2/2/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	Docket 50-369
	)	50-370
(William B. McGuire Nuclear	)	
Station, Units 1 and 2)	)	

NRC STAFF RESPONSE TO CESG'S MEMORANDUM IN SUPPORT OF MOTION TO ADD FURTHER CONTENTIONS

I. INTRODUCTION

On November 7, 1980, Carolina Environmental Study Group (CESG), Intervenor in this reopened McGuire operating license proceeding, proffered for the Board's consideration the following two "additional contentions:"

5. Under current practice the NRC is required to issue an environmental impact statement as to the consequences of Class 9 accidents. Such an environmental impact statement is required for McGuire.

6. The emergency plan for McGuire must, due to the special circumstance of close proximity to a large population center, be revised to provide an emergency response for the city of Charlotte in the event of a Class 9 accident.

In an order dated November 25, 1980[1/] the Board directed the Staff and Applicant to respond to CESG's "additional contentions" by December 15,

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1/ Duke Power Company (William B. McGuire Nuclear Station, Units 1 and 2), Memorandum and Order Regarding Applicant's Motion for Summary Disposition, Slip Op. (November 25, 1980).

1980. Responses were filed by both the Staff and the Applicant on that date. On January 8, 1981, CESG sought the opportunity to supplement its November 7, 1980 filing with a memorandum of law. In a conference call with all parties on January 14, 1981, the Board permitted CESG to file its memorandum of law no later than January 21, 1981. "CESG's Memorandum in Support of Motion to Add Further Contentions" was filed on that date. Staff's response to the arguments advanced by CESG is set forth below.

II. STAFF RESPONSE TO CESG ARGUMENT IN SUPPORT OF CONTENTION 5

On June 13, 1980, the Commission published in the Federal Register[2/] a Statement of Interim Policy entitled "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969," in which the Commission revised its policy concerning consideration of Class 9 accidents in environmental impact statements. In the Statement of Interim Policy, the Commission instructed the Staff to prepare a discussion of Class 9 accidents in accordance with the Statement of Interim Policy "in its ongoing NEPA reviews, i.e., for any proceeding at a licensing stage where a Final Environmental Impact Statement has not yet been issued."[3/] In the Statement of Interim Policy the Commission indicated that "this change in policy is not to be construed as any lack of confidence in conclusions regarding the environmental risks of accidents in any previously issued Statements, nor,

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2/ 45 Fed. Reg. 40101.

3/ Id. at 40103.

absent a showing of special circumstances, as a basis for opening, reopening or expanding any previous or ongoing proceeding."[4/]

The Final Environmental Statement for McGuire has long been completed and thus would not fall within the scope of those cases in which the Commission has instructed the Staff to discuss Class 9 accidents. CESG does not appear to dispute this, nor does it take issue with the Statement of Interim Policy.[5/] Rather, it is clear from CESG's memorandum of law that CESG argues that, due to four "special circumstances," the Staff is obligated to prepare a supplemental EIS discussing Class 9 accidents in order to satisfy the Commission's Statement of Interim Policy.

Briefly, CESG contends that the combination of (1) the Three Mile Island accident, (2) the proximity of Charlotte, North Carolina to the McGuire facility, (3) the capability of the McGuire containment to withstand a hydrogen explosion, and (4) the four-year old EIS already issued for McGuire, constitute "special circumstances" as defined in the Commission's Statement of Interim Policy. Before proceeding to a point-by-point analysis

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4/ Id. (emphasis added).

5/ In fact, CESG specifically notes that "[t]he Licensing Board need not address this issue..." CESG Memorandum in Support of Motion to Add Further Contentions, at 7. For the record, however, Staff notes its disagreement with the argument advanced by CESG and emphasizes that the position taken by the Commission in its Statement of Interim Policy finds more than ample support in the case law. See, e.g., Carolina Environmental Study Group v. AEC, 510 F.2d 796 (D.C. Cir. 1975).

of the four "special circumstances" advanced by CESG, however, a brief discussion of the "special circumstances" provision is needed.

A. Background

The "special circumstances" concept in connection with consideration of Class 9 accidents was articulated in the Offshore Power Systems[6/] proceeding. In that proceeding the Staff, in support of its decision to conduct an analysis of the Class 9 accident risks associated with floating nuclear power plants ("FNPs"), argued that:

> [T]here is no need for a detailed NEPA discussion of Class 9 accident risks in nuclear power reactor licensing proceedings unless the special circumstances of a particular case indicate that Class 9 accident risks may be unusually higher or of a different character than for the typical land based nuclear power reactor. To date only three types of special circumstances have been identified that would trigger a detailed Class 9 accident evaluation: a high population density for the proposed site (above the "trip points" in the Standard Review Plan and Regulatory Guide), a novel reactor design (a type of power reactor other than a light water power reactor),

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6/ Offshore Power Systems (Floating Nuclear Power Plants), CLI-79-9, 10 NRC 257 (1979), addressing a question certified to the Commission by the Atomic Safety and Licensing Appeal Panel in ALAB-489, 8 NRC 194 (1978).

or a combination of a unique design and a unique siting mode (a floating nuclear plant).[7/]

