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UNITED STATES
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OFFICE OF INSPECTION AND ENFORCEMENT
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March 6, 1980

IE Circular No. 80-03

PROTECTION FROM TOXIC GAS HAZARDS

Chlorine gas releases have been reported at two different reactor facilities in the past two years.

- At Millstone, in March 1978, a leak of about 100 standard cubic feet of chlorine (about a gallon of liquid) occurred over a ten minute period, resulting in the hospitalization of 15 people. The ventilation system carried the chlorine into the plant buildings, where personnel distress was noted. No injuries occurred in the buildings due to the small size of the release.
- At Browns Ferry, in June 1979, a small leak from a diaphragm on a chlorine reducing valve resulted in the hospitalization of five people, including a control room operator.

Chlorine is highly toxic, producing symptoms after several hours exposure in concentrations of only one ppm. Concentrations of 50 ppm are dangerous for even short exposures and 1000 ppm is fatal for brief exposures. Chlorine, used at some power stations to control organisms in the circulating water, is normally supplied in one ton containers or in tank cars of up to 90 tons capacity.

Other potential sources of toxic gas that have been identified at nuclear power plants include:

- Nearby industrial facilities. At Waterford, in July 1979, construction forces had to be evacuated for two and a half hours due to a chlorine gas release from a nearby chemical plant.
- Chlorine transportation on adjacent highways, railways and rivers.
- Large tanks of aqueous ammonia stored near plant buildings.
- Both acid and caustic storage tanks located in a common building near the control room. At the Dresden site, in August 1977, accidental mixing of acid and caustic solutions resulted in toxic fumes that entered the control room via the ventilation system.

Criterion 19 of Appendix A to 10 CFR 50 requires a control room from which action can be taken to maintain the reactor in a safe condition under accident conditions. The control room designs in current license applications are

reviewed for operator protection from toxic gases (as well as radiation), in accordance with Standard Review Plan (SRP) 6.4 (NUREG 75/087 dated 11/24/75). Related information on the identification of potential hazards and the evaluation of potential accidents can be found in SRP sections 2.2.1-2.2.2 and 2.2.3 respectively. The SRP references Regulatory Guide 1.78 (dated June 1974) on control room habitability during chemical releases. It also references Regulatory Guide 1.95 on requirements for protection against chlorine releases specifically.

The majority of the plants currently operating, however, were built and licensed prior to the development and implementation of this guidance. A review of some older plants, with respect to toxic gas hazards indicates that they do not have the degree of protection that would be required for present day plants. Evaluation of the protection of control rooms from toxic gas releases is part of the systematic evaluation program currently being carried out on certain older plants. Also, as older facilities submit requests for significant license amendments, their design features and controls for protection of control rooms are reviewed and, if appropriate, are required to be changed. However, the recent history of frequent toxic gas release incidents appears to warrant a more rapid implementation of the newer toxic gas protection policies.

For the above reasons, it is strongly recommended that:

- You evaluate your plant(s) against section 6.4 and applicable parts of sections 2.2.1-2.2.2 and 2.2.3 of the SRP with respect to toxic gas hazards.
- Where the degree of protection against toxic gas hazards is found to be significantly less than that specified in the SRP, provide the controls or propose the design changes necessary to achieve an equivalent level of protection.

No written response to this circular is required. If you desire additional information regarding this matter, contact the Director of the appropriate NRC Regional Office.

Attachments:
Sections 2.2.1-2.2.2;2.2.3 and
6.4 of NUREG 75/087

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Enclosure

RECENTLY ISSUED
IE CIRCULARS

| Circular No. | Subject | Date of Issue | Issued to |
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| 80-02 | Nuclear Power Plant Staff Work Hours | 2/1/80 | All holders of Reactor OLs, including research and test reactors, and CPs |
| 80-01 | Service Advice for GE Induction Disc Relays | 1/17/80 | All licensees of nuclear power reactor operating facilities and holders of nuclear power reactor CPs |
| 79-25 | Shock Arrestor Strut Assembly Interference | 12/20/79 | All licensees and holders of power reactor CPs |
| 79-24 | Proper Installation and Calibration of Core Spray Pipe Break Detection Equipment on BWRs. | 11/26/79 | All Holders of a Power Reactor OL or CP |
| 79-23 | Motor Starters and Contactors Failed to Operate | 11/26/79 | All Power Reactor Operating Facilities and Holders of Reactor CPs |
| 79-22 | Stroke Times for Power Operated Relief Valves | 11/16/79 | All Power Reactor Operating Facilities and all Utilities having a CP |
| 79-21 | Prevention of Unplanned Releases of Radioactivity | 10/19/79 | All holders of Power Reactor OLs and CPs |
| 79-20 | Failure of GTE Sylvania Relay, Type PM Bulletin 7305, Catalog 5U12-11-AC with a 12V AC Coil | 9/24/79 | All holders of Power Reactor OLs and CPs |
| 79-19 | Loose Locking Devices on Ingersoll-Rand Pumps | 9/13/79 | All Holders of Power Reactor OLs and CPs |
| 79-18 | Proper Installation of Target Rock Safety-Relief | 9/10/79 | All Holders of Power Reactor OLs and CPs |