E. Marker
Fairbanks

NOV 8 1977

Docket No. 50-315

MEMORANDUM FOR: D. Davis, Acting Chief, Operating Reactors Branch No. 2, DOR

FROM: J. T. Collins, Chief, Effluent Treatment Systems Branch, DSE

SUBJECT: DSE EVALUATION OF D. C. COOK NUCLEAR PLANT, UNIT NO. 1, WITH RESPECT TO APPENDIX I TO 10 CFR PART 50

Enclosed is DSE's detailed evaluation of the radioactive waste treatment systems installed at D. C. Cook Nuclear Plant with respect to the requirements of Appendix I. The results of our evaluation are contained in the attached "Safety Evaluation and Environmental Impact Appraisal." We have also attached a draft "Notice of Issuance of Amendment to Facility Operating Licenses and Negative Declaration."

Based on our evaluation, we conclude that the radioactive waste treatment systems installed at D. C. Cook are capable of maintaining releases of radioactive materials in effluents to "as low as is reasonably achievable" levels in conformance with the requirements of 10 CFR Part 50.34a, and conforms to the requirements of Sections II.A, II.B, II.C, and II.D of Appendix I.

On March 29, 1977, DSE transmitted to ELD an NRC staff report entitled, "Application of Cost-Benefit Analysis Requirements of Appendix I to 10 CFR Part 50 to Nuclear Power Plants Whose Applications Were Docketed Before January 2, 1971." This report provides the staff's justification for using the September 4, 1975 amendment to Appendix I, rather than performing a detailed cost-benefit analysis required by Section II.D of Appendix I. On August 17, 1977, we received ELD comments on this report and we are currently preparing a NUREG report which will document our findings. When this report is completed, we will forward to you a paragraph to be inserted on page 1 of the enclosed Safety Evaluation, providing justification for the use of the September 4 option to the cost-benefit analysis.

When the model effluent radiological Technical Specifications, currently under development, have been approved they will be forwarded to you for transmittal to the licensee.

ORIGINAL SIGNED BY
JOHN T. COLLINS

John T. Collins, Chief
Effluent Treatment Systems Branch
Division of Site Safety and
Environmental Analysis

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DSE Evaluation

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SAFETY EVALUATION AND ENVIRONMENTAL IMPACT APPRAISAL BY
THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. TO FACILITY LICENSE NO. DPR-58
INDIANA AND MICHIGAN ELECTRIC COMPANY
D. C. COOK NUCLEAR PLANT, UNIT NO. 1
DOCKET NO. 50-315

INTRODUCTION

On May 5, 1975, the Nuclear Regulatory Commission announced its decision in the rulemaking proceeding concerning the numerical guides for design objectives and limiting conditions for operation to meet the criterion "as low as is reasonably achievable" for radioactive materials in light-water-cooled nuclear power reactor effluents. This decision is set forth in Appendix I to 10 CFR Part 50.(1) On September 4, 1975, the Commission adopted an amendment to Appendix I(2) to provide persons who have filed applications for construction permits for light-water-cooled nuclear power reactors which were docketed on or after January 2, 1971, and prior to June 4, 1976, the option of dispensing with the cost-benefit analysis required by Section II.D of Appendix I, if the proposed or installed radwaste systems satisfy the guides on design objectives for light-water-cooled nuclear power reactors proposed by the Regulatory Staff in the rulemaking proceeding on Appendix I (Docket RM 50-2), dated February 20, 1974.(3)

A paragraph will be added which will provide justification for using the September 4, 1975, amendment to Appendix I for application for construction permits filed prior to January 2, 1971.

Section V.B of Appendix I to 10 CFR Part 50 requires the holder of a license authorizing operation of a reactor for which application was filed prior to January 2, 1971, to file with the Commission by June 4, 1976; 1) information necessary to evaluate the means employed for keeping levels of radioactivity

in effluents to unrestricted areas "as low as is reasonably achievable", and 2) plans for proposed Technical Specifications developed for the purpose of keeping releases of radioactive materials to unrestricted areas during normal operation, including anticipated operational occurrences "as low as is reasonably achievable."