In response to the question posed on appeal (i.e., whether the probability and consequences of a so-called "Class 9" accident at an FNP are proper subjects for consideration in the Commission's environmental analysis of Offshore's application), the Commission held that the Staff's Class 9 accident analysis was properly included in the environmental impact statement for the FNP. Although the Commission did not directly address the standard proffered by the Staff for determining "special circumstances," it did instruct the Staff, inter alia, to "bring to [the Commission's] attention, any individual cases in which it believed the environmental consequences of Class 9 accidents should be considered."[8/]

Five months later, the Class 9 issue was again raised, this time in the context of a request filed pursuant to 10 CFR 2.206 for the revocation or suspension of the Seabrook Construction Permits.[9/] Petitioner Seacoast Anti-Pollution League (SAPL), in support of its request for relief, alleged, inter alia, "that NRC has failed to...evaluate the consequences of a Class 9 accident, in determining site suitability, including the necessity for

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7/ NRC STAFF'S BRIEF IN SUPPORT OF AFFIRMATIVE FINDING ON CERTIFIED QUESTION, at 47 (January 12, 1979), as quoted in In the Matter of Public Service Company of New Hampshire (Seabrook Station Units 1 and 2), DD-80-6, 11 NRC 371, 377 (1980).

8/ Supra note 6, at 263.

9/ In the Matter of Public Service Company of New Hampshire (Seabrook Station Units 1 and 2), DD-80-6, 11 NRC 371 (1980).

evacuation beyond the low population zone."[10/] In denying the petition the Director of NRR reiterated that Class 9 accident analyses are appropriate only where one or more of three "special circumstances" is found to exist: (1) high population density around the proposed site (i.e., above the trip points in the Standard Review Plan (NUREG-75-087, September 1975) and Regulatory Guide 4.7, General Site Suitability Criteria For Nuclear Power Stations (November 1975); (2) a novel reactor design (a type of power reactor other than a light water reactor); or (3) a combination of a unique design and a unique siting mode.[11/]

10/ Id. at 372.

11/ Regulatory Guide 4.7, first referenced by the Staff as a benchmark for determining high population density in the Staff's OPS Brief, provides that:

> If the population density, including weighted transient population, projected at the time of initial operation of a nuclear power station exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area of 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, special attention should be given to the consideration of alternative sites with lower population densities. Regulatory Guide 4.7, General Site Suitability Criteria for Nuclear Power Stations, p. 4.7-9 (November 1975). The Standard Review Plan (NUREG-75-087, September 1975), also referenced by the Staff, contains virtually identical language.

Because of population densities substantially in excess of the Regulatory Guide 4.7 "trip points" surrounding the proposed Seabrook site,[12/] special consideration was given to alternative sites with lower population densities. SAPL's 2.206 petition was denied on the ground that the Staff's evaluation in its alternative site review had already considered relative differences in Class 9 accident consequences.

12/ The following table sets forth the population density for the Seabrook site:

POPULATION DISTRIBUTION - SEABROOK SITE[a]

Distance Miles	Cumulative Population[b] 1970	1980	2020	Population Density, people/mi 1970	1980	2020
0-1	473	728	2457	151	232	782
0-2	5980	8732	20,667	475	693	1640
0-3	12,306	16,925	42,582	435	598	1505
0-4	20,567	26,647	70,183	409	530	1395
0-5	30,901	41,818	111,164	394	533	1416
0-10	81,657	134,968	293,704	260	430	935
0-20	303,650	420,548	1,171,621	242	335	933
0-30	957,550	1,218,348	3,039,221	339	431	1075

a Resident population and 1980 seasonal population obtained from Seabrook Preliminary Safety Analysis Report

b Includes seasonal population within 5 miles of site adjusted to reflect an equivalent permanent population.

As this table indicates, population densities, in some instances, exceeded the "trip point" values by up to 64%.

Shortly after the Director's Decision in Seabrook, the Commission, in the Black Fox proceeding,[13/] once again addressed the Class 9 issue. In this proceeding, which preceded the Statement of Interim Policy, the Commission noted that, while the Staff had discretion in bringing individual cases to the attention of the Commission, "[t]he Commission did not expect that such discretion was to be exercised without reference to existing staff guidance on the type of exceptional case that might warrant additional consideration; higher population density, proximity to man-made or natural hazard, unusual site configuration, unusual design features, etc., i.e., circumstances where the environmental risk from such an accident, if one occurred, would be substantially greater than that for an average plant."[14/]

Thus, The Commission embodied in its guidance to the Staff, the three-pronged test of special circumstances previously articulated by the Staff in OPS and the Seabrook Director's Decision.[15/]

Indeed, in the Statement of Interim Policy itself, the Commission identified as prior instances of special circumstances 3 cases which correspond to the three prongs of the standard: (1) the Clinch River Breeder Reactor ("a liquid metal cooled fast breeder reactor very different from the more conventional ligh water reactor plants for which the safety experience is

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13/ Public Service Company of Oklahoma (Black Fox Station, Units 1 and 2), CLI-80-8, 11 NRC 433 (1980).

