Date: 3/1/83

RELATED CORRESPONDENCE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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| In The Matter of | ) | |
| | ) | |
| | ) | |
| COMMONWEALTH EDISON COMPANY | ) | Docket Nos. 50-454 OL |
| | ) | 50-455 OL |
| | ) | |
| (Byron Nuclear Power Station, Units 1 & 2) | ) | |



SUMMARY OF TESTIMONY OF
GERALD P. LAHTI REGARDING
CONSOLIDATED CONTENTIONS 39 AND 109

Mr. Lahti is an engineer, employed by Sargent & Lundy, the Byron Station Architect-Engineer. He is Assistant Division Head of the Nuclear Safeguards and Licensing Division in charge of shielding and radiological safety. His testimony addresses the radiological impacts associated with assumed releases to the groundwater of radioactive contaminants.

Mr. Lahti first discusses the design basis event analyzed in the Byron FSAR which pertains to groundwater releases. Based on the travel times for transport of radionuclides through the groundwater Mr. Lahti concludes that the radiological consequences associated with the design basis event would not exceed the limits extablished by 10 CFR Part 20. (Mr. Holish's testimony addresses the assumptions and calculations regarding travel time of contaminants through the groundwater.) Mr. Lahti also discusses the

DS03

consequences of releases to the groundwater associated with a core melt scenario. Although a detailed assessment and analysis of core melt events has not been performed for Byron, Mr. Lahti concludes that because of the travel times of contaminants through the ground water, measures to mitigate radiological consequences could be taken.

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## TESTIMONY OF GERALD P. LAHTI REGARDING CONSOLIDATED CONTENTIONS 39 AND 109

Q1: State your name and present occupation.

A1: My name is Gerald P. Lahti. I am Assistant Division Head of the Nuclear Safeguards and Licensing Division in charge of Shielding and Radiological Safety at Sargent & Lundy in Chicago, Illinois.

Q2: Briefly state your educational and professional qualifications.

A2: I received a BSCE in Civil Engineering from Wayne State University in 1959. I received a MSE (Nuclear Engineering) from the University of Michigan in 1960, and completed additional part time course work in Mechanical and Nuclear Engineering at the University of Delaware, Case Western Reserve University, and the University of Toledo. From 1960 to 1963 I was employed by E. I. duPont deNemours & Co., Inc., and mathematically analyzed and designed

polymer transfer systems and extrusion dies. From 1963 to 1973 I was a member of the National Aeronautics and Space Administration (NASA) staff at Lewis Research Center, Cleveland, Ohio. There, I evaluated radiation hazards and designed radiation shields for nuclear reactors considered for power or propulsion systems in space vehicles. In 1968 I assumed supervisory responsibilities in this area. In 1973 I joined Sargent & Lundy and have been employed in the Shielding and Radiological Safety Section continuously since that time. The Shielding and Radiological Safety Section, which is under my supervision, designs and evaluates all radiation shielding and other radiation protection features incorporated in nuclear power plant design. I am also responsible for assessing the radiological impact of radionuclides released during normal and abnormal power plant operations. I am a Registered Professional Engineer in the State of Illinois and a member of the American Nuclear Society and Health Physics Society. I am a past Chairman of the ANS's Radiation Protection and Shielding Division.

Q3: What is the scope of your testimony?

A3: My testimony addresses the possible consequences of accidental releases of radionuclides to the ground water at the Byron Station.

Q4: What have been your duties and responsibilities with respect to consideration of the possible consequences of releases of radioactivity to the ground water.

A4: I prepared the radiological portion of the Byron FSAR, Section 2.4.13.3, which addresses the design basis event groundwater contamination scenario. (A copy of § 2.4.13.3 is attached as Exhibit 1).

Q5: What accident scenarios have you considered regarding the manner in which radioactivity is released to the groundwater.