In conformance with the requirements of Section V.B of Appendix I, the Indiana and Michigan Electric Company (IMEC) filed with the Commission on June 4, 1976[4], September 2, 1976[5], December 6, 1976[6], June 22, 1977,[7] and July 20, 1977[8], the necessary information to permit an evaluation of the D. C. Cook Nuclear Plant, with respect to the requirements of Sections II.A, II.B, and II.C of Appendix I. In these submittals, IMEC provided the necessary information to show conformance with the Commission's September 4, 1975 amendment to Appendix I rather than perform a detailed cost-benefit analysis required by Section II.D of Appendix I.

By letter dated , IMEC submitted proposed changes to Appendix A Technical Specifications for D. C. Cook Nuclear Plant. The proposed changes implement the requirements of Appendix I to 10 CFR Part 50 and provide reasonable assurance that releases of radioactive materials in liquid and gaseous effluents are "as low as is reasonably achievable" in accordance with 10 CFR Parts 50.34a and 50.36a.

DISCUSSION

The purpose of this report is to present the results of the NRC staff's detailed evaluation of the radioactive waste treatment systems installed at

the D. C. Cook Nuclear Plant, Unit No. 1; 1) to reduce and maintain releases of radioactive materials in liquid and gaseous effluents to "as low as is reasonably achievable" levels in accordance with the requirements of 10 CFR Parts 50.34a and 50.36a, 2) to meet the individual dose design objectives set forth in Sections II.A, II.B, and II.C of Appendix I to 10 CFR Part 50, and 3) to determine if the installed radwaste systems satisfy the design objectives proposed in RM 50-2 rather than an individualized cost-benefit analysis as required by Section II.D of Appendix I.

I. Safety Evaluation

The NRC staff has performed an independent evaluation of the licensee's proposed method to meet the requirements of Appendix I to 10 CFR Part 50. The staff's evaluation consisted of the following: 1) a review of the information provided by the licensee in his June 4, 1976, September 2, 1976, December 6, 1976, June 22, 1977, and July 20, 1977, submittals; 2) a review of the radioactive waste (radwaste) treatment and effluent control systems described in the licensee's Final Safety Analysis Report (FSAR);[9] 3) the calculation of expected releases of radioactive materials in liquid and gaseous effluent (source terms) for the D. C. Cook Nuclear Plant; 4) the calculation of relative concentration (X/Q) and deposition (D/Q) values for the D. C. Cook site; 5) the calculation of individual doses in unrestricted areas; and 6) the comparison of the calculated releases and doses with the proposed design objectives of RM 50-2 and the requirements of Sections II.A, II.B, II.C and II.D of Appendix I.

The radwaste treatment and effluent control systems installed at the D. C. Cook Nuclear Plant have been previously evaluated in Section 11.0 of the staff's Safety Evaluation Report, dated September 10, 1973,[10] and have been described and evaluated in Section II.D.2 of the Final Environmental Statement (FES) dated August 1973.[11] Since the FES was issued, the licensee has modified these systems to include provisions for one of the two CVCS boric acid evaporators to function as a liquid radwaste evaporator if additional processing capability is required and to include use of mixed bed resins in the steam generator blowdown system demineralizer instead of anion bed resins. The modifications noted above were considered in the staff's evaluation.

Based on more recent operating data at other operating nuclear power reactors, which are applicable to the D. C. Cook Nuclear Plant, and on changes in the staff's calculation models, new liquid and gaseous source terms have been generated to determine conformance with the requirements of Appendix I. The new source terms, shown in Tables 1 and 2, were calculated using the model and parameters described in NUREG-0017[12] In making these determinations, the staff considered waste flow rates, concentrations of radioactive materials in the primary and secondary system and equipment decontamination factors consistent with those expected over the 30 year operating life of the plant for normal operation including anticipated operational occurrences. The principal parameters and plant conditions used in calculating the new liquid and gaseous source terms are given in Table 3.

