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From: "Kay Drey" <tritium@igc.org>
To: <nrcrep@nrc.gov>
Date: Mon, Jan 26, 2004 9:43 AM
Subject: manual actions for safe shutdown

Attached please find my four-page comments. Sincerely, Kay Drey

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January 26, 2004

Chief, Rules and Directives Branch
Division of Administrative Services
Office of Administration
US Nuclear Regulatory Commission
Mail Stop T6-D59
Washington DC 20555-0001

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Dear Sir or Madam:

Comments re: **Draft Criteria for Determining Feasibility of Manual Actions to Achieve Post-Fire Safe Shutdown** --- Federal Register. Nov. 26, 2003 (Vol. 68, No. 228, at p. 66501)

Shortly after I began reading about nuclear power, in 1974, I remember being incredulous when I learned that two trained nuclear power plant technicians at the Browns Ferry plant in Alabama had used a candle flame to check for air leaks. And that, as a result, they set nearby sealant on fire that ultimately destroyed electrical cable systems, and a significant portion of the plant. The candle flame touched off a fire that burned for more than seven hours. While human error is an unavoidable part of our daily lives, surely the March 1975 Browns Ferry fire represents an especially unfortunate, dangerous example. Because of this inconceivable lack of judgment and the resulting damage, the NRC subsequently mandated more stringent environmental protections throughout the nuclear industry. But apparently those safety measures may now be at risk.

The Nov. 29, 2003, New York Times, describes your proposed rule change in part as follows:

> After 10 years of struggling to make reactor owners modify their plants to protect electrical cables from fire, the Nuclear Regulatory Commission is now proposing to amend its own rules, retroactively legalizing an alternate strategy used by many plants but never formally approved.
>
> The change involves the cables that connect the control room with pumps, valves and other equipment needed to shut down a plant safely.
>
> Previously, the commission wanted the reactors to separate the control cables for redundant equipment, or install fire detection and suppression equipment or fire barriers, so a single fire could not disable all the cables. It now proposes to accept letting the plants designate technicians who would run through the plant and operate equipment by hand if the control cables had burned away. (emphasis added)

Later in the article the question is raised "whether workers could get to the equipment, through the heat, smoke, radiation, and steam that might be present in a fire." In the event of a fire, the proposed rule change would legalize "operator manual actions."

Licensees have currently been allowed to use manual actions, for example, in place of their having to upgrade or replace Thermo-Lag, an insulating shield or fibrous material manufactured here in St. Louis by Thermal Sciences, Inc., and used in power plants to retard flames, particularly around electrical systems. Because of fire endurance and ampacity tests and analyses conducted by the NRC staff and the Nuclear Energy Institute, and evidence gathered by the staff and licensees of delaminations, cracks, voids, and other defects in Thermo-Lag materials previously installed at power plants, Thermo-Lag was declared inoperable, in 1992, for the purpose of protecting electrical cables, circuits and small machinery from fire. The NRC, however, has allowed power plant operators to implement "fire watches," meaning that workers patrol vulnerable plant areas where Thermo-Lag is present, to watch for signs of fire. While the fire watches were to have served as a temporary fix until corrective actions were completed, much defective Thermo-Lag remains in place, apparently affirmed now by your proposed rule change.

The public subsequently learned, in 1997, that the silicone foam Dow Corning had been using for its fire barrier penetration seals was flammable. The NRC's decision with respect to the seals was to revise its regulations to decree that fire barrier seals no longer needed to be made of non-combustible materials. As explained in an NRC news release, dated May 31, 2000:

> NRC has determined that IF fire barrier penetration seals are properly designed, tested, configured, installed, inspected and maintained, they are capable of preventing the spread of fire for one, two or three hours, providing sufficient time for automatic systems or firefighters to control and extinguish the fire. (emphasis added)

No recognition, there, of any potential for human error. The Nuclear Information and Resource Service has been working to bring the deficiencies of Thermo-Lag and the penetration seals to the attention of the public.

It is understandable that repair or replacement of some of the environmentally deficient materials may not have been possible. Some may be located in inaccessible areas, for example -- wedged or hidden above, behind, or below layers of immovable equipment. Or they may be located in areas with radiation fields too high for human access and where additional radiation shielding is not a viable option.

If the proposed rule change is approved, I believe the licensee would be relieved of the requirement to provide some of the most basic physical protections, such as automatic fire detection and suppression systems, and passive fire barriers --- protections that the NRC has required for more than twenty years (as per the Code of Federal Regulations, Title 10, Part 50, Section 48). Instead the licensee could legally rely on fire watches and manual fixes.

The proposed rule change reminds me of a description recounted in an adult Sunday school tract about the experience of an auxiliary operator at Three Mile Island – Unit 2 on March 28, 1979, the day the TMI accident began. Mr. Ronald Fountain needed to open a valve <u>manually</u> in the highly radioactive auxiliary building in order to permit the reactor operators to begin cold shutdown procedures (quoting from SP Publications' <u>Power for Living</u>, March 30, 1980):

The needles on the instruments I normally carried to measure radiation were slammed against their highest readings, so I knew the place was badly contaminated. How seriously, I didn't know. I searched through the HP [health physics] room for high-radiation instrumentation, but found none. I dashed through the building complex to Unit 1 to look. Still nothing. Next I hunted for a self-contained breathing unit called a Scott Air Pack. I found one tank --- only half-full of oxygen. It would have to do. I'd already wasted half an hour. . . .

