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 DENTON, H. Office of Nuclear Reactor Regulation, Director

SUBJECT: Responds to NRC request for addl info re NUREG-0737, Item II, B.3 re post-accident sampling sys. Licensee has agreement w/B&W to perform offsite analysis of postulated post-accident samples.

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Iowa Electric Light and Power Company

April 15, 1985
NG-85-1462

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Post-Accident Sampling System,
Request for Additional Information
(NUREG-0737, Item II.B.3)
File: A-107b

Dear Mr. Denton:

The attachment to this letter provides the information requested during a conference call with our Licensing Project Manager and Chemical Engineering Branch reviewers concerning the DAEC Post-Accident Sampling System (PASS). Please advise us if you have any further questions.

Very truly yours,



Richard W. McGaughy
Manager, Nuclear Division

RWM/SLS/ta*

Attachment: Response to NRC Request for Additional Information Concerning
Post-Accident Sampling

cc: S. Swails
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DUANE ARNOLD ENERGY CENTER
RESPONSE TO NRC REQUEST FOR ADDITIONAL
INFORMATION CONCERNING POST-ACCIDENT SAMPLING

1. NRC REQUEST

Please provide copies of the following DAEC Post-Accident Sampling and Analysis Procedures (PASAPs):

- PASAP 3.7
- PASAP 7.2
- PASAP 7.3

RESPONSE

The following DAEC PASAPs are attached to this submittal:

- PASAP 3.7 and 3.7A
- PASAP 7.2
- PASAP 7.3

2. NRC REQUEST

Does Iowa Electric have an agreement with a contractor to perform offsite analysis of postulated post-accident samples?

RESPONSE

Iowa Electric has an agreement with Babcock & Wilcox to perform offsite analysis of postulated post-accident samples.

3. NRC REQUEST

Does Iowa Electric have access to the Pooled Inventory Management (PIM) program shipping cask?

RESPONSE

Iowa Electric is a participating member of the PIM program and has access to the PIM shipping cask.

4. NRC REQUEST

Are the DAEC PASS analytical procedures consistent with GE recommended analytical procedures (please reference specific GE documents)?

RESPONSE

DAEC PASAPs are based on and consistent with GE-recommended procedures. DAEC chemical and radiochemical analysis procedures are based on and consistent with procedures contained in NEDC-24889, March 1981 "Post-LOCA Sampling Station Compilation of Technical Information." DAEC procedures for estimating the extent of core damage are based on and consistent with procedures contained in NEDO-22215, August 1982 "Procedures for the Determination of the Extent of Core Damage Under Accident Conditions."

5. NRC REQUEST

Do the DAEC PASS operators undergo retraining on PASS procedures (drawing samples and analyzing samples) every six months?

RESPONSE

Currently, DAEC PASS operators undergo formal retraining on PASS procedures every two years. Beginning the current refueling outage, the two year operator training cycle will be staggered such that at least one operator is trained every six months. In addition to the DAEC formal training, some PASS operators demonstrate the ability to obtain PASS samples during the Tech. Spec. required PASS operability surveillance testing (performed once per operating cycle). Further, PASS operators demonstrate the ability to obtain and analyze PASS samples during the annual emergency drill.

6. NRC REQUEST

An attachment to a letter from the NRC to the BWR Owners' Group discusses operating procedures to obtain a representative sample from the jet pump flow sensing instrument lines under postulated conditions of <1% reactor power and concurrent high RPV pressure. The procedures instruct operators to flood the vessel to the moisture separator prior to obtaining a sample. Do DAEC procedures instruct operators to flood the vessel to the moisture separator prior to obtaining a PASS jet pump sample, under postulated conditions of <1% reactor power and concurrent high RPV pressure? If the answer is no, will DAEC procedures be modified to incorporate these instructions?

RESPONSE

DAEC operating and emergency operating procedures do not instruct operators to flood the vessel to the moisture separator for the purpose of obtaining a PASS jet pump sample. Iowa Electric does not consider it necessary to revise DAEC procedures to incorporate such instructions because:

- 1) Data provided by a jet pump sample is helpful but not essential to accident mitigation. It is not considered prudent to perturb system parameters, including RPV level, during a postulated accident to obtain information which is not essential to accident mitigation.
- 2) The peculiar condition in which the reactor remains pressurized for longer than the time it takes to reach 1% decay heat power represents a highly unlikely circumstance as one of the operator's primary objectives after a postulated accident is to bring the reactor to a cold shutdown condition.
- 3) The period of concern (<1% reactor power and concurrent high RPV pressure) will, if it exists at all, be very brief. Representative samples would likely have been obtained before the peculiar condition developed and would again be obtained when RHR shutdown cooling mode is established.