The staff also reviewed the operating experience accumulated at Unit No. 1 in order to correlate the calculated releases given in Tables 1 and 2 with observed releases of radioactive materials in liquid and gaseous effluents. Data on liquid and gaseous effluents are contained in the licensee's Semi-Annual Operating Reports covering 1976. A summary of these releases is given in Table 4.

D. C. Cook Nuclear Plant, Unit No. 1, reached initial criticality in January 1975, and commercial operation in August 1975. Since the staff does not consider data from the first year of operation to be representative of the long term operating life of the plant, only effluent release data from 1976 for Unit 1 were used in comparing actual releases from Unit No. 1, with calculated releases.

For the year 1976, the reported release of liquid effluents is 0.26 Ci/yr for total activity (except tritium) and 192 Ci/yr for tritium. These values are in good agreement with the staff's corresponding calculated values of 0.36 Ci/yr for total activity (except tritium and 680 Ci/yr for tritium.

For the year 1976 the reported release of gaseous effluents is 980 Ci/yr for noble gases, 0.001 Ci/yr for Iodine-131, 0.00001 Ci/yr for particulates, and 0.1 Ci/yr for tritium. The staff's corresponding calculated values are 4100 Ci/yr for noble gases, 0.072 Ci/yr for Iodine-131, 0.002 Ci/yr for particulates, and 680 Ci/yr for tritium. Considering that the plant is still in early operational life, the actual values are in reasonable agreement with the calculated values which considers operation over a 30 year plant life.

Therefore, the staff believes that the calculational model of NUREG-0017 reasonably characterizes the actual releases of radioactive materials in liquid and gaseous effluents from D. C. Cook Nuclear Plant, Unit No. 1. Therefore, the calculated releases given in Tables 1 and 2 were used in the dose assessment discussed below.

The staff has made reasonable estimates of average atmospheric dispersion conditions for the D. C. Cook site using the atmosphere dispersion model presented in NUREG-0324,[13] which is based on the "Straight-Line Trajectory Model" described in Regulatory Guide 1.111.[14] All releases at the D. C. Cook site were considered as ground-level, with adjustments for mixing in the building wake. An estimate of increase in calculated relative concentration (X/Q) and relative deposition (D/Q) due to spatial and temporal variations in airflow, not considered in the straight-line model, was included as presented in NUREG-0324. The calculations also included consideration of intermittent releases during more adverse atmospheric conditions than indicated by an annual average calculation as a function of total duration of release (NUREG-0324). Radioactive decay of effluents and depletion of the effluent plume were considered as described in Regulatory Guide 1.111. One year (May 1975 - April 1976) of onsite meteorological data was used in the analysis.

All releases were evaluated using joint frequency distributions of wind speed and direction at the 15.2 m (50-ft.) level by atmospheric stability (defined by the vertical temperature gradient measured between the 9.1 m (30-ft.) and 54.9 m (180-ft.) levels. Wind speeds were adjusted to represent conditions at the 10 m (33-ft.) level.

The staff's dose assessment considered the following three effluent categories: 1) pathways associated with radioactive materials released in liquid effluents to Lake Michigan; 2) pathways associated with noble gases released to the atmosphere; and 3) pathways associated with radioiodines, particulates, carbon-14, and tritium released to the atmosphere. The mathematical models used to perform the dose calculations to the maximum exposed individual are described in Regulatory Guide 1.109.[15]

The dose evaluation of pathways associated with the release of radioactive materials in liquid effluents was based on the maximum exposed individual. For the total body dose, we considered the maximum exposed individual to be an adult whose diet included the consumption of fish (21 kg/yr) harvested in the immediate vicinity of the discharge from D. C. Cook into Lake Michigan, consumption of drinking water (730 l/yr) from the Lake Township intake, and use of the shoreline for recreational purposes (12 hr/yr). For the organ dose, we considered the maximum exposed individual to be an infant whose diet include the consumption of drinking water (510 l/yr) from the Lake Township intake.

The dose evaluation of noble gases released to the atmosphere included a calculation of beta and gamma air doses at the site boundary and total body and skin doses at the residence having the highest dose. The maximum air doses at the site boundary were found at 0.38 miles N relative to the D. C. Cook Station. The location of maximum total body and skin doses were determined to be at the same location.

