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ESK-96-212

December 26, 1996

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Dresden Nuclear Power Station Units 2 and 3
Quad Cities Nuclear Power Station Units 1 and 2
ComEd Response to NRC Request For Additional Information (RAI) - Primary Containment Hydrogen Control
NRC Docket Nos. 50-237/249 and 50-254/265

References: (a) R. Pulsifer letter to I. Johnson, "Request for Additional Information Concerning Nitrogen Containment Atmosphere Dilution System Compliance With 10 CFR 50.44 At Dresden and Quad Cities Nuclear Power Stations" dated July 25, 1996.

(b) J. Stang letter to D. Farrar, "Post-Accident Combustible Gas Control System at Dresden, Units 2 and 3, and Quad Cities, Units 1 and 2, Generic Letter 84-09" dated June 29, 1993.

(c) J. Perry letter to USNRC regarding Nitrogen Containment Atmosphere Dilution (NCAD) dated February 16, 1996.

(d) L. England letter to A. Thadani, "Submittal of Requested Report on Control of Combustible Gasses in the Emergency Procedure Guidelines" dated November 9, 1993.

(e) A. Thadani letter to D. Grace, "Safety Evaluation of BWR Owners Group - Emergency Procedure Guidelines, Revision 964, NEDO-31331, March 1987" dated September 12, 1988.

The purpose of this letter is to provide ComEd's response to Reference (a) Request for Additional Information (RAI) regarding Combustible Gas Control at Dresden and Quad Cities Stations, the response is provided in the Attachment.

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In Reference (b), ComEd received Staff approval for an improved Nitrogen Makeup and Inerting system (NM&I) design that alleviated the need to install hydrogen recombiners. In Reference (c), ComEd stated that the improved NM&I system would be used in the Purge and Vent (P/V) mode to control combustible gas. The P/V strategy provides the greatest protection from a public health and safety standpoint. Additionally, this strategy provides the greatest flexibility with respect to Emergency Procedure Guidelines (EPGs) implementation. This implementation is consistent with the Staff approved EPG guidelines and current recommendations from the BWR Owners Group.

Respectfully,

E. S. Kraft, Jr.
Site Vice President
Quad Cities Station

Attachment (A), Response to NRC RAI Regarding Combustible Gas Control at Dresden and Quad Cities Stations.:

cc: A. B. Beach, Regional Administrator - RIII
C. G. Miller, Senior Resident Inspector - Quad Cities
C. L. Vanderniet, Senior Resident Inspector - Dresden
R. M. Pulsifer, Project Manager - NRR
J. F. Stang, Project Manager - NRR
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ATTACHMENT A (Page 1 of 4)
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Response to NRC RAI Regarding
Combustible Gas Control at Dresden and Quad Cities Stations

1) *In the SER that approved the Emergency Procedure Guidelines (EPG), the staff's stated goal is to limit venting to a "last resort" action. The major staff concern has centered on the appropriate containment pressure for venting. As a result, the venting pressure should be established as high as reasonably achievable. If the primary containment pressure limit (PCPL) is less than the design pressure, the licensee must submit justification which the staff will evaluate on a case by case basis. Accordingly, a reasonable effort should be made by each licensee to increase PCPL as high as practical; e.g., perform adjustments to the pneumatic operating pressure of the SRVs, and consider improving vent valve operability. Provide justification for your approach. How does the PCPL compare to the design pressure? Which of the four criteria contained in the staff evaluation cited above, limit the PCPL?*

For Dresden and Quad Cities, the PCPL is only limited by the design pressure capability of the containment structure (item 1 in the Reference (e) SER). ComEd has not established a pressure limitation for combustible gas control - nor is a limit required by the EPGs. Consistent with the approved EPG guidelines, venting is established to preclude a combustible mixture of H_2 and O_2 . For lower levels of H_2 and O_2, venting is established only when off-site dose levels are projected to remain below Technical Specification limits. When Technical Specification limits will be exceeded, venting is not established until H_2 and O_2 concentrations reach combustible levels. At this point, it is appropriate to vent irrespective of release rates because a true threat to containment exists. A delay at this point would only increase the probability and consequences of a deflagration. Should a deflagration occur, the structural integrity of the containment could be lost. The Staff agreed with this approach in the Reference (e) SER.

