bureau projections, Bureau of Economic Analysis, etc). Note any significant underestimates in the SAR which require clarification.

At the construction permit stage, use the population and its distribution, including weighted transients, projected to the year of plant startup and projected over the lifetime of the plant, to determine the population density in persons per square mile as a function of distance from the plant out to 30 miles. Compare results to the SAR plot of population density vs distance (Reference 3, Section 2.1.3.6). If the population density, including weighted transient population, projected at the time of initial operation exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area at that distance), or the projected population density over the lifetime of the facility exceeds 1,000 persons per square mile averaged over any radial distance out to 30 miles, a memorandum should be prepared advising appropriate staff personnel that an evaluation of alternative sites having lower population densities will be required.

Determine that the SAR includes a map of the low population zone and a table of population distribution which includes transients (Reference 3, Section 2.1.3.4). Determine the method used by the applicant to establish the boundary of the nearest population center (Reference 3, Section 2.1.3.5). Evaluate communities which are closer to the plant than the design population center to determine the likelihood that any of them can be projected to 25,000 people within the plant lifetime. Compare the distance to the boundary of the population center to the distance to the outer boundary of the low population zone and establish that the population center distance is at least one and one-third times the low population zone distance as required by 10 CFR Part 100.

Population and population density data of specific towns and cities within the low population zone can be checked against population data as contained in the Department of Commerce publication, "1970 Census of Population - Characteristics of the Population," or other Census Bureau publications.

Determine that the current and projected population data for the LPZ includes transients (e.g., workers, occupants of schools, hospitals, etc., recreational facilities).

The EPLB determines the acceptability of the LPZ with respect to the necessary finding that there is reasonable assurance that appropriate protective measures could be taken in behalf of the people within the LPZ in the event of a radiological emergency. [10 CFR Part 100, Section 100.3(b)]

A memorandum stating this finding should be transmitted to SAB for use in preparing the staff's safety evaluation report.

Determine that the nearest boundary of the closest population center is at least one and one-third times the distance to the outer boundary of the low population zone. Evaluate the characteristics of the land area between the plant and the nearest population grouping which has, or is projected to have during plant lifetime, a population of about 25,000. Use whatever data is available on land use, land use controls such as zoning, potential for growth, or factors which are likely to limit growth between the population grouping and the plant to determine the potential growth in population density toward the site. The population center boundary should be established at that point nearest the plant where, in the reviewers judgment, the population density may grow to a value comparable to the density of the community itself. Population density is the controlling criteria, and in this regard, the corporate boundary of the community itself is not limiting. The detail to which this aspect of the site is reviewed will depend on the distance of the nearest probable population center relative to the distance to the outer boundary of the low population zone. (See References 5 and 6.) Where a very large city is involved, a greater distance than the one and one-third factor may be required, and appropriate additional compensating engineered safeguards may be required. These will be evaluated on a case-by-case basis, and where appropriate, a memorandum should be prepared by SAB providing any recommendations.

Results of the review under this SRP section should be forwarded to the Division of Licensing, Assistant Director for Operating Reactors whenever the site contains a previously licensed and operating nuclear unit.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided, and that his evaluation is sufficiently complete and adequate to support conclusions of the following type, to be included in the staff SER:

> The staff concludes that the population data provided is acceptable and meets the requirements of 10 CFR Part 50, §50.34, and 10 CFR Part 100. This conclusion is based on the applicant having provided an acceptable description and safety assessment of the site which contains present and projected population densities which, at the CP stage, are within the guidelines of Position C.3 of Regulatory Guide 4.7 and has properly specified the low population zone and population center distance. In addition, the staff has reviewed and confirmed by comparison with independently obtained population data, the applicant's estimates of the present and projected populations surrounding the site, including transients.

The Emergency Prepardness Licensing Branch shall determine that:

> The applicant also has calculated the radiological consequences of design basis accidents at the outer boundary of the low population zone (Section 15) and has provided reasonable assurance that appropriate protective measures can be taken within the low population zone to protect the population in the event of a radiological emergency.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides and NUREGs.

V. REFERENCES

1. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."
2. 10 CFR Part 100, "Reactor Site Criteria."
3. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."
4. Regulatory Guide 4.7, "General Site Suitability for Nuclear Power Stations."
5. NUREG-0308 Safety Evaluation Report, Arkansas Nuclear One, Unit 2. November 1977 and supplements.
6. NUREG-75/054 Safety Evaluation Report, Pilgrim Nuclear Generating Station, Unit 2. June 1975 and supplements.