14/ Id. at 434-35.

15/ It should be noted that, in Black Fox, the Commission added a fourth "special circumstance," proximity to man-made or natural hazard, to the list proposed by the Staff in OPS.

much broader"[16/]), (2) the Perryman site (involving high population density[17/]), and (3) the floating nuclear power plants ("[t]he special circumstances were the potentially serious consequences associated with water (liquid) pathways..."[18/])

Indeed, on five occasions following announcement by the Commission of its Statement of Interim Policy, the Director of NRR has used this three-pronged "special circumstances" standard to determine whether to prepare supplemental Class 9 analyses.[19/] Thus the task now before this Board is to determine whether the four "special circumstances" advanced by CESG do indeed fall within the ambit as defined by Commission practice.

B. CESG "Special Circumstances" 1, 3 and 4

In support of its argument that the licensing of the McGuire facility involves "special circumstances" which warrant an analysis of Class 9 accident risks, CESG offers the following four factors for the Board's consideration:

16/ 45 Fed. Reg. 40101.

17/ 11 NRC at 924.

18/ 45 Fed. Reg. 40101.

19/ See, e.g., In the Matter of Duke Power Company (Catawba Nuclear Station, Units 1 and 2), DD-81-____, 13 NRC ____ (January 8, 1981); In the Matters of Arizona Public Service Company (Palo Verde Nuclear Generating Station, Units 1, 2, and 3), Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2), and Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station, Unit 1) DD-80-22, 11 NRC 219 (1980); In the Matter of Florida Power and Light Company (St. Lucie Nuclear Power Plant, Unit 2), DD-80-____, 12 NRC ____ (November 15, 1980).

1. Three Mile Island confirmed that Class 9 accidents can occur.
2. McGuire is located near the high population center of Charlotte, North Carolina.
3. There exist undertainties regarding the capability of the McGuire containment to withstand the explosion of an amount of hydrogen no greater than that present at TMI.
4. The EIS for McGuire is now over four years old.[20/]

With respect to the first, third, and fourth of these "special circumstances," the response is that, in each instance, the position taken by CESG is (1) outside the scope of "special circumstances" as defined by the Commission and (2) patently inconsistent with the policy articulated by the Commission in its Statement of Interim Policy.

With regard to CESG's first special circumstance that "Three Mile Island confirmed that Class 9 accidents can occur," it need only be noted that the Commission's Statement of Interim Policy came after the Three Mile Island accident and the Commission was fully aware of the Three Mile Island accident when it established the "special circumstance" standard. If the Three Mile Island accident were intended by the Commission as a "special

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20/ CESG at no time suggests that the McGuire facility involves a novel reactor design, a combination of a unique design and a unique siting mode, or proximity to a man-made or natural hazard. Accordingly, Staff will only address the special circumstance of high population density. Suffice it to say, however, that in reviewing the Catawba Nuclear Station Units 1 and 2 (supra note 23), an ice condenser facility located about 17 miles from Charlotte, North Carolina, the Director of Nuclear Reactor Regulation found there to be no "special circumstances" warranting an analysis of Class 9 accident risks.

circumstance," then it would appear that every proceeding would be subject to reopening for an analysis of Class 9 accident risks. But the Commission explicitly did not do so. Indeed it specifically indicated that cases like McQuire need not be reopened absent a showing of "special circumstances."

With regard to CESG's contention that the potential for a hydrogen explosion at McGuire qualifies this facility for a supplemental Class 9 EIS Staff notes that the issue of hydrogen generation has explicitly been admitted as a contention in this proceeding for litigation. Thus, the associated uncertainties must be sufficiently resolved by evidence in this proceeding to permit the Board to reach the ultimate safety conclusion on the McQuire facility. Assuming satisfactory safety evidence on this issue, this potential accident would not be significantly different from all other Class 9 accident sequences--thus it would not constitute a special circumstance.

CESG urges this Board to rule that McGuire's 4-year old EIS constitutes a "special circumstance." Once again, Staff submits, the position taken by CESG appears to run directly against the provisions of the Commission's Statement of Interim Policy. The issue before this Board, to wit, whether a Class 9 analysis should be prepared by the Staff, is a narrowly-focused one, resolution of which depends upon the Commission's Statement of Interim Policy. CESG's broadside attack on the adequacy of the McGuire FES (supported, the Staff notes, by nothing more than an allegation that the FES is inadequate because it was completed 4 years ago) has absolutely no bearing on this Board's decision concerning the necessity to prepare a discrete Class 9 supplment to that FES under the provisions of the Statement of Interim

Policy. Indeed, the position taken by CESG runs directly counter to that taken by the Commission in its Statement of Interim Policy, wherein it declared that "this change in policy is not to be construed as any lack of confidence in conclusions regarding the environmental risks of accidents expressed in any previously issued statements...." Accordingly, the Staff urges this Board to dismiss this "circumstance," as well as "circumstances" 1 and 3, on the ground that all 3 fall outside the scope of the "special circumstances" standard articulated by the Commission.[21/]