The dose evaluation of pathways associated with radioiodine, particulates, carbon-14, and tritium released to the atmosphere was also based on the maximum exposed individual. For this evaluation, the staff considered the maximum

exposed individual to be an infant whose diet included the consumption of milk (330 l/yr) from a cow grazing at 1.8 miles ENE of the D. C. Cook Station. The evaluation further considered that the cow grazing at this location received pasture equivalent to 6 months per year total diet.

Using the dose assessment parameters noted above and the calculated releases of radioactive materials in liquid effluents given in Table 1, the staff calculated the annual dose or dose commitment to the total body or to any organ of an individual, in an unrestricted area to be less than 3 mrem/reactor and 10 mrem/reactor, respectively, in conformance with Section II.A of Appendix I.

Using the dose assessment parameters noted above, the calculated releases of radioactive materials in gaseous effluents given in Table 2, and the appropriate relative concentration (X/Q) value given in Table 5, the staff calculated the annual gamma and beta air doses at or beyond the site boundary to be less than 10 mrad/reactor and 20 mrad/reactor, respectively, in conformance with Section II.B of Appendix I.

Using the dose assessment parameters noted above, the calculated releases of radioiodine, carbon-14, tritium, and particulates given in Table 2, and the appropriate relative concentration (X/Q) and deposition (D/Q) values given in Table 5, the staff calculated the annual dose or dose commitment to any organ of the maximum exposed individual to be less than 15 mrem/reactor in conformance with Section II.C of Appendix I.

The summary of calculated doses given in Table 6 are different from and replace those given in Table V-5 and V-6 of the FES-OL[11].

Rather than performing an individualized cost-benefit analysis required by Section II.D of Appendix I, the licensee elected to show conformance with the numerical design objectives specified in the September 4, 1975 amendment to Appendix I (RM 50-2). The dose design objectives contained in RM 50-2 are on a site basis rather than a per reactor basis while the curie releases are on a per reactor basis. As shown in Table 1, the calculated release of radioactive material in liquid effluents is less than 5 Ci/yr/ reactor, excluding tritium and dissolved noble gases. As given in Table 2, the calculated quantity of iodine-131 released in gaseous effluents is less than 1 Ci/yr/reactor. The calculated doses combined for D. C. Cook Nuclear Plant, Unit No. 1 are less than the dose design objectives set forth in RM 50-2, and therefore, satisfy the requirements of Section II.D of Appendix I.

CONCLUSION

Based on the foregoing evaluation, the staff concludes that the radwaste treatment systems installed at the D. C. Cook Nuclear Plant, Unit No. 1, are capable of reducing releases of radioactive materials in liquid and gaseous effluents to "as low as is reasonably achievable" levels in accordance with the requirements of 10 CFR Part 50.34a, and therefore, are acceptable.

The staff has performed an independent evaluation of the radwaste systems installed at D. C. Cook Nuclear Plant, Unit No. 1. This evaluation has shown that the installed systems are capable of maintaining releases of radioactive

materials in liquid and gaseous effluents during normal operation including anticipated operational occurrences such that the calculated individual doses are less than the numerical dose design objectives of Section II.A, II.B, and II.C of Appendix I to 10 CFR Part 50. In addition, the staff's evaluation has shown that the radwaste systems satisfy the design objectives set forth in RM 50-2 and, therefore, satisfy the requirements of Section II.D of Appendix I to 10 CFR Part 50.

The staff concludes, based on the considerations discussed above, that: (1) because the revised Technical Specifications do not involve a significant increase in the probability of consequences of accidents previously considered and does not involve a significant hazard consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

II. Environmental Impact Appraisal

The licensee is presently licensed to possess and operate the D. C. Cook Nuclear Plant, Unit No. 1, located in the State of Michigan, in Berrien County, at power levels up to 3250 megawatts thermal (MWt). The proposed changes to the liquid and gaseous release limits will not result in an increase or decrease in the power level of the reactor. Since neither power level nor fuel burnup is affected by the action; it does not affect the benefits of electric power

affect the benefits of electric power production considered for the captioned facility in The Commission's Final Environmental Statement (FES) for D. C. Cook Nuclear Plant, Docket No. 50-315.