U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

2.2.1 - 2.2.2 IDENTIFICATION OF POTENTIAL HAZARDS IN SITE VICINITY

REVIEW RESPONSIBILITIES

Primary - Siting Analysis Branch (SAB)

Secondary - None

I. AREAS OF REVIEW

The site and its vicinity are reviewed for location and separation distance with respect to industrial, military, and transportation facilities and routes. Such facilities and routes include air, ground, and water traffic, pipelines, and fixed manufacturing, processing, and storage facilities. The review focuses on potential external hazards or hazardous materials that are present or which may reasonably be expected to be present during the projected lifetime of the proposed plant. The purpose of this review is to establish the information concerning the presence and magnitude of potential external hazards so that the reviews and evaluations described in SRP Sections 2.2.3, 3.5.1.5, and 3.5.1.6 can be performed.

Control room habitability with respect to toxic chemicals is reviewed in SRP Section 6.4 by the Accident Evaluation Branch (AEB) as part of its primary review responsibility.

II. ACCEPTANCE CRITERIA

10 CFR Part 100 §100.10 requires that site acceptance be based on the consideration of factors relating to the proposed reactor design and the characteristics peculiar to the site. One of the factors involves the use characteristics of the site environs. In accordance with 10 CFR Part 50, §50.34, the applicant is required to submit in the preliminary and final safety analysis reports (PSAR and FSAR) information needed for evaluating these factors. Guidelines for specific information requirements are described in Chapter 2, Sections 2.2.1 and 2.2.2 of Regulatory Guide (RG) 1.70.

The information submitted by the applicant is adequate and meets the 10 CFR Part 50, §50.34 and 10 CFR 100, §100.10 requirements and RG 1.70 guidelines if it satisfies the following criteria.

Rev. 2 - July 1981

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

1. Data in the SAR adequately describes the locations and distances of industrial, military, and transportation facilities in the vicinity of the plant, and is in agreement with data obtained from other sources, when available.

2. Descriptions of the nature and extent of activities conducted at nearby facilities, including the products and materials likely to be processed, stored, used, or transported, are adequate to permit identification of possible hazards in subsection III of this SRP section.

3. Sufficient statistical data with respect to hazardous materials are provided to establish a basis for evaluating the potential hazard to the plant.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this review plan will be made by the reviewer on each case. The judgment of the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved. The following procedures are followed:

1. The reviewer should be especially alert, in the construction permit (CP) stage review, for any potentially hazardous activities in close proximity of the plant since the variety of activities having damage potential at ranges under about one kilometer can be very extensive. All identified facilities and activities within eight kilometers (5 miles) of the plant should be reviewed. Facilities and activities at greater distances should be considered if they otherwise have the potential for affecting plant safety-related features. At the operating license (OL) stage, most hazards will already have been identified. Emphasis should be placed on any new information. At the operating license stage, any analyses pertaining to potential accidents involving hazardous materials or activities in the vicinity of the plant will be reviewed to ensure that results are appropriate in light of any new data or experience which is then available. Facilities which are likely to either produce or consume hazardous materials should be investigated as possible sources of traffic of hazardous materials past the site.

2. Information should be obtained from sources other than the SAR wherever available, and should be used to check the accuracy and completeness of the information submitted in the SAR. This independent information may be obtained from sources such as U.S. Geological Survey (USGS) maps and aerial photos, published documents, contacts with State and Federal agencies, and from other nuclear plant applications (especially if they are located in the same general area or on the same waterway.) Information should also be obtained during the site visit and subsequent discussions with local officials. (See Standard Review Plan Section 2.1.1 for further guidance with regard to site visits.) To the extent that definitive information is available, future potential hazards over the proposed life of the plant should be reviewed.

3. The specific information relating to types of potentially hazardous material, including distance, quantity, and frequency of shipment, is reviewed to eliminate as many of the potential accident situations as

possible by inspection, based on past review experience. At the operating license stage, nearby industrial, military and transportation facilities and transportation routes will be reviewed for any changes or additions which may affect the safe operation of the plant. If these changes alter the data or assumptions used in previous hazards evaluations or demonstrate the need for new ones, appropriate evaluations will be performed.

For pipeline hazards, Reference 7 may be used as an example of an acceptable risk assessment. For cryogenic fuels, Reference 9 may be used, and for tank barge risks, Reference 8. For military aviation, Reference 10 may be used. Safe separation distances for explosives are identified in References 1 and 2, and for toxic chemicals, References 3 and 4 should be consulted.