C. CESG "Special Circumstance" 2

The only "circumstance" proffered by CESG arguably within the scope of the "special circumstances" standard is that the McGuire facility is located near the high population center of Charlotte, North Carolina. CESG argues that the proximity of Charlotte warrants a finding by this Board that this case presents "special circumstances." However, the Director's Decsion in

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21/ Indeed, if CESG now seeks to raise the broader issue concerning the adequacy of the McGuire FES, Staff submits that CESG has failed to satisfy the Wolf Creek standard for reopening a proceeding. Kansas Gas and Electric Company (Wolf Creek Generating Station, Unit No. 1), ALAB-462, 7 NRC 320, 328:

> As is well settled, the proponent of a motion to reopen the record has a heavy burden. Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-359, 4 NRC 619, 620 (1976). The motion must be both timely presented and addressed to a significant safety or environmental issue. Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-138, 6 AEC 520, 523 (1973); id., ALAB-167, 6 AEC 1151-52 (1973); Georgia Power Company (Alvin W. Vogtle Nuclear Plant, Units 1 and 2), ALAB-291, 2 NRC 404, 409 (1975). Beyond that, it must be established that "a different result would have been reached initially had the material submitted in support of the motion been considered." Northern Indiana Public Service Co. (Bailly Generating Station, Nuclear-1), ALAB-227, 8 AEC 416, 418 (1974).

the Catawba case, supra note 21, provides a clear, unequivocal response: the mere fact that a large city is located nearby does not constitute "special circumstances." Indeed, Catawba addressed the very issue raised by CESG in the immediate proceeding when the Director held that the location of Charlotte, North Carolina 17 miles from the Catawba facility did not constitute "special circumstances."[22/] Moreover, as pointed out in the attached affidavit of Leonard Soffer there are twelve facilities with large cities within 20 miles.

As outlined in the three-pronged test discussed above, the Staff considers nearby population in determining whether there are special circumstances. For this purpose the Staff uses the guideline values of Reg Guide 4.7 as a screening tool. Mr. Soffer's affidavit attached indicates that based on 1972 projections the population density for McGuire in 1980 at 0-20 miles may exceed by a very slight amount, the trip point value of Reg. Guide 4.7 of 500 persons per square mile. For other radial distances measured the population density for 1980 and for 2020 are below the trip point levels of Reg. Guid 4.7. On the other hand Mr. Soffer points out that based on preliminary 1980 census data for Charlotte it appears that the population density for 0-20 miles is slightly below 500 persons per square mile.

22/ Indeed, the issue was raised in the Catawba proceeding on behalf of Intervenor-CESG by Mr. Riley.

But the question of special circumstances does not turn on which value is more accurate. Rather, to assess whether there are special circumstances with respect to population density, the nearby population distribution characteristics of a facility must be considered vis-a-vis population characteristics common to other facilities. The Staff uses the trip points of Regulatory Guide 4.7 as a screening tool to screen out those cases which present no real question needing more careful consideration.

Although the Director's Decision in Diablo Canyon, Palo Verde and Rancho Seco is written so as to equate population in excess of the trip points of Regulatory Guide 4.7 with special circumstances, the context of those cases indicates that the question before the Director was, in fact, the converse, that is, whether for populations below these values any further consideration need be given to population distribution to assess whether there were "special circumstances". Diablo Canyon and Palo Verde involved instances of populations well below the Regulatory Guide 4.7 trip points. Rancho Seco raised a question somewhat like that of McGuire, in which, on one projection basis, population for the year 2020 would exceed the trip point values of Regulatory Guide 4.7 whereas on another it would not. The Director, in Rancho Seco considered the later basis to be more reasonable and thus concluded that population would not exceed the guideline values of Regulatory Guide 4.7.

Indeed we believe that the Director's Decision in Catawba more clearly represents the factors to be considered when population density approaches the guideline values of Regulatory Guide 4.7. In that Decision the Director briefly notes

that a large fraction of the population at the distance involved (0-20 miles roughly the same distance as that involved in the McGuire case) "is due to the City of Charlotte, North Carolina, and its environs, located about 17 miles from the Catawba site. Staff studies of accident risk leads the Staff to conclude that the risk is higher for persons relatively close to the site, and generally decreases with distance. In particular, the Staff has found that the most severe consequences of very large accidents, namely, acute fatalities, would be generally limited to distances of about 5 miles or less."[23/] The Director also noted that emergency planning protection is provided out to 10 miles from the reactor site.

The Director concluded that the circumstances associated with Catawba did not constitute a sufficiently unique circumstance to warrant considerations of Class 9 accident risks in connection with the petition.

For a case like McGuire, in which the population is near, and perhaps very slightly in excess of the trip points the Staff recognizes the need to consider additional information to determine whether population distribution for this case when compared to other facilities would amount to "special circumstances". Mr. Soffer's affidavit points out that in a group of 31 of the highest population sites, McGuire, from an overall point of view is in the middle of the group, and when population is weighted by proximity to the site, McGuire is more strongly in the lower half of these 31 sites.

23/ Supra note 19 at 22.