- 4) DAEC PASAPs contain a caution to personnel that some sample dilution may occur under certain peculiar post-accident conditions. Therefore, even if a postulated post-accident sample were to be obtained under these peculiar conditions, DAEC personnel would not be misled by the analytical results.

7. NRC REQUEST

Provide a statement that the accuracy and range of DAEC analytical procedures are unaffected by the presence of the expected radiation field from the sample.

RESPONSE

Analysis which will be performed on post-accident samples includes isotopic analyses of all samples, and analyses of liquid samples for boron, chlorides, dissolved gas (total dissolved gas or hydrogen and oxygen). Containment atmosphere samples may also be analyzed for hydrogen, oxygen, and iodine content. Boron analyses of reactor liquid samples are performed using the carminic acid method. Irradiation tests performed by General Electric determined that radiation exposure corresponding to Regulatory Guide 1.3 source terms and a one hour decay would result in only a 1 ppm error in the analyses of 2 ml of a 100:1 diluted reactor coolant sample. Chloride analysis performed at the DAEC is a scoping analysis of a .1 ml reactor liquid sample using the turbidimetric method. Irradiation tests performed by GE demonstrated that radiation has an insignificant effect on the results of the analysis.

Analysis of dissolved gases from reactor coolant samples is accomplished by measuring total dissolved gases using the pressure differential method. Radiation will not affect the results of total dissolved gases measured in this way. If a decision is made to obtain a grab sample of dissolved gases, analysis of the sample would be performed using a gas chromatograph. Gas chromatography has been successfully demonstrated for the determination of hydrogen in the presence of gamma radiation through testing and analysis by Babcock & Wilcox on TMI-2 post-accident gas samples. Dissolved oxygen will be measured indirectly, whenever possible, using the residual hydrogen method. Using this method, dissolved oxygen is verified to be less than .1 ppm by measurement of a positive hydrogen residual of greater than 10 scc/kg.

Measurement of pH of reactor coolant samples is currently performed using pH indicator paper. However, a semi-micro combination pH electrode has recently been purchased for use which is capable of accurately measuring the pH of a small volume of liquid sample. Testing performed by General Electric under high radiation conditions demonstrated that the semi-micro combination electrode performed satisfactorily, with a drift of less than .3 pH units.

Based on the above, we believe that the accuracy and range of instrumentation used at the DAEC for post-accident sample analysis is not significantly affected by the presence of the expected radiation field from the sample.

8. NRC REQUEST

Demonstrate that the accuracy and range of DAEC analytical procedures are unaffected by the presence of the chemical species included in the NRC standard test matrix for undiluted reactor coolant samples.

RESPONSE

The following provides a discussion of the effect of the standard test matrix on the accuracy of the sample analysis.

Boron Analysis: General Electric has determined that none of the chemical species listed in the NRC standard test matrix are expected to interfere with the carminic acid method of boron analysis.

Chloride Analysis: Of the chemical species listed in the standard test matrix, only iodide would be expected to interfere with chloride analysis by the turbidimetric method. On an atom-for-atom basis, 40 ppm iodide is equivalent to 11 ppm chloride, and will interfere in turbidimetric method by the formation of silver iodide. However, the chloride analysis performed at the DAEC is only a scoping analysis; confirmatory analysis which will be relied upon will be performed at an offsite laboratory. The accuracy and range of this analysis was discussed in our previous transmittal.

Dissolved Gas: As stated previously, total dissolved gases from reactor coolant samples will be measured using the pressure differential method. None of the chemical species listed in the standard test matrix would be expected to interfere with this method of analysis. Should a decision be made to obtain a grab sample of dissolved gas, hydrogen and oxygen would be measured using a gas chromatograph. None of the chemical species in the matrix would be expected to interfere with this analysis.

pH Analysis: As discussed previously, the pH of reactor liquid samples will be measured at the DAEC using a semi-micro combination pH electrode. This analysis consists of measuring the acidity/alkalinity of a solution rather than analyzing the chemical contents of the sample. Therefore, none of the chemical species in the standard test matrix would be expected to interfere with the pH analysis.

Based on the above, the accuracy and range of post-accident sample analysis is not significantly affected by the chemical species included in the NRC standard test matrix.

9. NRC REQUEST

Please provide a copy of the DAEC procedure for estimating core damage based upon containment hydrogen concentration.

RESPONSE

Currently, the DAEC does not have a procedure for estimating core damage based upon containment hydrogen concentration. However, as a result of

this request, plans are underway to incorporate a procedure for estimating the percent of metal-water reaction based upon containment hydrogen concentration into the DAEC Post-Accident Sampling and Analysis Procedures. This procedure will be adapted from Appendix A, "Integration of Containment Atmosphere Hydrogen Measurement Into Core Damage Estimate," of NEDO-22215, August 1982.