The distance from nearby railroad lines is checked to determine if the plant is within the range of a "rocketing" tank car which, from Reference 5, is taken to be 350 meters with the range for smaller pieces extending to 500 meters.

4. Potential accidents which cannot be eliminated from consideration as design basis events because the consequences of the accidents, if they should occur, could be serious enough to affect plant safety-related features, are identified. Potential accidents so identified are assessed in detail, using criteria in Standard Review Plan Sections 2.2.3, 3.5.1.5, or 3.5.1.6, as appropriate.

IV. EVALUATION FINDINGS

The reviewer verifies that the information submitted by the applicant is in accordance with 10 CFR Part 50, §50.34 requirements and within RG 1.70 guidelines such that compliance with 10 CFR Part 100, §100.10 can be evaluated. The information is sufficiently complete and adequate if it can support conclusions of the following type, to be used in the staff's safety evaluation report:

> The applicant has provided information in the SAR on potential site hazards in accordance with the requirements of 10 CFR 50, §50.34 and Regulatory Guide 1.70. The nature and extent of activities involving potentially hazardous materials which are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities which have the potential for adversely affecting plant safety-related structures. Based on evaluation of information contained in the SAR, as well as information independently obtained by the staff, it is concluded that all potentially hazardous activities in the vicinity of the plant have been identified. The hazards associated with these activities have been reviewed and are discussed in Sections _____ and _____ of this SER.

If the activities are identified as being potentially hazardous, the evaluations described in Standard Review Plan Sections 2.2.3, 3.5.1.5 and 3.5.1.6 are performed with respect to the inherent capability of the plant or special plant design measures to prevent radiological releases in excess of the 10 CFR Part 100 guidelines.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides and NUREG.

VI. REFERENCES

1. Department of the Army Technical Manual TM5-1300, "Structures to Resist the Effects of Accidental Explosions," June 1969.

2. Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plant Sites."

3. Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."

4. Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release."

5. National Transportation Safety Board Railroad Accident Report, "Southern Railway Company, Train 154, Derailment with Fire and Explosion, Laurel, Mississippi, January 25, 1969," October 6, 1969.

6. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

7. NUREG-0014 Safety Evaluation Report, Hartsville Nuclear Plants A1, A2, B1, and B2, April 1976, Docket STN 50-518.

8. Safety Evaluation of the Beaver Valley Power Station, Unit No. 2, November 9, 1976 and supplements. Docket 50-412.

9. Safety Evaluation Report, Hope Creek Generating Station, Units 1 and 2, Supplement No. 5, March 1976, Docket 50-354 and 50-355.

10. Project 485, Aircraft Considerations, Preapplication Site Review, Boardman Nuclear Plant. October 1973.

11. 10 CFR Part 50, §50.34, "Contents of Applications; Technical Information."

12. 10 CFR Part 100, §100.10, "Factors to Be Considered When Evaluating Sites."

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DESIGNATED ORIGINAL

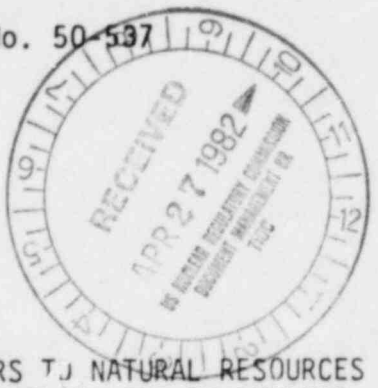
Certified By AS

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

(3527)

In the Matter of)
)
UNITED STATES DEPARTMENT OF ENERGY)
PROJECT MANAGEMENT CORPORATION)
TENNESSEE VALLEY AUTHORITY)
)
(Clinch River Breeder Reactor)
Plant))

Docket No. 50-537



CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S UPDATED ANSWERS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB SIXTH SET OF INTERROGATORIES TO NUCLEAR REGULATORY COMMISSION STAFF," "NRC STAFF'S UPDATED ANSWERS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB NINTH SET OF INTERROGATORIES TO NUCLEAR REGULATORY COMMISSTION STAFF," and "NRC STAFF'S ANSWERS TO INTERVENORS' NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB, TWENTY-THIRD SET OF INTERROGATORIES, AND REQUEST TO PRODUCE TO THE STAFF" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk, either through deposit in the Nuclear Regulatory Commission's internal mail system or hand delivery, this 26th day of April, 1982:

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