As pointed out in Mr. Soffer's affidavit the Staff, in connection with its responsibilities under the Statement of Interim Policy, has developed a comprehensive method of assessing population characteristics which it proposes to use to determine whether special risk studies should be carried out. The methodology employed is described in greater detail in the attachment to Mr. Soffer's affidavit. The result is a comprehensive comparative analysis of 93 sites which places each site in context based upon population density and distribution. The McGuire facility ranks along with 19 other sites in Group III, "Slightly Above Average." Eight sites fall within Group IV, "Above Average", while 3 fall in Group V "Substantially Above Average".

Staff submits that, based upon the foregoing analysis, the McGuire site does not present a "special circumstance" as used by the Commission in the Statement of Interim Policy risks. Accordingly, Staff urges the Board to reject CESG's Contention 5.

III. STAFF RESPONSE TO CESG ARGUMENT IN SUPPORT OF CONTENTION 6

Distilled to its essential ingredient, CESG argues in Contention 6 that the emergency planning zone (EPZ) for the McGuire facility must be expanded to include the city of Charlotte, North Carolina. Staff submits that the very issue raised in Contention 3 is the sufficiency of the EPZ proposed by the Staff, for the scenario posited in Contentions 1 and 2. Without belaboring the point, Staff simply reiterates the position it took in its initial response to Contention 6: Whether the McGuire EPZ should include Charlotte because of the potential for an accident resulting from hydrogen generation, is a matter which can be fully and fairly adjudicated within the framework of CESG Contention 3, admitted by the Board on November 25, 1980.[24/] Staff simply sees no need to address this same issue in the context of two virtually identical contentions.

Nor is the Staff persuaded by CESG's argument that "the Commisison has already admitted CESG's contention 4 [sic], which questions the sufficiency of an emergency planning zone of 10 miles in terms of protecting the public from one particular Class 9 accident, i.e., a low pressure, ice condenser

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24/ Duke Power Company (William B. McGuire Nuclear Station, Units 1 and 2), Memorandum and Order Regarding CESG's Motion to Reopen Record, Slip Op. (November 25, 1980).

containment ruptured by a hydrogen explosion."[25] If, as Staff has already noted, the admission of Contention 6 will not expand the Board's inquiry beyond that called for by Contentions 1-4, the separate admission of Contention 6 accomplishes nothing. If, on the other hand, CESG now seeks to argue that the EPZ fails to consider a broad range of Class 9 accidents, Staff submits that, in light of the Board's Order reopening this proceeding to address the narrow issue of hydrogen generation and control, the Wolf Creek standard for reopening[26] has not been satisfied.[27] Accordingly, Staff again objects to the admission of Contention 6 to this reopened proceeding.

IV. CONCLUSION

For the reasons stated herein, Staff believes that Contentions 5 and 6 should not be admitted in this reopened proceeding.

Respectfully submitted,

James R. Curtiss
Counsel for the NRC Staff

Dated at Bethesda, Maryland
this 2nd day of February, 1981.

25/ "CESG's Memorandum in Support of Motion to Add Further Contentions at 11-12 (January 21, 1981).

26/ Supra note 21.

27/ As a practical matter, Staff notes that the argument advanced by CESG reflects a misunderstanding of the manner in which Class 9 accident risks are to be considered under the Commission's emergency planning regulations. As Staff indicated in its initial response to Contention 6, the emergency planning regulations call for the Staff to consider a "spectrum" of accidents, including certain so-called Class 9 accidents. Thus, although Staff may not have considered specific Class 9 accidents identified by CESG (i.e., specific scenarios deemed to be Class 9), the fact that the EPZ selected by the Staff includes certain Class 9 accidents within the "spectrum" of accidents addressed means that, for all intents and purposes, the EPZ accounts for Class 9 consequences.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of the Application of Duke Power Company (McGuire Nuclear Station, Units 1 & 2)	)))	Docket Nos. 50-369 50-370

AFFIDAVIT OF LEONARD SOFFER

Leonard Soffer, having first been duly sworn, hereby states as follows:

1. I am the Section Leader for the Site Analysis Section, Siting Analysis Branch, and am responsible for the review of the population characteristics of reactor sites, including that for the McGuire Nuclear Station, Units 1 and 2.

2. This affidavit addresses population density considerations relevant to consideration of the environmental consequences of Class 9 accidents for the proposed McGuire Nuclear Station, Units 1 and 2.

3. On the basis of the Staff's evaluation of population characteristics of the site, the Staff concludes that there are no unusual features or special circumstances with regard to the population characteristics of this site that would distinguish it from other land-based light water reactor sites to the extent that warrant consideration of environmental consequences of Class 9 accidents.

4. I have prepared the attached statement of Professional Qualifications and, if called upon, would testify as set forth therein.

Leonard Soffer 2/2/81
Leonard Soffer

Sworn and subscribed before me
this _____ day of _____1981.

_____
Notary Public for Montgomery County, MD

POPULATION EVALUATION OF THE MCGUIRE SITE
BY LEONARD SOFFER

As the Commission noted in its statement of interim policy (FR 40101, June 13, 1980), the staff has identified in the past special circumstances which would warrant more extensive consideration of Class 9 accidents. One of these was high population density around the site, an example of which was population density values in excess of those given in the Standard Review Plan (NUREG-75/087, September 1975) and Regulatory Guide 4.7, General Site Suitability Criteria for Nuclear Power Stations, November 1975.

