



**Commonwealth Edison**

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January 8, 1988

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Subject: Byron Station Units 1 and 2  
Braidwood Station Units 1 and 2  
Application for Amendment to Facility  
Operating Licenses NPF-37, 66, 72 and 75,  
Appendix A, Technical Specifications  
NRC Docket Nos. 50-454/455 and 50-456/457

References (a): February 18, 1987 letter from K.A. Ainger  
to H.R. Denton

(b): November 17, 1987 letter from K.A. Ainger  
to U.S. NRC

Gentlemen:

Reference (a) transmitted and application for an amendment to the operating licenses for Byron Station Units 1 and 2. The amendment incorporates operability, surveillance, and sampling requirements into the technical specifications for two additional radioactive liquid effluent monitoring instruments. These instruments will assure the release limits of 10 CFR Part 20 are not exceeded when discharging fluids from the condensate cleanup system sump and the turbine building fire and oil sump to the circulating water system. Reference (b) modified the amendment request to include a composite sample of sump effluent prior to discharge into the circulating water system. Reference (b) also indicated this amendment request applies to Braidwood Station.

Based on a December 9, 1987 conference call with the NRC staff to discuss the revised amendment request, Commonwealth Edison agreed to provide a simplified one-line drawing showing how the fire and oil sump discharge and the condensate polisher discharge interface with the cooling water flume (lake for Braidwood), circulating water blowdown and liquid release tank. This is provided in the attached drawing. Also provided is a drawing showing the condensate polishing system with respect to the secondary system of the plant.

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As noted on the drawing, the condensate polishers can process between 20 and 30% of the secondary side flow at full power. The condensate polishers are operated as necessary to maintain steam generator chemistry requirements. Steam generator blowdown is processed separately. It is sent through a steam generator demineralizer back to the condenser hotwell.

Both the fire and oil sump and the condensate polisher sump will discharge into the 62 million gallon volume of the flume. At Braidwood, the body of water is the lake, which has a volume of approximately 8 billion gallons. The circulating water pumps (not shown) take suction from the flume and discharge to the condenser which flows to the cooling tower which has a water basin adjoining the flume. At the discharge of the circulating water pumps, prior to the condenser, the station blowdown line diverts a portion of the water for discharge offsite to the river. There is a radiation monitor and composite sampler on the station blowdown line. If the radioactivity limits exceed the radiation monitor setpoint, discharge of radioactive effluent through the station blowdown lines will be terminated. The liquid release tank discharges into the station blowdown line upstream of the blowdown line radiation monitor. There is also a separate radiation monitor on the liquid release tank discharge.

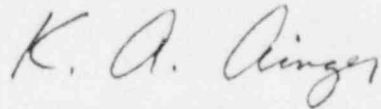
The proposed technical specification amendment incorporates two radiation monitors and composite samplers to monitor discharge from the turbine building fire and oil sump and the condensate polisher (CP) sump. The condensate polisher sump discharges directly into the flume (lake for Braidwood). A radiation monitor and composite sampler are located on the discharge of the CP sump. The fire and oil sump discharges to the flume (lake for Braidwood) via the treated waste system. The radiation monitor is located on the fire and oil sump discharge to the treated waste system. The composite sampler is located on the treated waste system discharge to the flume (lake for Braidwood). The fire and oil sump discharges approximately 40,000 gallons per day at a rate of 25 to 30 gallons per minute. The condensate polisher sump discharges approximately 100,000 gallons of water per condensate polisher bed regeneration. The Station estimates that typically two regenerations will be performed per week. The maximum discharge rate is 600 gallons per minute. If radioactivity levels exceeded their setpoints, the discharge into the flume (lake) from the fire and oil sump or the condensate polisher sump would be terminated.

Finally, a sample annual Appendix I calculation was performed assuming the discharge is continuous at the radiation monitor setpoint and the amount discharged is in accordance with the discharge rates presented above. It was determined that the addition of these release paths will not have a measurable effect on the dose to the public. This calculation was conservative because the activity of the discharge was assumed to be right at the setpoint of the radiation monitor, when in actuality, the expected release will be considerably lower. Details of the calculations are provided in Attachment 1.

January 8, 1988

Please direct any further questions regarding this matter to this office.

