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Iowa Elec. Light & Power Co. Cedar Rapids, Iowa C.W. Sandford	8-15-72	8-21-72	X			

TO:	ORIG	CC	OTHER	
Mr. Daniel R. Muller	1 signed			SENT AEC PDR ✓ SENT LOCAL PDR ✓

CLASS:	INPUT	NO CYS REC'D	DOCKET NO:
U PROP INFO		1	50-331

DESCRIPTION: Ltr trans the following:

ENCLOSURES: Basic Data for Source Term Calculation amended to correct errors in original response of July 12, 1972 & to add addl data.......

(45 cys encl rec'd)

PLANT NAMES: Duane Arnold Energy Center

DO NOT REMOVE

ACKNOWLEDGED

FOR ACTION/INFORMATION

DL 8-21-72

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IOWA ELECTRIC LIGHT AND POWER COMPANY

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C. W. SANDFORD
VICE PRESIDENT

August 15, 1972
IE-72-473

RECEIVED AUG 21 1972 U.S. ATOMIC ENERGY COMMISSION Regulatory Mail Section

Mr. Daniel R. Muller, Assistant
Director for Environmental Projects
Directorate of Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Re: Duane Arnold Energy Center, Docket 50-331
Subject: Source Term Data
Ref: Your letter of June 23, 1972
IE letter IE 72-387 dated July 12, 1972
File: A-104, A-116

Dear Mr. Muller:

Enclosed are forty-five (45) copies of our amended response, Basic Data for Source Term Calculation. This amendment is to correct errors in our original response of July 12, 1972 and to add some additional data. All of these changes have been discussed with Mr. George Parker of ORNL. One copy is being sent directly to Mr. Row.

Sincerely,

C. W. Sandford

C. W. Sandford
Vice President

KAM:CWS:bms

cc: Thomas H. Row, Deputy Director
Environmental Impact Report Project
Oak Ridge National Laboratory
Oak Ridge, Tenn. 37830

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BASIC DATA FOR SOURCE TERM CALCULATION

1. Operating power (Mwt) at which impact is to be analyzed.

   - 1658 Mwt -

   Received w/Ltr Dated 8-15-72

2. Weight of U loaded (first loading and equilibrium cycle).

   - First core ~152,000 lbs. U approximately the same total weight will be maintained through reloading cycles.

3. Isotopic ratio in fresh fuel (first loading and equilibrium cycle).

   - First core will contain 1.90% U-235. When equilibrium is reached, it is expected that reload fuel will contain 2.0% U-235 and 0.7% fissile Plutonium.

4. Expected offgas rate after 30 minutes delay.

   - The expected annual average offgas rate is 25,000 µCi/sec.

5. Escape rate coefficients used (or referenced).

   - The curie DF is 61 and the Kr + Xe offgas discharge is approximately 410 µCi/sec (See Table 2-9.5-1 of Amend. 2 to the FSAR for a detailed isotopic release rate).

6. Mass of primary coolant in system (lb).

   a. Mass of primary coolant in reactor; mass water, mass steam (lb).

   b. Mass of primary coolant in recirculating system (lb).

   c. Mass of coolant in condenser.

   d. Mass of coolant in feedwater pipe and heaters.

   - a. Water - 289,000 lbs.
     Steam - 9,460 lbs.

   - b. 29,649 lbs.

   - c. 853,000 lbs.

   - d. 365,800 lbs.

7. Steam conditions at turbine (temp °F, press. psi, flow lb/hr).

   - Temperature ~540° F
     Pressure ~965 psia
     Flow ~7,147,498 lbs/hr (max)

8. Normal recirculation flow rate (lb/hr).

- 20,500,000 lbs/hr

9. Normal cleanup system flow rate (lb/hr). What type of resins are used? What decontamination factors are expected for each principal nuclide?

- The cleanup system flow rate is 70,000 lbs/hr. The filter-demineralizer units are pressure precoat type filters using a resinous fiber (Solka-floc) and finely ground mixed ion exchange resins (Powdex) as a filter-ion exchange medium. The fiber to resin concentration can vary from 1 to 1 up to 5 to 1.

  Specific deconcamination factors are not available for particular isotopes. However, an average df of 10 is expected for particulate filtration and a df of 100 for ion demineralization.

10. What is the expected performance of the expanded gaseous radwaste system from the main condenser air ejector? Give the design air in leakage. Is the condenser ejecter one stage or two stages? Where is it discharged? How many condenser shells? (If applicable--Pounds of charcoal and operating temperature of)

- The expected performance of the expanded offgas system is described in question 9.3 of Amend. 1 to the DAEC FSAR; a portion of which is under separate cover as a proprietary information.

  The design air inleakage is 18.5 cfm @ 130° F. The condenser ejector is a two stage air ejector discharging to the offgas system. There are two condenser shells. The ejector discharge will pass through 37 tons of charcoal at 77° F.

11. What is the expected leak rate of primary coolant to the drywell? (lb/hr). How frequently is the drywell purged? What treatment is given to this purge?

- The expected leak rate of primary coolant to the drywell is 0.5 gpm steam and 0.5 gpm unidentified reactor water. The drywell is planned to be purged once a year; however, the impact has been analyzed using four purges per year. The purge is passed through HEPA and deep bed charcoal filters in the Standby Gas Treatment System.

12. What is the expected leak rate of primary coolant to the reactor building? What is the ventilation air flow through the reactor building? (CFM) Where is it discharged? Is the air filtered or otherwise treated before discharge? If so, provide expected performance.

