

DMB

UNION ELECTRIC COMPANY

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ST. LOUIS, MISSOURI
March 28, 1984

DONALD F. SCHNELL
VICE PRESIDENT

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Mr. James G. Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

ULNRC-782

FINAL 10CFR50.55(e) REPORT U-71
INDUCTION OF EXHAUST GASES INTO CONTROL ROOM
CALLAWAY PLANT

On February 24, 1984 Union Electric informed the NRC Region III office of a potential significant deficiency under 10CFR50.55(e) regarding the induction of auxiliary boiler exhaust gases into the Callaway Plant Control Room. This deficiency was reported as a significant deficiency on March 2, 1984. Subsequently, on March 22, 1984, Messrs. Pelke and Choules of the NRC were contacted and it was agreed that a final report would be transmitted to the NRC on or before March 30, 1984.

The event occurred on December 30, 1983 when exhaust gases from the plant auxiliary boiler stack apparently entered the control building air intake as a result of a temperature inversion or a downdraft condition. As a point of reference, the control building air intake penthouse is located approximately 70 feet below and 90 feet southeast of the stack. Control room operators noticed the smell of exhaust fumes for approximately thirty minutes to an hour. During the event, our constructor's safety personnel analyzed the control room atmosphere and determined that the oxygen level was adequate, and there were no measurable combustible gases present. The ventilation system was then switched to the recirculation mode to alleviate the condition. Subsequently, one individual indicated he was nauseated and could not complete his work shift. This individual left the control room and subsequently recovered without seeking medical assistance. Another individual indicated that he was "light headed" but he did not become ill. A third person in the control room revealed that the odor was unpleasant but it did not cause him to become ill. Other personnel were in the control room at the time, and they experienced little discomfort.

From the information available regarding the event, it is indeterminate which combustion gases or concentrations of gases affected the operators. The operator who became ill

exhibited symptoms similar to that of carbon monoxide and carbon dioxide exposure. Carbon monoxide is the predominant cause of illness from the inhalation of exhaust fumes due to its interference with the transfer of oxygen to the blood. Carbon dioxide has the same effect, but to a much lesser degree. Exposure to these gases is difficult for humans to detect because the gases are colorless and odorless.

Other predominant gases in the exhaust fumes, such as unburned hydrocarbons and sulfur dioxide, produce a characteristic malodor that indicates their presence. These gases can produce the same discomforting effect on an individual; however, the symptoms may be caused by either a physiological reaction or by a psychological response to a disagreeable, but benign odor. For example, the pungent smell of sulfur dioxide produces a repugnant response from most individuals at a concentration well below that which is considered harmful. It is not known what stimulus caused the reaction in some of the individuals in the control room as they recovered shortly thereafter without requiring medical attention. Regardless, fumes were detected by the occupants of the control room and it did prompt them to take necessary corrective action.

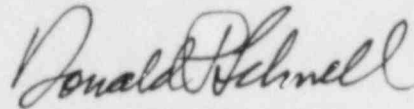
Regulatory Guide 1.78 addresses the use of human detection as a mechanism for identifying hazardous chemical buildup although we recognize this means is not appropriate for carbon dioxide and carbon monoxide. Therefore, redundant non-IE monitors for these gases are being installed in the control building air intake duct to alarm operators if unacceptable levels of these gases, as defined by OSHA, are reached.

Our A/E, Bechtel Power Corporation considered the location of the control building air intake duct relative to the auxiliary boiler and diesel generator exhaust stacks in their original design. Based on engineering judgement, they determined that the system design would meet the requirements of Regulatory Guide 1.78 for control room habitability. In addition, the original design provides an ionization-type smoke detector for the air intake duct to alarm the operators of the presence of smoke. However, this detector was not operational at the time of the event and it is indeterminate if its sensitivity can be equated to levels of fumes that would impair operator performance. The smoke detector will be operational prior to fuel load while the gas monitors are expected to be installed and operational prior to ascension above 5% power. If the permanent gas monitors are not operational at that time, portable detection equipment will be utilized within the control room.

In summary, we believe that necessary steps are being taken to assure control room habitability. The addition of CO/CO₂ monitors coupled with the smoke detector and human detection of malodors provides a Control Room ventilation system design which

assures that control room occupants have adequate warning of these potential environmental conditions. This is our final report regarding this matter.

Very truly yours,

A handwritten signature in cursive script, reading "Donald F. Schnell".

Donald F. Schnell

JJS/JJM/glp

cc: B. L. Forney, NRC Region III
Richard DeYoung, Director, I&E
NRC Resident Inspectors, Callaway Plant (2)
Missouri Public Service Commission