Very truly yours,



K. A. Ainger  
Nuclear Licensing Administrator

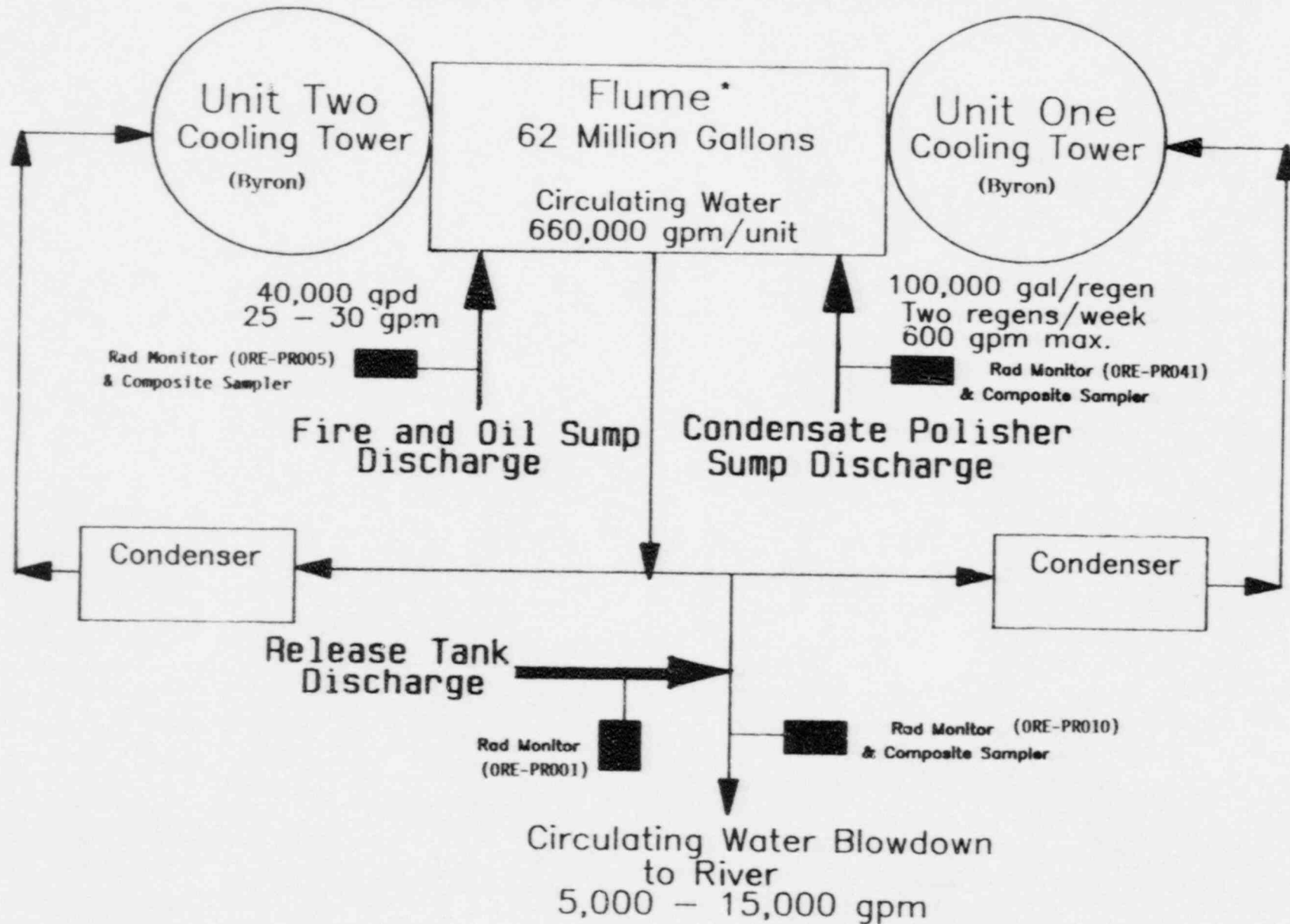
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Attachments

cc: Byron Resident Inspector  
Braidwood Resident Inspector  
L. N. Olshan - NRR  
M. C. Parker - IDNS