In conclusion, a controlled, elevated and filtered release through the Standby Gas Treatment system is preferable to an unmonitored ground level release - which might occur if containment integrity is lost. A loss of primary containment may also impact the sites ability to adequately cool the core (for example during flooding evolutions) and would significantly hamper long-term recovery efforts.

2) *What impact did the change in methodology have on the time to manually initiate nitrogen dilution, maximum required injection flow rate and steady state flow rate?*

The improved NM&I system at Dresden and Quad Cities did not represent a significant change in methodology. Prior to the modifications, the station's Emergency Procedures provided combustible gas control consistent with the NRC approved EPG guidelines (Rev 4) using the existing N_2 make-up system. The improved NM&I system, which was added to close out outstanding issues pertaining to 10 CFR 50.44, simply provides an additional means of adding N_2 to the containment.

Studies performed by the BWR Owners using a "best estimate" approach suggest that during a design basis event, an inerted Mark 1 containment would not require NCAD dilution during the first month following a design basis accident. The station Emergency Procedures are symptom based and do not provide a timeframe for N2 addition. Combustible gas control is triggered on containment conditions; therefore, the time to manually initiate nitrogen dilution is not affected. Nitrogen Containment Atmospheric Dilution is placed in service when deflagration limits are exceeded and purge and venting would continue until the either H_2 or O_2 levels are reduced to below their respective deflagration limit.

3) *The first step of the PC/H section of the EPGs requires venting/purging, whenever either the suppression chamber or drywell reaches the minimum detectable hydrogen concentration, provided that the off-site radioactivity release rate is expected to remain below the off-site Technical Specification value of the Limiting Condition for Operation (LCO) for the release rate. The staff concluded in its SER that operators should have detailed guidance when conditions dictate removal of hydrogen using a purge and vent strategy and that sufficient safeguards should be established to preclude this action from being implemented during an emergency situation. Identify and provide a summary of the primary containment venting procedure, lineups and valve operations.*

   Dresden and Quad Cities stations have a detailed procedure for containment venting operation during accident conditions (Quad Cities - QCOP 1600-13; Dresden - DEOP 500-4). The procedure directs the appropriate lineups and valve operations. When combustible gas levels are below the deflagration limit, containment is vented through the normal containment vent (2-inch vent line) which can be aligned to vent the torus (preferred) or the drywell through the Standby Gas Treatment System. Guidance is provided to ensure release rates are closely monitored during venting operations to ensure Technical Specification limits are not violated.

4) *What is the containment pressure profile versus time? The profile should show the initiation and duration of the vent cycle. What volume of containment atmosphere is released during the cycle? What is the maximum allowable purge flow without repressurizing containment?*

   The BWR Owners conducted a study in late 1993 to evaluate two strategies for combustible gas control - Purge and Vent (P/V) and Represurization/Purge (R/P). This study, which was transmitted to the NRC for review in Reference (d), concludes that the P/V strategy "minimizes the amount of uncontrolled and unmonitored fission products that are released, and maintains the maximum margin to containment failure from a hydrogen deflagration or other overpressure event." In addition, the report concludes that the results are not limited to the sample plant and are broadly applicable to BWRs with Mark 1 containments. ComEd has evaluated this report and concurs with the conclusions.

Early "best estimate" evaluations performed by the BWR Owners suggest that NCAD would not be required during the first month following a design basis accident. For events that are beyond design basis, the specific flow rates and injection times can not be determined. Venting under these conditions is explicitly controlled by the EPGs. The EPGs are symptom based procedures that are designed to protect the containment under a wide range of accident scenarios. Providing explicit flow rates and injection times would be in conflict with the philosophy of the EPGs and may place the containment in an unsafe condition.

5) *Do plant-specific procedures exist for analyzing a primary containment air sample in support of Step PC/H-1 in the EPGs? If so, identify and summarize these procedures.*

Station procedures exist for obtaining samples of containment during post accident conditions. These procedures include the necessary steps for operating the High Radiation Sample System to collect the necessary samples for post accident containment monitoring. The sample results would be used by operating and Technical Support Center personnel to determine if venting is allowed.

The ComEd emergency plan would also be activated. The underlying philosophy of the Emergency Plan is to protect the public from the effects of all station releases to the environment during an accident condition. This includes the appropriate environmental monitoring, notifications, and recommended protective actions for the public.