The revised liquid and gaseous effluent limits will not significantly change the total quantities or types of radioactivity discharged to the environment from D. C. Cook Nuclear Plant, Unit No. 1.

The revised Technical Specifications implement the requirements of Appendix I to 10 CFR Part 50 and provide reasonable assurance that releases of radioactive materials in liquid and gaseous effluents will be "as low as is reasonably achievable." If the plant exceeds one-half the design objectives in a quarter, the licensee must: (1) identify the cases, (2) initiate a program to reduce the releases; and (3) report these actions to the NRC. The revised Technical Specifications specify that the annual average release be maintained at less than twice the design objective quantities set forth in Sections II.A, II.B, and II.C of Appendix I.

Conclusion and Basis for Negative Declaration

On the basis of the foregoing evaluation, it is concluded that there would be no significant environmental impact attributable to the proposed action. Having made this conclusion, the Commission has further concluded that no environmental impact statement for the proposed action need be prepared and that a negative declaration to this effect is appropriate.

Dated:

TABLE 1

CALCULATED RELEASES OF RADIOACTIVE MATERIALS IN
IN LIQUID EFFLUENTS FROM
D. D. C. COOK NUCLEAR PLANT, UNIT NO. 1

Nuclide	Ci/yr
Corrosion and Activation Products	
Cr-51	1.2(-4)[a]
Mn-54	1(-3)
Fe-55	1.1(-4)
Fe-59	7(-5)
Co-58	5.1(-3)
Co-60	8.8(-3)
Zr-95	1.4(-3)
Nb-95	2(-3)
Np-239	4(-5)
Fission Products	
Br-93	3(-5)
Rb-86	3(-5)
Rb-88	1.5(-3)
Sr-89	3(-5)
Mo-99	4(-3)
Tc-99m	6.6(-3)
Ru-103	1.4(-4)
Ru-106	2.4(-3)
Ag-110m	4.4(-4)
Te-137m	2(-5)
Te-127	4(-5)
Te-129m	9(-5)
Te-129	1.6(-4)

Nuclide	Ci/yr
Fission Products	
I-130	1.1(-4)
Te-131m	7(-5)
Te-131	1(-4)
I-131	2(-1)
Te-132	1.2(-3)
I-132	3(-3)
I-133	4.7(-2)
I-134	1.2(-4)
Cs-134	2.2(-2)
I-135	4(-3)
Cs-136	4(-3)
Cs-137	3(-2)
Ba-137	5(-3)
Ba-140	1(-5)
La-140	1(-5)
Ce-144	5.2(-3)
All Others	6(-5)
Total except tritium	0.36
Tritium	670

a = exponential notation, $1.2(-4) = 1.2 \times 10^{-4}$

TABLE 2

CALCULATED RELEASES OF RADIOACTIVE MATERIALS IN GASEOUS EFFLUENTS FROM D. C. COOK NUCLEAR PLANT, UNIT NO. 1
RELEASE (Ci/yr/reactor)

