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FACIL: 50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315
50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana & 05000316
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ALEXICH, M. P. Indiana & Michigan Electric Co.
RECIP. NAME RECIPIENT AFFILIATION
DENTON, H. R. Office of Nuclear Reactor Regulation, Director (post 851125

SUBJECT: Forwards evaluation & discussion of alternative methods for noble gas monitoring & iodine/particulate sampling sys, per util 860219 ltr re NUREG-0737, Sections II.B.3 & II.F.1. Exemption requests listed.

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June 23, 1986
AEP:NRC:0678W

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
MONITORING AND SAMPLING RADIOACTIVE EFFLUENTS
NUREG-0737, SECTIONS II.F.1-1 AND II.F.1-2

Mr. Harold R. Denton, Director
Office of Nuclear Regulatory Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

In our letter AEP:NRC:0678S, dated February 19, 1986, we provided a summary of the actions we planned to take with regard to Section II.B.3 and II.F.1 of NUREG-0737. As a follow-up to Items IV and V of that letter, we are now transmitting our evaluation of the radioactive source terms for the steam jet air ejector (SJAE) and gland seal condenser (GSC) exhaust. The attachment to this letter contains this evaluation and also discusses an alternative method for sampling iodine from these two exhaust pathways.

As a result of this evaluation, we are requesting exemptions from NUREG-0737 for the following items:

1. Iodine/particulate source term requirement in Section II.F.1-2 for the SJAE and GSC exhaust systems.

2. The design range requirement of 10^5 uCi/cc for noble gas monitoring of the GSC exhaust as required in Section II.F.1-1. The low-range noble gas detector will be the only one used on this release pathway.

3. Iodine grab and continuous sampling capability for the SJAE and GSC exhaust pathways as required in Section II.F.1-2. We have an alternative method for estimating iodine releases.

4. Particulate sampling capability for the SJAE and GSC. These exhausts are not potential release pathways for particulates.

Our schedule for closing out NUREG-0737 Sections II.F.1-1 and II.F.1-2 is dependent on the NRC's response to the above requests for exemption.

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Pursuant to the requirements of 10 CFR 170.12(c), we have enclosed an application fee of $150.00 for review of this exemption request.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

RPAlexich 6/23/86

cm

Attachments

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman

Attachment to AEP:NRC:0678W

Evaluation of the D. C. Cook Nuclear Plant Noble Gas Monitoring and Iodine/Particulate Sampling Systems

PURPOSE

The purpose of this analysis was to evaluate our present post-accident noble gas monitoring and iodine/particulate sampling systems for the steam jet air ejector (SJAE) and gland seal condenser (GSC) exhaust pathways in the context of NUREG-0737 Sections II.F.1-1 and II.F.1-2.

The analysis encompassed the types and amounts of radioactivity that would be expected to be released to the atmosphere through the SJAE and GSC exhaust pathways from the main steam system, as a result of a postulated accident.

ACCIDENT SCENARIO

The following two worst-case accident scenarios were considered in this analysis: (1) the steam generator tube rupture with 1% of failed fuel, and (2) a LOCA resulting in cladding and fuel damage, with a 1-gpm leak rate from the primary to the secondary side.

To use the LOCA scenario, there must be a greater pressure in the primary side than in the secondary side after fission products are released into the reactor coolant as the result of fuel damage. After an investigation of this criterion and a review of Appendix 14.F of the FSAR, Major LOCA Analysis, it was concluded that in all cases, the blowdown phase of the transient ends before hot rod burst time, alleviating the driving force from the primary to secondary side after fission products appear in the reactor coolant system. Therefore, the LOCA with fuel damage scenario would be an inappropriate scenario to be used for the determination of an accident source term for the main steam system.

The accident scenario used for determining the main steam radionuclide concentration was, then, a steam generator tube rupture.

ASSUMPTIONS

For the analysis of the steam generator tube rupture accident scenario, the following assumptions were determined to be the most conservative:

1. The break occurred high up on the steam generator tube bundles.

2. No credit was taken for the transfer of radiation to the steam generator water.

3. All noble gas particulates and iodines entered the main steam system (upper bound model of Reference 1).

4. 1% of the reactor's fuel contained clad defects.

5. Iodine spiking resulted from a series of reactor transients. As the result of the iodine spiking assumption, a multiplier of 500 was applied. This multiplier was the highest found in the reference material reviewed.