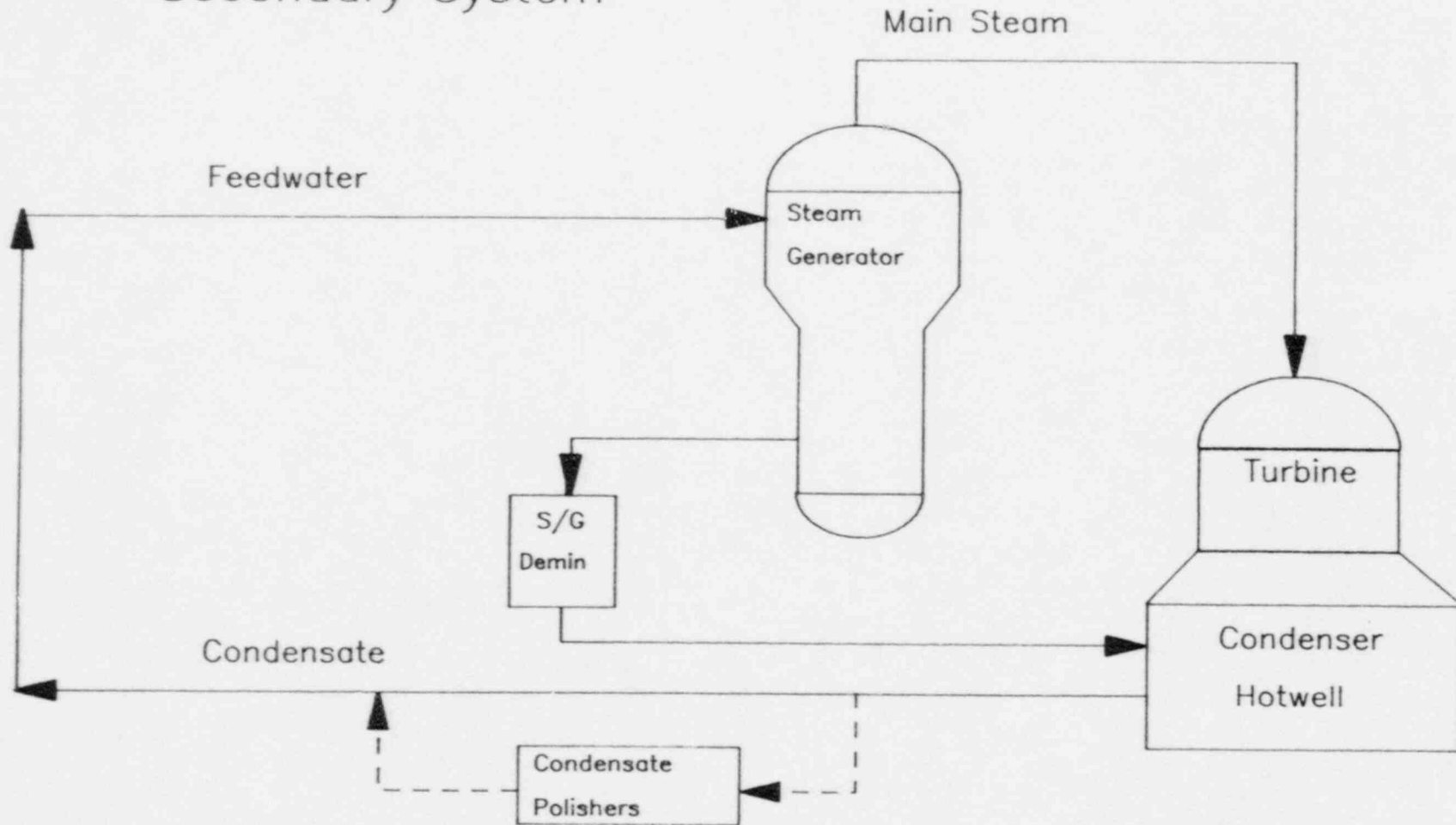
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# Commonwealth Edison B/B Nuclear Power Stations



\* Lake at Braidwood with approximate volume of 8 billion gallons

# Commonwealth Edison B/B Nuclear Power Stations Secondary System



Side Stream Condensate Polishing

20% - 30% of Feedwater Flow at Full Power

Operated As Steam Generator Chemistry Requires

ATTACHMENT 1

The following is a sample, annual Appendix I calculation to determine the impact of discharges from the fire and oil sump and condensate polisher sump on the Station's current Appendix I calculation. The assumptions used to perform the calculations are listed below.

