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Iowa Electric Light & Power Company Cedar Rapids, Iowa C. W. Sandford	7-12-72	7-14-72	X			

TO:	ORIG	CC	OTHER	SENT AEC PDR	SENT LOCAL PDR
Mr. Muller	1			X	X

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

DESCRIPTION:
Ltr re our 6-23-72 ltr, & trans the following:

ENCLOSURES:
Basic Data for Source Term Calculation for Duane Arnold Energy Center.

PLANT NAMES: Duane Arnold Energy Center

(45 cys rec'd),

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ACKNOWLEDGED

FOR ACTION/INFORMATION 7-14-72 AB

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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office

CEDAR RAPIDS, IOWA

July 12, 1972

IE-72-387

C. W. SANDFORD
VICE PRESIDENT

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
File: A-104, A-116

Dear Mr. Muller:

Enclosed are forty five (45) copies of our response, Basic Data for Source Term Calculation, as requested in your letter of June 23, 1972. One copy is also being sent directly to Mr. Row.

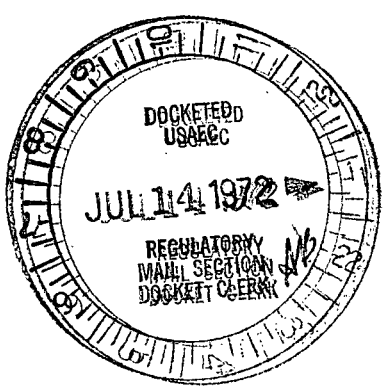
Sincerely,

C. W. Sandford

C. W. Sandford
Vice President

KAM:CWS:wr

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 -

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).

      - a. Water - 93,580 lbs.
           Steam - 9,460 lbs.

      - b. 29,649 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 180,000 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 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.

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 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 69,500 CFM. There is an additional 3,000 CFM due to infiltration. 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 turbine 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 37,500 CFM in the winter and 109,500 CFM in the summer. There is an additional 3,500 CFM due to infiltration. 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.

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 stream 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	$8X10^{-6}$
c. Chemical wastes	500	$4X10^{-5}$
d. Detergent waste	300	$1X10^{-5}$

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% chemical 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) 10,000 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
- 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
  3.16×10^{9} gal/yr to 1.26×10^{10} gal/yr as necessary