My trip in and out had to be over in a few minutes or I'd absorb more than my once-in-a-lifetime allowable maximum of 115 rems! . . .

I opened the door to the hallway, knowing I was facing thousands of times more radiation than anyone outside. But if this was what had to be done, I was ready to do it. I figured I'd be out in a few minutes. I didn't realize that I had been operating on adrenalin -- the high-powered force that pushes one beyond his normal capabilities, sometimes beyond his best reasoning.

One doesn't run with a Scott Air Pack and a face mask on or he gulps oxygen, risking hyperventilation and claustrophobia. But, hoping to cut my exposure time, I *ran* unthinkingly down the hallway and up the stairs. By the time I reached the upper level, I was dizzy and lightheaded with hyperventilation. I was desperate for air; claustrophobia and panic set in. I slumped helplessly against the wall, debating away the precious seconds I'd saved by running.

First: *I'm going to rip this mask off so I don't suffocate.* Next: *I'll escape down those stairs and out that hallway.* Then finally: *God is with me in this; He can help me through.*

Consciously slowing my panic breathing, I asked my heavenly Father for His calmness and peace. Then, clutching the key, I made my lead feet walk toward that valve.

A couple minutes later, my shaky knees had gotten me safely up those 50 frightening feet. I was reaching for the lock when the worst sound I've ever heard burst in my ears. The alarm on my air pack warned me I had only three minutes of air in the tank. In half that time, I opened the uncooperative valve, and was off those pipelines above the gaping nothingness [a 50-foot drop below him] and about 50 feet from the outside door.

Suddenly I was sucking in a vacuum. My fast breathing had used up my air supply too rapidly. Tearing at my face mask, I lunged toward the pressurized door. It didn't yield. I panic-kicked it open and flung myself on the floor as the door snapped shut behind me. Breathing in the precious air, I just sat. . . . .

Quoting again from Matthew Wald's piece in the New York Times, November 29, 2003:

But the idea of substituting humans for physical protections has attracted some skepticism. In September, at a meeting of the commission's Advisory Committee on Reactor Safeguards, Dana A. Powers, the committee's vice chairman, asked: 'Is there any hope? It's not like you

can set up a simulator and test an operator action. How do you simulate smoke, light, fire, ringing bells, fire engines, crazy people running around?' he asked.

The current regulations in 10 CFR 50.48 and Appendix R (Section III.G.3) list three physical methods --- such as one-hour or three-hour fire-rated barriers --- that are required "to protect at least one shutdown train during a fire if redundant trains are located in the same fire area." (Inside NRC, Nov. 17, 2003, p. 4) Are manual methods to be used instead? Will an NRC licensee be allowed to rely on some frightened worker wearing (we would hope) a heavy, cumbersome, self-contained breathing apparatus, while running through "smoke, light, fire . . . ." in search of a switch or valve somewhere that demands his personal, informed attention?

The need to improve the environmental qualification of electrical equipment important to safety was acknowledged by the NRC/AEC and sought by the public both before and after the Browns Ferry accident. (Please see the Union of Concerned Scientists v. NRC No. 82-2000, 711 F.2d 370 [D.C.Cir.1983] and a subsequent, related UCS case, No. 84-1549.) The NRC has required testing to try to make certain that "equipment can function in the environment caused by the accident, such as steam, elevated temperature and pressure, and radiation." (from the UCS publication, "Safety Second: A Critical Evaluation of the NRC's First Decade." Feb/85. p. 30)

If anything, the need for environmental protections has increased over the past twenty or thirty years as embrittlement, corrosion and other processes have impacted upon the nation's aging plants. The NRC's institutional memory should make the Commission more, not less, wary of potential tinderbox effects -- more insistent upon mandating the use of qualified equipment and procedures. Heretofore the NRC has required that systems, structures, and components are to be protected so that if a fire is not promptly extinguished, the fire will not prevent the safe shutdown of a nuclear power plant in the event of an accident (as per an enclosure to a September 19, 1994, NRC letter to Union Electric, regarding Thermo-Lag compliance concerns at the Callaway plant, here in Missouri).

The U.S. Nuclear Regulatory Commission (Atomic Energy Commission) was established in part "to promote the common defense and security or to protect health or to minimize danger to life or property." (Section 161(b) of the Atomic Energy Act, 42, U.S.C., - 2201(b)) Should it not be the obligation of the Commission, at the very least, to require that each of its licensees prepare a plant-specific "**justification for continued operation,**" demonstrating or at least documenting that the fire protection deficiencies of its safety-related electrical equipment and systems can and will be corrected aggressively and expeditiously --- for operation during normal conditions and when exposed to the harsh environment of an accident?

Or is the public being asked to accept additional years of deferred deadlines and exceptions to your safe shutdown regulations and standards?

Sincerely,