A5: I have considered two accident scenarios. The first is the design basis event scenario referred to in my previous answer which was postulated to demonstrate the suitability of the site. It involves postulating the rupture of one of the 125,000 gallon boron recycle holdup (BRH) tanks located in the auxillary building and subsequent release of radioactivity into the ground water. The second involves postulating a core melt scenario.

Q6: Please describe the BRH tank rupture scenario.

A6: As stated earlier, the BRH tank has a 125,000 gallon capacity. The postulated accident assumes that the tank ruptures and that its contents travel to the lowest level of the auxillary building and then drips onto the foundation rock through a .1 inch wide crack assumed to have developed along the entire width of the building. The tank is assumed to contain radioactivity in a water solution in concentrations which are given in Table 2.4-20 of the Byron FSAR. (Table 2.4-20 is attached as Exhibit 2).

The leak rate of the BRH tank fluid through the crack in the auxillary building floor is $2.35 \times 10^{-9}$ cfs

per foot of crack. The contaminated stream is then assumed to drip onto the foundation rock into the groundwater resulting in dilution of the radioactivity concentration by a factor of 13702.

The contaminated groundwater, driven by the hydraulic gradient, is first assumed to travel through the relatively impermeable grouted rock mass underlying the plant, then through ungrouted rock. For reasons of conservatism, no further dilution of the groundwater stream in either a transverse direction or in the direction of flow is assumed. Further, no removal of contaminants either by adsorbtion (physical trapping) or absorbtion (chemical ion exchange) is assumed to occur during this time.

The calculated travel time of the contaminated flow from the point of release to the nearest offsite down gradient well is estimated to be 18.85 years. I believe Mr. Holish, also of Sargent and Lundy, addresses the details of this estimate in his testimony.

Q7: Have you determined the radiological consequences which result from this postulated accident?

A7: Yes. Obviously the principal concern associated with the accident scenario I have just described relates to possible consumption of contaminated water by the public. Since it would take approximately 18 years for contaminated water to reach the nearest well, the vast majority of the nuclides released by the postulated accident

would decay to negligible levels. The nuclides with longer half-lives which would not have decayed to such levels are Cs-134, Cs-137 and H-3. However, because of the dilution of the BRH tank fluid in the groundwater, the concentrations of these nuclides would be well within the 10 CFR Part 20 limits of allowed concentrations of radionuclides in water in unrestricted areas. Thus, the consequences of this postulated accident would not represent a public threat.

Q8: How dependent is your conclusion regarding radiological consequences of this accident on the estimated travel time of contaminated water to the nearest well?

A8: My conclusion is not sensitive to even major changes in travel time. Any travel times in excess of 5 years would lead me to the conclusion stated above.

Q9: Have you considered the consequences of releases of radioactivity into the groundwater resulting from a core melt event?

A9: Yes, in a general sense, I have. This issue has not received my detailed consideration due to the extreme unlikelihood of such an event occurring. I believe Mr. Klopp, of Commonwealth Edison Company, will address the question of the improbability of such an event with respect to consolidated Contentions 39 and 109.

First, in terms of ground water impacts, it must be remembered that we believe that the majority of the radioactive materials released as a result of a postulated

core melt would likely be released to the containment atmosphere or be plated out on cooler surfaces. The remainder of the fission products would remain in a slag-like material mix of uranium, structural metals and concrete. Assuming this mass melted through the concrete base mat its heat would likely flash any encountered ground water to steam, providing little source to the groundwater. Later, when sufficiently cool, the ground water could slowly leach fission products from the remaining mass.

It is possible that the depth of the mass would be below the water flow gradient causirj the predominant flow of water towards the mass. If this did not occur, I would expect the water to flow as described earlier in this testimony with respect to the BRH tank rupture postulated event.

Under these circumstances, and given the travel times involved, it would be possible to take measures to interdict the groundwater flow, by pumping to control groundwater gradients or grouting, so as to mitigate radiological consequences.