With regard to population density, Regulatory Guide 4.7 states in part, as follows:

> If the population density, including weighted transient population, projected at the time of initial operation of a nuclear power station 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, special attention should be given to the consideration of alternative sites with lower population densities.

For the McGuire Station, the population densities at year of projected plant startup (1980) and projected end of life (year 2020) are shown in the accompanying table. These data were taken from the McGuire FSAR.

McGuire Population Density

(people/square mile)

Distance, Miles	1980	2020
0-1	10.	18.
0-2	35.	59.
0-3	46.	81.
0-4	48.	83.
0-5	54.	94.
0-10	154.	281.
0-20	503.	932.
0-30	343.	621.

As can be seen from this table, the population density for the McGuire site very slightly exceeds the values of Regulatory Guide 4.7 at a distance of 20 miles at the time of projected plant startup.

However, the degree by which the McGuire population density exceeds the Regulatory Guide values is so small (by less than 1 percent), and at only one distance, that a closer analysis is warranted. Since the primary reason contributing to the large increase in population density between 10 and 20 miles from the McGuire Station is the presence of the City of Charlotte, N.C., located about 15 miles SSE of the site, it was considered useful to examine the proximity of cities comparable in size to Charlotte (1970 population 275,000) to other nuclear power plants.

Table 2 presents a listing of nuclear power plants within 20 miles of cities with population greater than 100,000 persons. As can be seen from the table, several plants are located closer to cities than McGuire is to Charlotte, while several others are located at comparable distances. Since the population data in NUREG-0348, from which this table was also compiled, clearly indicate that only the Bailly and Zion sites have population densities in excess of the Regulatory Guide values, we conclude that the presence of the city of Charlotte at this distance does not, by itself, place the McGuire site into the category of special consideration with respect to population density.

Since the population density values for 1980 and 2020 were taken from the McGuire FSAR and since these data were generally based upon population projections made in about the year 1972, it was considered useful to examine these values in light of 1980 preliminary census information, which has recently become available. While the McGuire FSAR projected a 1980 population for Charlotte, N.C. to be 350,560 persons, the 1980 preliminary census figures indicate that the 1980 actual population for Charlotte was only 310,800 persons. Incorporating this corrected value the revised McGuire population density values become:

McGuire Population Density*

(people/square mile)

Distance, Miles	1980	2020
0-1	10.	18.
0-2	35.	59.
0-3	46.	81.
0-4	48.	83.
0-5	54.	94.
0-10	154.	282.
0-20	472.*	932.
0-30	329.	621.

*Based upon 1980 preliminary census data for Charlotte, N.C.

As shown from this revised table, the 1980 actual population density values are less than the Regulatory Guide values at all distance.

Finally, it is also useful to examine the McGuire site in relation to other nuclear power sites. The staff has completed an analysis which lists a first-order prioritization of all power reactor sites with regard to population density. This analysis (attached to this evaluation), was presented as part of a recent staff paper (SECY 81-20) to the Commission, and divides all reactor sites into 5 groups on the basis of reactor power level and weighted population density. Those reactor sites having a power level and weighted population density between one-half and twice the median value were considered to be "average". Those sites from two to

four times, the median value were rated "slightly above average". Sites from four to eight times and median value were rated "above average," while sites greater than eight times the median value rated as "substantially above average."

During the Commission's discussion on April 16, 1980 on SECY-131, "Accident Consideration under NEPA", there were expressions of interest in plants in early stages of construction that might be candidates for special risk studies. The staff is presently preparing a staff proposal which makes use of the above classification of all power reactors into 5 groups and intends to recommend to the Commission that only those sites listed in the highest two groups; namely, "Substantially Above Average" and "Above Average" be construed to have "adverse" population densities for the purposes of conducting special risk studies. As can be seen from the tables listing the classification of each site, the McGuire site has been classified as being "Slightly Above Average", and thus would <u>not</u> be construed to have an adverse population density for the purposes of conducting special risk studies.

For the 31 sites comprising the highest 3 groupings; namely "Substantially Above Average," "Above Average", and "Slightly Above Average", a survey and comparison based upon 1970 population data within the ranges 0-5 miles, 0-10 miles, 0-20 miles and 0-30 miles revealed that the McGuire site ranked in the 20% most sparsely populated sites in the closest range, in 0 to 5 miles. For the ranges 0 to 10 miles and 0 to 30 miles the McGuire site placed within the 50th percentile range. Only for the range 0 to 20 miles did the McGuire site rank in the upper 20% with regard to population. Thus for these 31 sites, the McGuire site from an overall point of view is seen to be in the middle of the group. When population weighting by proximity to the site is performed, as

was done for this analysis (Priortization of Sites to Population Density), the effect is to place McGuire even more strongly in the lower half of the 31 sites.

Since the conducting of special risk studies is intended to serve the same general purpose as determing whether an EIS regarding Class 9 accidents should be performed, it can be concluded that the comprehensive staff analysis concludes that the population characteristics of the McGuire site are not significantly special with regard to other sites to warrant special consideration.

