

10CFR50.75(g)(1) Documentation on Circulating Water Blowdown
Line Vacuum Breaker Leak discovered on 11/6/2000

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I. Summary

On 11/6/2000, Circulating Water Blowdown Vacuum Breaker, 0CW136, was discovered leaking following a report from a local resident of water in a ditch adjacent to his property. The local resident reported that the water had been present in the ditch for approximately 7-10 days. Since multiple radwaste discharges had been made into the circulating water blowdown while the valve was leaking, radioactive contaminated water was discharged to the site property and to a ditch along Smilie Road, immediately adjacent to site property. Following discovery of the leak, initial soil and water samples were obtained in the vicinity of the leak to determine the extent of contamination, and these samples indicated the presence of low levels of radioactivity. A sampling plan and soil sampling grid was then established to determine the extent of contamination and potential dose associated with the contamination. Soil sampling indicated a total contaminated area of approximately 1600 m², assumed present to a depth of 6 inches. The dose assessment from the contamination indicated that the total dose for the first year is 1.376 mrem, mainly from direct radiation from radioactivity in the soil. Total dose from pathways other than direct radiation resulting in a maximum dose of less than 0.019 mrem in the first year.

II. Event Description and Location

Refer to Attachment II of this report.

III. Radiological Information

Refer to Attachment III of this report.

IV. Dose Analysis

Refer to Attachment IV of this report.

V. References

Refer to Attachment V of this report.

Attachment V

References

References:

1. NSP-RP-6101, Revision 0, "10CFR50.75(g)(1) Documentation Requirements"
2. OP-AA-101-501, Revision 0, "NGG Significant Event Reporting"
3. OP-AA-101-503, Revision 0, "NGG Issues Management"
4. 10CFR20, Standards for Protection Against Radiation
5. Root Cause Analysis titled "Circ Water Blowdown Line Vacuum Breaker failure due to low stress, high cycle fatigue, resulting in flooding of Owner Controlled property and discharge outside of NPDES approved path."
6. Dose Assessment performed by Millennium Services, Inc. titled "Braidwood Nuclear Station Discharge Pipe Vacuum Breaker Leak Dose Assessment"

Calculation of Activity Released for the Blowdown Line Leak

Timeframe estimated for the blowdown line leak: October 27 through November 7, 2000.

The Liquid Release Tank Release Forms were utilized to determine the diluted concentration in the blowdown line during the actual periods of each release from release tanks 0WX01T and 0WX26T. The formula used to calculate the diluted uCi/ml is as follows:

$$\text{diluted uCi/ml} = \frac{\text{undiluted uCi/ml} \times \text{maximum release rate}}{\text{maximum release rate} \times \text{blowdown rate}}$$

where:

undiluted uCi/ml is the analyzed tank activity (uCi/ml)

maximum release rate is the actual maximum release rate (gpm) as recorded in BwOP WX-526T1 or BwOP WX-501T1, step G.16

blowdown rate is the actual circulating water blowdown rate (gpm) for the release as recorded in BwOP WX-526T1 or BwOP WX-501T1, step G.15.d.

Once the diluted uCi/ml is determined during the periods of release, then information from the blowdown line leak is utilized to calculate the activity released from the leak. The formula used to calculate the activity is as follows:

$$\text{Activity (uCi)} = \text{diluted uCi/ml} \times \text{leakrate} \times \text{conversion factor} \times \text{release time}$$

where:

diluted uCi/ml is the concentration of the activity from the release tank after dilution from circulating water blowdown

leakrate is the rate of leakage from the blowdown line leak (360 gpm)

conversion factor is 3785 ml per gallon

release time is the actual duration of release (minutes)

Soil Sampling Isotopic Results

| <u>Grid</u> | <u>Isotope</u> | <u>Result (uCi/g)</u> |
|-------------|----------------|-----------------------|
| 3 | Co-58 | 2.5E-07 |
| | Co-60 | 2.3E-07 |
| | Te-123m | 1.2E-07 |
| 4 | Co-58 | 9.8E-08 |
| | Te-123m | 1.2E-07 |
| 6 | Mn-54 | 9.9E-08 |
| | Co-58 | 3.3E-07 |
| | Co-60 | 1.9E-07 |
| | Te-123m | 3.7E-07 |
| 12 | Co-58 | 7.6E-08 |
| 13 | Co-60 | 6.0E-08 |
| 15 | Te-123m | 2.8E-08 |
| 16 | Co-58 | 5.3E-08 |
| 18 | Co-58 | 1.0E-07 |
| | Te-123m | 5.5E-08 |
| 20 | Co-58 | 4.9E-08 |
| 30 | Co-58 | 5.0E-08 |
| 35 | Mn-54 | 1.4E-07 |
| | Co-58 | 8.9E-07 |
| | Co-60 | 2.2E-07 |
| | Te-123m | 8.1E-07 |
| 62 | Co-58 | 1.0E-07 |
| 63 | Co-58 | 9.5E-08 |