Nuclides	Waste Gas Processing System	Reactor	Auxiliary	Turbine	Steam Jet Air Ejector	Total
Kr-83m	a	a	a	a	a	a
Kr-85m	a	3	2	a	1	6
Kr-85	260	10	a	a	a	270
Kr-87	a	a	1	a	a	1
Kr-88	a	3	4	a	2	9
Kr-89	a	a	a	a	a	a
Xe-131m	18	17	a	a	a	35
Xe-133m	a	37	3	a	2	42
Xe-133	83	3400	150	a	96	3700
Xe-135m	a	a	a	a	a	a
Xe-135	a	16	6	a	4	26
Xe-137	a	a	a	a	a	a
Xe-138	a	a	a	a	a	a
Total Noble Gases						4100
I-131	a	2.1(-3)[b]	4.2(-2)	1.6(-3)	2.6(-2)	7.2(-2)
I-133	a	2.8(-3)	5.9(-2)	1.5(-3)	3.7(-2)	1(-1)
Co-60	7(-5)c	c	2.7(-4)	c	c	3.4(-4)
Co-58	1.5(-4)c	c	6(-4)	c	c	7.6(-4)
Fe-59	1.5(-5)c	c	6(-5)	c	c	7.6(-5)
Mn-54	4.5(-5)	c	1.8(-4)	c	c	2.3(-4)
Cs-137	7.5(-5)c	c	3(-4)	c	c	3.8(-4)
Cs-134	4.5(-5)c	c	1.8(-4)	c	c	2.3(-4)
Sr-90	6(-7)c	c	2.4(-6)	c	c	3(-6)
Sr-89	3.3(-6)c	c	1.3(-5)	c	c	1.6(-5)
Total Particulates						2(-3)
C-14	7	1	-	-	-	8
H-3	-	-	-	-	-	680
Ar-41	-	25	-	-	-	25

a = less than 1.0 Ci/yr for noble gases, less than 10^{-4} Ci/yr for iodine.
b = exponential notation; 2.4(-4) = 2.4×10^{-4}
c = less than 1% of total

TABLE 3

PRINCIPAL PARAMETERS AND CONDITIONS USED IN CALCULATING RELEASES OF RADIOACTIVE MATERIAL IN LIQUID AND GASEOUS EFFLUENTS FROM D. C. COOK, UNIT NO. 1

Reactor Power Level (MWt)	3391
Plant Capacity Factor	0.80
Failed Fuel	0.12% [a]
Primary System	
Mass of Coolant (lbs)	5.6×10^5
Letdown Rate (gpm)	75
Shim Bleed Rate (gpm)	11
Leakage to Secondary System (lbs/day)	100
Leakage to Containment Building	b
Leakage to Auxiliary Buildings (lbs/day)	160
Frequency of Degassing for Cold Shutdowns (per year)	2
Secondary System	
Steam Flow Rate (lbs/hr)	1.4×10^7
Mass of Steam/Steam Generator (lbs)	6.6×10^3
Mass of Liquid/Steam Generator (lbs)	1.3×10^5
Secondary Coolant Mass (lbs)	2.1×10^6
Rate of Steam Leakage to Turbine Bldg (lbs/hr)	1.7×10^3
Blowdown Flow Rate (lbs/hr)	3.6×10^4
Containment Building Volume (ft^3)	1.2×10^6
Annual Frequency of Containment Purges (shutdown)	4
Annual Frequency of Containment Purges (at power)	34
Iodine Partition Factors (gas/liquid)	
Leakage to Auxiliary Building	0.0075
Steam Generator (volatile species)	1.0
Steam Generator (nonvolatile species)	0.01
Main Condenser Air Ejector (volatile species)	0.15

Decontamination Factors (liquid wastes)

	Shim Bleed & Eq. Drain	Misc. Wastes	Steam Gen. Blowdown
I	1×10^3	1×10^3	1×10^3
Cs, Rb	1×10^3	1×10^4	1×10^2
Others	1×10^5	1×10^4	1×10^3

	All Nuclides Except Iodine	Iodine
Miscellaneous (Dirty) Waste Evaporator DF	10^4	10^3
Boron Recovery System & Equipment Drain Evaporator DF	10^3	10^2

	Anions	Cs, Rb	Other Nuclides
Letdown Coolant Waste Demineralizers DF	10	2	10
Evaporator Condensate Polishing Demineralizers DF	10	10	10
Steam Generator Blowdown Demineralizers DF	$10^2(10)$ [c]	10(10)	$10^2(10)$
Cation Bed Demineralizers	1(1)	10(10)	10(10)
Anion Bed Demineralizers	$10^2(10)$	1(1)	1(1)

(Continued - next page)

TABLE 3

(continued)

	Anions	Cs, Rb	Other Nuclides
Containment Kidney Charcoal Adsorber DF (Iodine Removal)		10	
Gaseous Systems HEPA filter DF (Particulate Removal)		100	

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[a]This value is constant and corresponds to 0.12% of the operating power fission product source term as given in NUREG-0017, April 1976.