On the basis of the evaluation performed above, we have found that:

a) Although the population densities as given in the McGuire FSAR very slightly exceed the values of Regulatory Guide 4.7

b) The proximity of the City of Charlotte to the McGuire site is not unique and special in and of itself.

c) That actual 1980 census information for the City of Charlotte reveals that the actual population densities are close to but within the Regulatory Guide values, and

d) That an overall comprehensive staff analysis of all power reactor sites concluded that the McGuire site should not be recommended for special risk studies.

On the basis of the above evaluation, we conclude that the population characteristics of the McGuire site does not have a population density or other population chacteristics that warrant more extensive consideration of Class 9 accidents.

TABLE 2

NUCLEAR POWER PLANTS*

WITHIN 20 MILES OF CITIES GREATER THAN 100,000

City	Nuclear Power Plant	Distance, Miles
Cedar Rapids, IA	Duane Arnold	10.6
Gary, IN	Bailly	11.4
Charlotte, NC	McGuire	15.3
Rockford, IL	Byron	16.4
Rochester, NY	Ginna	17.0
Charlotte, NC	Catawba	17.6
Chattanooga, TN	Sequoyah	17.7
Davenport, IA	Quad Cities	18.6
Metairie, LA	Waterford	18.7
Racine, WI	Zion	18.7
Omaha, NB	Ft. Calhoun	19.3
Newport News, VA	Surry	20.0

*Data taken from NUREG-0348, Demographic Statistics Pertaining to Nuclear Power Reactor Sites.

Prioritization of Sites with Regard to Population Density

1. Introduction

In comparing and evaluating the population around nuclear power reactor sites, the staff has long recognized that the population characteristics of a site, that is, its density and distribution, are a relatively crude measure of the consequences associated with the accidental release of radioactivity. The residual risk from an accident would depend not only upon the population density of the site, but also upon many other factors, such as reactor design, onsite and offsite management and technical support resources, external hazards, liquid pathway considerations, meteorological conditions at the time of the accident, and effectiveness and nature of public protective actions taken. In addition, the risk is not uniform for all members of the population regardless of distance from the site, but would be higher for those persons relatively close to the site, and would generally decrease with distance away from the site.

An analysis has been carried out to obtain a first-order prioritization of sites based upon population density and distribution. The discussion that follows outlines the rationale and methodology used and gives the results of this analysis.

2. Methodology

In carrying out this analysis, the following assumptions and methodology were used:

(a) All sites where a reactor was either in operation, under construction, or where a construction permit was presently under active review were evaluated. This involved a total of 93 sites.

(b) The population data used were taken from NUREG-0348, based on the 1970 census. The population data for the Fermi site as reported in NUREG-0348 are in error and were corrected for this analysis by a special computer run of the 1970 census tape.

(c) Although it is well-known that individuals closer to the reactor are at a higher level of risk, given an accident, than those more remotely located, the precise quantification of the variation of risk with distance is still somewhat uncertain. For the purpose of this analysis, the distance weighting given by the Site Population Factors (SPF), as given in WASH-1235, were used. Further, population beyond 30 miles was neglected, because the consequences at distances within 30 miles were considered to dominate any considerations of overall societal impact, and beyond 30 miles the potential population exposure differences from site to site become less sharp. Preliminary analyses carried out by the staff have indicated that somewhat differing weighting schemes, or the factoring in of population out to 50 miles, does not change the resulting prioritization of sites to a significant degree.

(d) The power level of the largest reactor at the site was multiplied by the SPF value to account, in a first-order way, for the variation of reactor fission product inventory from site to site. Only one reactor at a site was considered, even where multiple reactors exist or are contemplated,

because the probability of an accident involving more than one reactor simultaneously was considered negligible. Although it can be argued that the population around a 4 reactor site is at a higher level of risk than those around a single reactor site, the prioritization of sites is intended to give a measure of the relative consequences, given that an accident has occurred. The number of reactors at a site presumably effects only the probability of an accident. Also, it could be argued that a multi-reactor site would have some attributes that would reduce risk, compared to a single-reactor site, because of greater management and technical resources that can be applied to reducing either the likelihood or consequences of an accident. Using the above methodology, the reactor power level times the SPF value was calculated and tabulated for each of the 93 sites considered. The results are discussed below.

3. Results

The reactor power level times SPF (P x SPF) was calculated for each of the 93 sites. The resulting values ranged from a high value of 2980 to a low value of 6. The median value is 206; and the median site has a population of less than 100 persons per square mile, which is almost a factor of two less than the population of the average site. The sites are not listed in numerical order, since this would imply a greater degree of precision than is warranted by the uncertainties in the analysis. Also, as pointed out previously, the residual risk at a particular site cannot be measured in terms of consequences alone, since plant design and other factors are important contributors to risk. Therefore, we decided to place each site

into one of five groups or categories. The variation within a given group was selected to be sufficiently small so that each site within that group is considered to have about the same ranking. In selecting the groups we decided to use the median value and factor of two variation about the median to demarcate the "average" group boundaries. The other groups were chosen as indicated below.

