



Regulatory

File Cy.

Commonwealth Edison Company

ONE FIRST NATIONAL PLAZA ★ CHICAGO, ILLINOIS

Address Reply to:

POST OFFICE BOX 767 ★ CHICAGO, ILLINOIS 60690

OPW Ltr. #268-73

Dresden Nuclear Power Station
R. R. #1

Morris, Illinois 60450
April 5, 1973

50-237

Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

SUBJECT: LICENSE DPR-19, DRESDEN NUCLEAR POWER STATION, UNIT #2,
SECTION 6.6.B.3 OF THE TECHNICAL SPECIFICATIONS.

Dear Mr. Giambusso:

This is to report a condition relating to the operation of the unit in which, on March 27, 1973, an explosion took place in a temporary filter which was being used to purge the Unit #2 off-gas piping.

PROBLEM AND INVESTIGATION

At 5:45 p.m. on March 27, 1973, an explosion took place in a temporary filter which was being used to purge the Unit 2 off-gas piping. At the time, both Units 2 & 3 were shutdown.

The events leading up to the explosion were as follows: The off-gas line required purging prior to making a cut in the piping for off-gas modification tie-ins. At the time of the purging, the 2/3 Turbine Building ventilation system was out-of-service for modifications. Purging consisted of drawing air into the off-gas line via the open off-gas filter housing, backward through the off-gas line, through the rupture disc which had been removed into a temporary duct work and filter arrangement, into the suction of the gland steam exhauster in "B" Steam Jet Air Ejector (SJAЕ) room and then up the chimney. The off-gas filter through which purge air was being taken was a slightly contaminated filter, i.e., it had not been used during recent operation. Valve lineups were completed and the purge was initiated in accordance with approved procedures at about 4:45 p.m. on March 27, 1973. The gland steam exhauster was shut down about 2 minutes later when it was noted that the duct work around the temporary filter,



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which was located outside the SJAЕ room, had partially deformed. Cause of the deformation was determined to be the result of reduced pressure within the system being purged. The reduced pressure resulted from restriction of the air flow path by a partially throttled off-gas filter isolation valve. The duct work was inspected, and repairs were initiated.

While these repairs were in progress, at about 5:45 p.m., an explosion occurred. At the time of the explosion, a welder, working under an approved permit and procedures on an unrelated job, was welding on a pipe located approximately 8 feet above the filter housing. Apparently, leakage of hydrogen from the filter housing rose up to the area of the welder and the arc from his welding rod ignited the hydrogen, initiating the explosion. Following the explosion, both ends of the purging system were verified to be isolated from the existing plant equipment, i.e., the condenser. At the off-gas filter, the valves were also secured.

As a result of the explosion, 2 contractors received minor injuries, none of which involved any radioactive contamination.

The two areas of potential contamination were the areas outside the "B" SJAЕ room where the temporary filter was located and the area of the off-gas filter outside the building near the base of the 2/3 vent chimney.

Following the explosion, the areas of potential contamination or airborne activity were promptly roped off and air samples were collected. The maximum airborne radioactivity recorded approximately 50 minutes after the incident was 4.9×10^{-8} uCi/cc. This sample was taken at the job site near the SJAЕ compartment. All other air samples collected in the Turbine Building at this time ranged from 1.9×10^{-9} uCi/cc to 6.6×10^{-10} uCi/cc. Results of a subsequent air sample collected on the main turbine floor 4 hours after the event were 2.2×10^{-10} uCi/cc.

The area at the base of the ventilation chimney was covered with plastic sheeting to prevent loss of the potentially contaminated filter media which was found to be distributed over a limited area immediately adjacent to the off-gas filter housing. Although complicated by background activity from the above-ground Radwaste storage tanks in the area, surveys indicated that all detectable contamination was localized and only low radiation levels (GM range) were observed. Surveys of the on-site area downwind and remote from the filter vault were conducted and no contamination was found. As a precautionary measure, urine analysis of all personnel identified as being in the area have been collected and sent to a contractor for analysis.

Although no significant release of radioactivity to the environs was believed to have occurred, as a precautionary measure, an off-site sampling program was initiated. Samples of particulate activity and vegetation were collected by the contractor, both upwind and downwind. Direct radiation measurements were also taken.

Based on the information available, an analysis of the radioactivity release was calculated and a summary of the results presented below:

1. No ionization chamber readings above background were detected in the upwind and downwind sectors subsequent to the event.
2. A total of 1.76 curies of Xe-133 was calculated to have been released. A fraction of this radioactivity was released from the ground level filter vault (puff release) and a fraction from the 300' chimney (elevated release). Since the fraction released via each pathway is not known, cloud dose calculations (mrem) were determined for a total release from the chimney for a one-hour period and for a three-hour period. A third calculation determined the cloud dose for a one second, ground level, puff release. The actual site boundary dose (804 meters) would be within this range of data. The following table summarizes these calculations at various off-site distances where the maximum dose could have occurred:

<u>Range</u> (meters)	<u>Cloud Dose</u> (mrem)		
	<u>Model</u>		
	<u>Elevated</u> ¹	<u>Ground-Puff</u> ²	<u>Ground-Puff</u> ³
3-hr	1-hr		
804		7.0×10^{-5}	5.7×10^{-2}
1609	7.7×10^{-5}		
12,000		8.1×10^{-5}	

- 1) Equation 7.43-Meteorology and Atomic Energy, p.343 (Gamma Dose)
- 2) Equation 8.10-Meteorology and Atomic Energy, p.382 (Gamma Dose)
- 3) 10CFR20 MPC Xe-133

From the above, the maximum calculated off-site cloud dose from this event ranged from approximately 1/35 to 1/25,000 of that permitted by 10CFR20.105(b)(1) for a one hour period and 1/1,300,000 of that permitted by 10CFR20.105(b)(2) for a seven day period.

- 3) Measured average beta-gamma airborne radioactivity concentrations upwind and downwind of the station were not statistically different, i.e., $2.2 \times 10^{-2} \text{ pCi/m}^3 \pm 0.9 \times 10^{-2} \text{ pCi/m}^3$ for the upwind stations, $3.0 \times 10^{-2} \text{ pCi/m}^3 \pm 0.6 \times 10^{-2} \text{ pCi/m}^3$ for the downwind stations, and a difference of $0.8 \times 10^{-2} \text{ pCi/m}^3 \pm 1.1 \times 10^{-2} \text{ pCi/m}^3$. If this difference were significant, it would represent 1/1,250 of that continuously permitted by 10CFR20, Appendix B ($1.0 \times 10^{-11} \text{ uCi/ml}$) for unrestricted areas.

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CORRECTIVE ACTION

An inspection of the plant equipment subject to damage by the explosion was conducted and damage was found to be limited to the temporary filter and housing. Included in the inspection were the off-gas line flow measuring orifice, off-gas filter housing, and the gland steam exhauster. The off-gas line flow instrumentation was also recalibrated.

Both off-gas filters were replaced and a filter efficiency test conducted. Both tests indicated the filter efficiency to be greater than 99%.

In order to prevent a similar recurrence, all subsequent off-gas line purging was conducted with the area roped off as an exclusion area. Thus no work groups other than those assigned to the purging job were allowed in the area surrounding the purge lines.

Sincerely,

Fred J. Morris

W. P. Worden

Superintendent

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cc: WPW Ltr. File

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