6. The primary-to-secondary leak rate remained constant.

7. The steam generator blowdown was isolated and remained isolated during the duration of the accident.

8. There was no deposition of iodine on any surface.

RESULTS/CONCLUSIONS

The results of our analysis are as follows:

	Concentrations		
Radionuclide	Main Steam System (uCi/cc)	SJAE Exhaust (uCi/cc)	GSC Exhaust (uCi/cc)
Iodine	2.07	1.54×10^{-6}	1.03×10^{-8}
Particulate	4.06×10^{-3}	0	0
Noble Gas	1.87×10^{-1}	$1.97 \times 10^{+3}$	5.48×10^{-3}

In conclusion, as shown above, the 100 uCi/cc of iodine and 100 uCi/cc of particulates that are a required source term in NUREG-0737, Section II.F.1-2 are unreasonably conservative for the SJAE and GSC exhaust systems. We therefore request exemption from using these source terms for these two pathways.

The noble gas design range requirement of 10^5 uCi/cc for the GSC exhaust pathway is also unreasonably conservative. The present low-range noble gas detector (range = 1×10^{-7} to 1×10^{-2} uCi/cc) is adequate for measuring releases of noble gases from this pathway. We therefore request exemption from the 10^5 uCi/cc range requirement of NUREG-0737, Section II.F.1-1 for the GSC exhaust.

In our analysis low concentrations of iodine would be released from the SJAE and GSC pathways. The analysis did not include iodine line-loss in the main steam system and sample lines, which would also lower these values significantly, in accordance with Reference 2. Dealing with such unknown losses and low concentrations, taking iodine grab samples and/or having a continuous sampling system would not provide a reasonable source of information for quantitative analysis and/or off-site dose assessment. Since our prime objective is to protect the health and safety of the public, we propose the following alternative method for an iodine release from the SJAE and GSC exhaust systems.

Since noble gas is constantly monitored for these release pathways, and since there will be field teams available for sampling the surrounding environment, we propose to develop a ratio between the calculated secondary coolant noble gas and iodine. We will then apply this noble gas/iodine ratio correction to the noble gas monitor reading to predict the expected iodine reading. We will also compare the expected iodine with field data on iodine and adjust the correction factor if necessary. We believe this proposed method will more realistically protect the health and safety of the public. We therefore request exemption from NUREG-0737 Section II.F.1-2 for sampling iodine released from the SJAE and GSC exhaust pathways.

In addition, iodine particulates were considered in this analysis as an iodine release and were assumed to be adsorbed on the iodine filters. Other particulates would remain in the main steam/feedwater systems and would not be released to the atmosphere. We therefore request exemption from sampling of particulates from the SJAE and GSC exhaust pathways.

REFERENCES

(1) BNL-NUREG-24994 "Radioactivity Release vs. Probability for a Steam Generator Tube Rupture Accident" (1978)

(2) "Deposition of Airborne Radioiodine Species of Surfaces of Metals and Plastics." M. J. Kabat; Ontario Hydro, Health and Safety Division

ADDITIONAL SOURCES OF INFORMATION

NUREG-0017, Rev. 1
"Calculation of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors" (1985)

NUREG-0409 - "Iodine Behavior in a PWR Cooling System Following a Postulated Steam Generator Tube Rupture Accident" (1978)

NUREG/CR-2683//BMI-2094 "Iodine Behavior in Steam Generator Tube Rupture Accidents" (1982)

June 20, 1986

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DOCKET NO(S).: 50-315/316

Mr. John Dolan, Vice President
Indiana and Michigan Electric Company
c/o American Electric Power Service Corp.
1 Riverside Plaza
Columbus, Ohio 43216

SUBJECT: D. C. Cook Nuclear Plant, Units 1 and 2

The following documents concerning our review of the subject facility are transmitted for your information.

☐ Notice of Receipt of Application, dated _____.

☐ Draft/Final Environmental Statment, dated _____.

☐ Notice of Availability of Draft/Final Environmental Statement, dated _____.

☐ Safety Evaluation Report, or Supplement No. _____, dated _____.

☐ Notice of Hearing on Application for Construction Permit, dated _____.

☐ Notice of Consideration of Issuance of Facility Operating License, dated _____.

☒ Monthly Notice; Applications and Amendments to Operating Licenses Involving no Significant Hazards Considerations, dated June 18, 1986. (See page 22238)

☐ Application and Safety Analysis Report, Volume _____.

☐ Amendment No. _____ to Application/SAR dated _____.

☐ Construction Permit No. CPPR- _____, Amendment No. _____ dated _____.

☐ Facility Operating License No. _____, Amendment No. _____, dated _____.

☐ Order Extending Construction Completion Date, dated _____.

☐ Other *(Specify)* _____

Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc: See next page

OFFICE➤	PWR#4/DPWR-A		PWR#4/DPWR-A				
SURNAME➤	MDuncan/mac		DWigginton				
DATE➤	06/20/86		06/20/86				

NRC FORM 318 (1/84) NRCM 0240