Group No.	Title	Range
I	Below Average	PXSPF less than one-half the median value (PXSPF < 100)
II	Average	PXSPF between one-half and twice the median value (PXSPF from 100 to 400)
III	Slightly Above Average	PXSPF between twice and four times the median value (PXSPF from 400 to 800)
IV	Above Average	PXSPF between four and eight times the median (PXSPF from 800 to 1600)
V	Substantially Above Average	PXSPF greater than eight times the median (PXSPF > 1600)

Within each group the sites have been listed in alphabetical order, as shown in the following tables.

Group V - Substantially Above Average

1. Indian Point
2. Limerick
3. Zion

Group IV - Above Average[1]

1. Bailly
2. Beaver Valley
3. Fermi
4. Millstone
5. Seabrook
6. Shoreham
7. Three Mile Island
8. Waterford

Group III - Slightly Above Average

1. Byron
2. Catawba
3. Cook
4. Cherokee
5. Erie
6. Forked River
7. Haddam Neck
8. Hope Creek
9. McGuire
10. Midland
11. Peach Bottom
12. Perkins
13. Pilgrim
14. Perry
15. Salem
16. Sequoyah
17. Susquehanna
18. Rancho Seco
19. Turkey Point
20. Zimmer

Group II - Average

1. Arkansas
2. Bellefonte
3. Black Fox
4. Braidwood
5. Browns Ferry
6. Calvert Cliffs
7. Clinton
8. Brunswick
9. Davis-Besse
10. Duane Arnold
11. Fort Calhoun
12. Fitzpatrick
13. Ginna
14. Hartsville
15. LaSalle
16. Maine Yankee
17. Marble Hill
18. Nine Mile Point
19. Oconee
20 Oyster Creek
21. Palisades
22. Phipps Bend
23. Prairie Island
24. Quad Cities
25. River Bend
26. Robinson
27. San Onofre
28. Shearon Harris
29. Summer
30. Surry
31. St. Lucie
32. Skagit
33. Trojan
34. Vogtle
35. Watts Bar
36. WPPSS 3/5
37. Vermont Yankee
38. Monticello
39 Yellow Creek

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[1]Bailly and Millstone Unit 3 are the only plants in Group IV that are in the early stages of construction.

Group I - Below Average

1. Allens Creek
2. Big Rock Point
3. Callaway
4. Comanche Peak
5. Cooper
6. Crystal River
7. Diablo Canyon
8. Dresden
9. Farley
10. Ft. St. Vrain
11. Grand Gulf
12. Hatch
13. Kewaunee
14. LaCrosse
15. North Anna
16. Palo Verde
17. Pebble Springs
18. Point Beach
19. South Texas
20. WPPSS 2
21. WPPSS 1/4
22. Wolf Creek
23. Yankee Rowe

LEONARD SOFFER

PROFESSIONAL QUALIFICATIONS

SITING ANALYSIS BRANCH

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I am a Section Leader in the Siting Analysis Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. My duties in this position include the evaluation of site related aspects of nuclear power generating facilities.

I received a B.S. Degree (with honors) in Physics from the City College of New York in 1952 and attended graduate school at Case Western Reserve University in Cleveland, Ohio.

Before joining the Commission, I was employed for 21 years as a Physicist and Nuclear Engineer with the National Aeronautics and Space Administration (NASA) at the Lewis Research Center in Cleveland, Ohio. In this capacity, I performed analyses on radiation shielding and nuclear safety requirements for nuclear power systems intended for lunar and space applications. I assisted in the radiation shielding design of the NASA Plum Brook reactor, served on an agency-wide study

team investigating the radiological safety aspects of using radioisotopes for space power generation, and was section leader of a group responsible for development of new shielding computer programs. I also monitored contracts and occasionally lectured on radiological physics and shielding to others within NASA.

I have written about 12 technical papers on various topics related to radiological safety aspects of nuclear reactors. I am a member of the American Nuclear Society and the Population Association of America, which is the professional society of U. S. demographers.

I joined the Commission staff in July 1973, and have participated in the detailed review of about 20 nuclear power plants. My responsibilities in this regard have included evaluation of the demographic characteristics and the nearby facilities of sites as well as the independent assessment of the likelihood and consequences of various postulated accidents. I have prepared and presented testimony at hearings on the population density and use characteristics of sites as well as on the radiological consequences of accidents. In my capacity as Section Leader, Siting Analysis Branch, I am responsible for reviewing the results of similar efforts by others. I have also lectured on accident consequence assessment at a course sponsored by the International Atomic Energy Agency (IAEA), have attended conferences devoted to population projection methodology for small geographic areas and have had discussions with expert demographers on this subject.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	Docket Nos. 50-369
	)	50-370
(William B. McGuire Nuclear	)	
Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF RESPONSE TO CESG'S MEMORANDUM IN SUPPORT OF MOTION TO ADD FURTHER CONTENTIONS" dated February 2, 1981, 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, through deposit in the Nuclear Regulatory Commission's internal mail system, this 2nd day of February, 1981.

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