[b]1%/day of the primary coolant noble gas inventory and 0.001%/day of the primary coolant iodine inventory.

[c]For two demineralizers in series, the DF for the second demineralizer is given in parenthesis.

TABLE 4

SUMMARY OF LIQUID AND GASEOUS RADIOACTIVE EFFLUENTS FOR D.C. COOK NUCLEAR PLANT, UNIT NO. 1

	1976(1) (Ci/yr)
Liquid Releases	
Total Activity (Except Tritium)	0.26
Tritium	192
Gaseous Releases	
Noble Gases	980
Iodine-131	.0013
Tritium	.1
Particulates	1×10^{-5}

(1) From "Environmental Operating Report, Indiana and Michigan Power Company, Donald C. Cook Nuclear Plant Unit 1," January through June 1976; and from "Environmental Operating Report, Indiana and Michigan Power Company, Donald C. Cook Nuclear Plant Unit 1," July through December 1976.

TABLE 5

D. C. COOK, UNIT NO. 1 :
RELATIVE CONCENTRATION (X/Q) AND DEPOSITION (D/Q) VALUES
USED FOR DOSE CALCULATIONS

Receptor Type	Direction	Distance (miles)	Release Type	X/Q (sec/meters^3)	D/Q (meters^{-2})
Site Boundary	N	0.38	Continuous	2.3×10^{-5}	7.9×10^{-8}
			Intermittent - 24 2-hr purges	5.8×10^{-5}	2.0×10^{-7}
			Intermittent - 15 8-hr purges	4.9×10^{-5}	1.7×10^{-7}
Residence/Garden/ Milk Cow	ENE	1.8	Continuous	9.2×10^{-7}	4.8×10^{-9}
			Intermittent - 24 2-hr purges	2.7×10^{-6}	1.4×10^{-8}
			Intermittent - 15 8-hr purges	2.3×10^{-6}	1.2×10^{-8}

TABLE 3

COMPARISON OF D.C. COOK, UNIT NO. 1, WITH APPENDIX I TO 10 CFR PART 50, SECTIONS II.A, II.B, AND II.C (MAY 5, 1975) AND SECTION II.D, ANNEX (SEPTEMBER 4, 1975)[b]

Criterion	COLUMN 1 Appendix I[a] Design Objectives	COLUMN 2 Annex[b] Design Objectives[c]	COLUMN 3 Calculated Doses Unit Nos. 1 or 2
Liquid Effluents			
Dose to total body from all pathways	3 mrem/yr/unit	5 mrem/yr/site	0.14 mrem/yr/unit
Dose to any organ from all pathways	10 mrem/yr/unit	5 mrem/yr/site	0.34 mrem/yr/unit
Noble Gas Effluents[d]			
Gamma dose in air	10 mrad/yr/unit	10 mrad/yr/site	3.0 mrad/yr/unit
Beta dose in air	20 mrad/yr/unit	20 mrad/yr/site	8.2 mrad/yr/unit
Dose to total body of an individual	5 mrem/yr/unit	5 mrem/yr/site	1.8 mrem/yr/unit
Dose to skin of an individual	15 mrem/yr/unit	15 mrem/yr/site	5.2 mrem/yr/unit
Radioiodines and Other Radionuclides Released to the Atmosphere[e]			
Dose to any organ from all pathways	15 mrem/yr/unit	15 mrem/yr/site	3.0 mrem/yr/unit

[a] Federal Register, V.40, p. 19442, May 5, 1975.

[b] Federal Register, V.40, p. 40816, September 4, 1975.

[c] Design objectives given on a site basis. Therefore, these design objectives apply to 2 units at the site.

[d] Limited to noble gases only.

[e] Carbon-14 and Tritium have been added to this category.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-315

INDIANA AND MICHIGAN ELECTRIC

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSES AND NEGATIVE DECLARATION

The U.S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. to Facility Operating License No. DPR-58, issued to Indiana and Michigan Electric Company, for revised Technical Specifications for operation of the D. C. Cook Nuclear Plant Unit No. 1, located near St. Joseph/Benton Harbor, Berrien County, Michigan. The amendments are effective as of the date of issuance.