- The expected leak rate of primary coolant to the reactor building is a 1.0 gpm reactor water leak. The ventilation air flow through the reactor building is 71,000 CFM. The air flow is discharged through three reactor building discharge stacks. The air is not filtered or otherwise treated before discharge; however, it is monitored.

13. What is the expected leak rate of steam to the turbine building? What is the ventilation air flow through the turbing building? (CFM) Where is it discharged? Is the air filtered or treated before discharge? If so, provide expected performance.

    - The expected leak rate of steam to the turbine building is 5.0 gpm. The ventilation air flow through the turbine building is 41,000 CFM in the winter and 112,000 CFM in the summer. The air is discharged through the reactor building stacks in the winter and through the reactor building stacks as well as through eight turbine building roof vents during the summer. The air is not filtered or treated before discharge; however, it is monitored for Radioiodine.

14. Describe the treatment of the exhaust stream from the turbine seal glands.

    a. What is the origin of the steam used in the gland seals? (i.e., Is it primary steam, condensate, or demineralized water from a separate source, etc.?)

    b. How is the effluent steam from the gland seals treated and disposed of?

    - a. Primary steam is the source of steam used in the gland seals.

    - b. Effluent steam from the gland seals is discharged to the gland steam condenser. The condensate drains to the main condenser and the non-condensibles are discharged to a short delay line and then to the 100 meter stack. Approximately 2 minute delay time exists between steam leaving the reactor vessel and subsequent release to the environment.

15. Provide average gallons/day and μCi/cc for the following categories of liquid waste. Use currently observed data in the industry where different from the SAR or Environmental Report (indicate which is used).

    a. High-level wastes (for example, "clean" or low conductivity waste and equipment drains);

b. "Dirty" wastes (for example, floor drain wastes, high-conductivity wastes, and laboratory wastes);

c. Chemical wastes;

d. Laundry, decontamination, and washdown wastes;

For these wastes (a-d), provide:

1. Number and capacity of collector tanks.

2. Fraction of water to be recycled or factors controlling decision.

3. Treatment steps - include number, capacity, and process D.F. for each principal nuclide for each step. If step is optional, state factors controlling decision.

4. Decay time from primary loop to discharge.

5. How is waste concentrate (filter cake, demineralizer resin, evaporator bottoms) handled? Give total volume or weight and curies per day or year.

Waste		Liquid Discharges Gal/day	μCi/cc
a.	Equipment Drains	0	-
b.	Floor drains	2,040	8×10^{-6}
c.	Chemical wastes	500	4×10^{-5}
d.	Detergent waste	300	1×10^{-5}

a. Equipment Drains

1. Waste Collector Tank (1) — 10,000 gal.
   Waste Surge Tank (1) — 40,000 gal.

2. 100% to be recycled

3. Filtration and demineralization. The overall df for the filter and demineralizer is approximately 100. The df for individual radionuclides is unknown. The df will vary in actual operation since it is a function of inlet concentration of the soluble and insoluble species present.

4. Not applicable.

5. Waste concentrate is centrifuged and drummed. The estimated weight and volume are 63,000 pounds per year and 2,200 cubic feet per year respectively for all sludges and resins for the plant excluding evaporator bottoms. The total isotopic inventory of these solids is expected to be about 1,000 curies per year.

b. Floor Drains

1. Floor drain collector tank (1) 10,000 gal.

2. 70% recycled. The impact of discharges has been made assuming 30% floor drain, 100% chamical waste and 100% detergent drains discharged.

3. Filtration and demineralizations. The overall df for the filter and demineralizer is approximately 100. The df for individual radionuclides is unknown. The df will vary in actual operation since it is a function of inlet concentration of the soluble and insoluble species present.

4. 12 hours

5. Waste concentrate is centrifuged and drummed. The estimated weight and volume are 63,000 pounds per year and 2,200 cubic feet per year respectively for all sludges and resins for the plant excluding evaporator bottoms. The total isotopic inventory of these solids is expected to be about 1,000 curies per year.

c. Chemical Wastes

1. Chemical waste tank (1) 4,000 gal.

2. None recycled. The impact of discharges has been made assuming 30% floor drain, 100% chemical waste and 100% detergent drains discharged.

3. All chemical wastes will be neutralized, filtered and evaporated. Exact df for each principal nuclide is not known; the overall df for the evaporator is expected to be about 10^4.

4. 12 hours

5. The waste concentrate in the evaporator bottoms is solidified and drummed in 55 gallon drums. The specific method has not yet been determined.

d. Detergent Wastes

1. Detergent drain tanks (2) 1,000 gal. each

2. None recycled. The impact of discharges has been made assuming 30% floor drain, 100% chemical waste and 100% detergent drains discharged.

3. Detergent wastes will be treated in the same manner as chemical wastes to the maximum extent practicable, taking into account the tendency of these wastes to adversely affect evaporator performance.

4. 12 hours

5. Same as chemical wastes above.

16. For the condensate demineralizers, provide the flow rate lb/hr, type of resin used, expected backwash and regeneration frequency, and expected df for each principal nuclide.

- Flow rate	3,625 gpm
- Type of resin	Powdex and Solka Floc
- Expected backwash frequency -	one backwash per 4 days (ave) four backwashes per day (max)
- Regeneration frequency	no regeneration
- Expected df for each nuclide	Specific decontamination factors are not available for particular isotopes. However, an average df of 10 is expected for particulate filtration and a df of 100 for ion demineralization.

17. Dilution flow rate for liquid effluents, normal gpm and total gallons per year.

- 6,000 gpm to 24,000 gpm as necessary
  $3.16X10^9$ gal/yr to $1.26X10^{10}$ gal/yr as necessary