

July 20, 2005

Mr. Alexander Marion  
Senior Director, Engineering  
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17761 I Street, NW, Suite 400  
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SUBJECT: PROJECT NUMBER: 689  
U.S. NUCLEAR REGULATORY COMMISSION (NRC) RESPONSE  
REGARDING THE WHITE PAPER ON CARBON DIOXIDE (CO<sub>2</sub>) FIRE  
SUPPRESSION SYSTEM DESIGN CHANGES

Dear Mr. Marion:

On January 31, 2005, you submitted a white paper on "Carbon Dioxide Suppression System Design Changes" for our review (ADAMS Package ML050320125). We have completed our review and provided our comments in the enclosure.

Licensees who wish to make design changes to their CO<sub>2</sub> fire suppression systems must evaluate whether prior NRC approval is needed in accordance with their current licensing basis. Potential plant security implications associated with the CO<sub>2</sub> fire suppression systems design changes must be addressed in accordance with the references identified in the enclosure.

Thank you for your assistance in resolving this issue. Please contact Dr. Sunil Weerakkody or Mr. Naeem Iqbal of my staff if you have additional questions.

Sincerely,

*/RA/*

James E. Lyons, Director  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation

Enclosure: As stated

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## NRC COMMENTS REGARDING THE NUCLEAR ENERGY INSTITUTE (NEI) WHITE PAPER ON CARBON DIOXIDE SUPPRESSION SYSTEM DESIGN CHANGES

The following are the Nuclear Regulatory Commission (NRC) staff's comments to the key positions set out in the NEI white paper.

1. Licensees who elect to convert an automatic CO<sub>2</sub> fire suppression system to manual actuation should consider alternate fire suppression methods that reduce the potential for personnel hazards and maintain nuclear safety and security. The staff also recommends that, along with the conversion to a manually actuated system, the licensees provide adequate measures to (a) enhance the reliability of the manual fire fighting capability and (b) reduce the potential personnel hazards.
2. Licensees who elect to perform CO<sub>2</sub> fire suppression system design changes that add operator manual actions, including conversion to manual actuation, should also consider the impact of those changes on plant security. NRC requirements for the physical protection of nuclear power plants (NPPs) are set forth in 10 CFR Part 73 "Physical Protection of Plants and Materials." The physical protection requirements are further supplemented by various security Orders (e.g., EA-02-026, February 25, 2002, "Interim Safeguards and Security Compensatory Measures," EA-03-086, April 29, 2003, Revised Design Basis Threat for Operating Power Reactors", and other security related orders for operating reactors as applicable), Advisories, other generic communications, and plant specific security commitments. Licensees who implement changes to their plant must ensure that compliance with the physical protection requirements, security orders and subsequent rulemaking and adherence to their commitments applicable to their plant are maintained.
3. Licensees who elect to make design changes to an automatic CO<sub>2</sub> fire suppression system are provided with three options in the white paper. The white paper includes a design change option to completely eliminate the CO<sub>2</sub> fire suppression system for a very limited number of applications. The licensees who choose this option should consider the following:
  - If the CO<sub>2</sub> system is not replaced with a system that provides an equivalent level of fire protection, this option results in a compromise of the fire protection defense-in-depth (DID) element, i.e., rapidly detecting and controlling and extinguishing a fire promptly. Since providing and maintaining DID is a fundamental requirement for NPP fire protection program (FPP), complete elimination of the CO<sub>2</sub> system from an area containing safety-related systems and equipment most likely would adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. 10 CFR 50.48(a) requires a fire protection plan to satisfy Criterion 3 of Appendix A to 10 CFR 50. Licensees must ensure that compliance with this regulation is maintained. A licensee contemplating this option must perform an analysis of the change that considers the impact to DID and safety margin to demonstrate that there will be no adverse affect on safe shutdown. Most likely, licensees exercising this option would require prior NRC approval, whether they are pre- or post-79 plants.
4. Licensees who choose to use the guidance provided in white paper regarding interim and long term compensatory measures for making changes to an automatic CO<sub>2</sub> system should consider the following:

ENCLOSURE

- If a licensee plans to use a compensatory measure as a permanent solution, that licensee must determine whether prior NRC approval is required. These solutions must be incorporated into the FPP.
  - For a degraded or an inoperable CO<sub>2</sub> fire suppression system, e.g., when the system is being converted from an automatic to manual actuation, compensatory measures should be put in place in accordance with the approved FPP.
  - The licensees should review and consider the guidance provided in Regulatory Issue Summery (RIS) 2005-07, "Compensatory Measures to Satisfy the Fire Protection Program Requirements," for alternate compensatory measures. Another source of information is Generic Letter 91-18, Revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," dated October 8, 1997, which includes a discussion of compensatory measures and timely corrective actions.
5. Licensees may elect to use risk-informed methods to justify CO<sub>2</sub> system design changes. However, if a licensee has not adopted 10 CFR 50.48(c) (NFPA 805), then the licensee must ensure that applicable technical (e.g., PRA Quality) and licensing basis requirements are met, and must obtain an exemption or a license amendment.
6. On pages 4–5, the white paper includes a discussion on regulatory implications that a licensee must consider regarding the CO<sub>2</sub> fire suppression system design changes. The staff suggests the following for a 5<sup>th</sup> bullet on page 5:
- "Is the automatic CO<sub>2</sub> fire suppression system relied upon by the licensee to meet the requirements of the approved FPP? If so, determine if this change constitutes an adverse affect on plant fire safe-shutdown (FSSD)."
7. On pages 5–6, the white paper includes a section entitled "Determining Need for Prior NRC Approval." The first paragraph of this section recommends that licensees having the standard fire protection license condition that was published in Generic Letter 86-10, "Implementation of Fire Protection Requirements," perform an evaluation using NEI 02-03, "Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program," to determine if a design change in the CO<sub>2</sub> fire suppression system would adversely effect the ability to achieve and maintain FSSD. The staff notes that NEI 02-03 has not been endorsed by the NRC for the determination of "adverse affect" on plant FSSD.