These amendments to the Technical Specifications will (1) implement the requirements of Appendix I to 10 CFR Part 50, (2) establish new limiting conditions for operation (LCO) for the quarterly and annual average release rates, and (3) revise environmental monitoring programs to assure conformance with Commission regulations.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of these amendments was not required since the amendments do not involve a significant hazards considerations.

The Commission has prepared an environmental impact appraisal for the revised Technical Specifications and has concluded that an environmental impact statement for the particular action is not warranted because there will be no significant effect on the quality of the human environment beyond that which has already been predicted and described in the Commission's Final Environmental Statement for the facility dated August 1973.

For further details with respect to this action, see (1) the application for amendment dated , (2) Amendment No. to License No. DPR-58, and (3) the Commission's related Safety Evaluation and Environmental Impact Appraisal. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., and at the St. Joseph Library, 500 Market Street, St. Joseph, Michigan. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland this day of

FOR THE NUCLEAR REGULATORY COMMISSION

Donald Davis, Chief
Operating Reactors Branch #2
Division of Operating Reactors

REFERENCES

1. Title 10, CFR Part 50, Appendix I. Federal Register, V. 40, p. 19442, May 5, 1975.

2. Title 10, CFR Part 50, Amendment to Paragraph II.D of Appendix I, Federal Register, V. 40 p. 40816, September 4, 1975, and revised as of January 1, 1976.

3. U.S. Atomic Energy Commission Concluding Statement of Position of the Regulatory Staff (and its Attachment) - Public Rulemaking Hearing on: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criteria "As Low As Is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactors, Docket No. RM 50-2, Washington, D.C., February 20, 1974.

4. "Donald C. Cook Nuclear Plant Docket Nos. 50-315, 50-316, DPR-58." Letter of Transmittal, June 4, 1976.

5. "Donald C. Cook Nuclear Plant, Unit Nos. 1 and 2, Docket Nos. 50-315 and 50-316, DPR No. 58 and CPPR No. 61." Letter of Transmittal, September 2, 1976.

6. "Donald C. Cook Nuclear Plant, Unit Nos. 1 and 2, Docket Nos. 50-315 and 50.316, DPR No. 58 and CPPR No. 61." Letter of Transmittal, December 6, 1976.

7. "Donald C. Cook Nuclear Plant, Unit No. 2, Docket No. 50-316, CPPR No. 61." Letter of Transmittal, June 22, 1977.

8. "Donald C. Cook Nuclear Plant, Unit Nos. 1 and 2, Docket Nos. 50-315 and 50-316, DPR No. 58 and CPPR No. 61." Letter of Transmittal, July 20, 1977.

9. Indiana and Michigan Electric Company, Final Safety Analysis Report for D. C. Cook Nuclear Plant, January 1971.

10. Staff of the U.S. Nuclear Regulatory Commission, "Safety Evaluation of the D. C. Cook Nuclear Plant, Unit Nos. 1 and 2," Docket Nos. 50-315/316, Washington, D.C., September 10, 1973.

11. Staff of the U.S. Nuclear Regulatory Commission "Final Environmental Statement Related to the Operation of D. C. Cook Nuclear Plant, Unit Nos. 1 and 2," Indiana and Michigan Electric Co., Docket Nos. 50-315/316, Washington,. D.C., August 1973.

12. NUREG-0017, "Calculation of Releases of Radioactive Materials In Gaseous and Liquid Effluents From Pressurized Water Reactors (PWR-GALE Code)," April 1976.

13. NUREG-0324, Sagendorf, J.F. and Goll, J.T.: "XOQDOQ, Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations, (DRAFT)." U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C , September 1977.

14. Staff of the U.S. Nuclear Regulatory Commission, Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," March 1976.

15. Staff of the U.S. Nuclear Regulatory Commission, Regulatory Guide 1.109, "Calculation of Annual Average Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Implementing Appendix I," March 1976.