The isotopic mix was determined from actual data from Byron Station for 3rd quarter, 1987. This is the most representative because both units were operational during this time period. The relative percentages are believed to be representative of two unit operation for the life of the plant. The isotopic mix is as follows:

Co-58	37%	Co-60	24%	Cs-137	8%
I-131	11%	Fe-59	2%	Mn-54	4%
Cr-51	8%	Nb-95	4%	Zr-95	2%
H-3 = (1.95E3) (total particulate uCi)					
See the later discussion for details on H-3 calculation.					

#1 = Calculation for the CP Regen Waste Water

Assumptions

- a. Monitor setpoint is 1.0E-6 uCi/ml
- b. 2 Regens per week
- c. Will process 100,000 gallons per regen

Therefore:

$$\frac{1.0E-6 \text{ uCi}}{\text{ml}} \times \frac{2 \text{ regen}}{\text{week}} \times \frac{100,000 \text{ gal}}{\text{regen}} \times \frac{52 \text{ weeks}}{\text{year}} \times \frac{3785 \text{ ml}}{\text{gal}}$$

$$= 3.94E4 \text{ uCi/year maximum}$$

Using the isotopic mix above, the following data is used to perform Appendix I calculations:

Co-58	1.46E4	uCi	Co-60	9.45E3	uCi
Cs-137	3.15E3	uCi	I-131	4.33E3	uCi
Fe-59	7.87E2	uCi	Mn-54	1.57E3	uCi
Cr-51	3.15E3	uCi	Nb-95	1.57E3	uCi
Zr-95	7.87E2	uCi	H-3	7.68E7	uCi

The ODCM Appendix I calculations yield the following results:

WHOLE BODY DOSE	=	2.33E-3	MREM
ORGAN DOSE	=	5.16E-3	MREM

Eased on these results, this release path will have no measurable effect on the dose to the public.

## #2 Calculations for the fire and oil sump monitor and the TR System.

- Assumptions: a. Monitor setpoint is  $1.0E-6$  uCi/ml  
 b. TR processes 40,000 gal/day

Therefore:

$$\frac{1.0E-6 \text{ uCi}}{\text{ml}} \times \frac{40,000 \text{ gal}}{\text{day}} \times \frac{365 \text{ day}}{\text{year}} \times \frac{3785 \text{ ml}}{\text{gal}}$$

$$= 5.53E4 \text{ uCi/year maximum}$$

Using the isotopic mix above, the following data is used to perform Appendix I calculations:

Co-58	2.04E4	uCi	Co-60	1.33E4	uCi
Cs-137	4.42E3	uCi	I-131	6.08E3	uCi
Fe-59	1.11E3	uCi	Mn-54	2.21E3	uCi
Cr-51	4.42E3	uCi	Nb-95	2.21E3	uCi
Zr-95	1.11E3	uCi	H-3	1.08E8	uCi

The ODCM Appendix I calculations yield the following results:

$$\begin{aligned} \text{WHOLE BODY DOSE} &= 3.28E-3 \text{ MREM} \\ \text{ORGAN DOSE} &= 7.25E-3 \text{ MREM} \end{aligned}$$

Based on these results, this release path will have no measurable effect on the dose to the public.

As a source of comparison, in 1986 with Unit 1 operational, Byron Station dose to the public was

$$\begin{aligned} 1986 \text{ WHOLE BODY DOSE} &= 0.498 \text{ mrem} \\ 1986 \text{ ORGAN DOSE} &= 0.689 \text{ mrem} \end{aligned}$$

Tritium cannot be detected by the radiation monitors so the calculations performed using the radiation monitor setpoint are not applicable to tritium. The tritium associated with each release path was calculated by applying the ratio of tritium to fission and activation products released in the 3rd quarter of 1987. The proper ratio was determined to be 1950 x fission and activation products.

After the proposed Technical Specification Amendment is approved, the actual contributions to the Appendix I calculations from the fire and oil sump and the condensate polisher sump will be included on an annual basis.