

Meserve responds to questions posed by Markey

An 11-page response from the chairman of the Nuclear Regulatory Commission to a member of the U.S. House of Representatives spells out the actions the NRC has taken for safeguarding the nation's nuclear power plants since the terrorist attacks on the World Trade Center and the Pentagon on September 11.

Congressman Edward Markey (D., Mass.), a frequent critic of the nuclear industry and the NRC, on September 20 sent a letter to NRC Chairman Richard Meserve (briefly mentioned in *Late News*, *NV*, Nov. 2001, p. 18) posing numerous questions about nuclear plant security. Meserve replied by letter to Markey on October 16, attaching an 11-page response to the congressman's questions. Meserve reiterated that nuclear containment structures are among the most secure civilian facilities in the United States and that the terrorist attacks have focused the NRC's attention on the need to review policies and practices related to safeguards and physical security measures. During the NRC's ongoing review, Meserve noted in his letter, the agency was interacting with the Federal Bureau of Investigation, other intelligence and law enforcement agencies, and the Defense Department to ensure that "any changes to the NRC's programs are informed by pertinent information from other relevant U.S. agencies."

Design basis threats

Markey questioned why the NRC, following the September 11 attacks, had only recommended—instead of ordered—that all nuclear facilities increase security. Meserve responded that all NRC licensees have a continuing regulatory obligation to defend against a design basis threat (DBT). The recommendation, or threat advisory, as Meserve referred to it, served a different purpose than an order. Issuing an order would have consumed time and resources, Meserve stated, and would have been no more effective than an advisory in achieving the desired result. The chairman added that NRC staff had reviewed the actions taken by licensees as a result of the September 11 threat advisory and concluded that no additional actions were necessary (at that time). These security actions generally included increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and limited access of personnel and vehicles to the sites, among other measures.

The NRC followed up the threat advisory by issuing on October 6 a safeguards advisory that spelled out certain prompt and longer-term additional actions to strengthen licensee capability to respond to terrorist attacks at or beyond the DBT.

Meserve stated that the baseline security level at U.S. commercial nuclear reactors is very high when compared with most other nations. He added that many foreign regulators often comment on the impressive security

measures and large guard forces evident when they visit U.S. nuclear power plants. In addition, Meserve commented that he was aware of no other regulator that systematically carried out security inspections involving force-on-force exercises, as occurs at U.S. nuclear plants. But, in answering a query from Markey, Meserve noted that he did not have specifics about security measures undertaken at nuclear facilities in Canada and Russia.

Suicide attackers

Regarding an attack on a nuclear facility by adversaries willing to commit suicide, Meserve pointed out that an underlying assumption of a DBT is that an attacker would be willing to die during the event. Thus, this scenario was not considered to be a new adversarial characteristic. Still, Meserve indicated that the NRC would consider information developed as a result of studying the September 11 event in determining potential adjustments to the DBT.

Regarding security exercises at nuclear power plants, before September 11 the NRC was prepared to test a one-year pilot program called Safeguards Performance Assessment (SPA), designed and to be managed by the nuclear industry. During the one-year pilot, which was scheduled to be conducted at eight nuclear power plants, the NRC would have continued with its ongoing Operational Safeguards Response Evaluation (OSRE) program by conducting security inspections at an additional six nuclear plants (*NV*, November 2001, p. 23). Now, though, as a result of the September 11 attacks, Meserve stated that the NRC's entire inspection program would be re-examined by the agency.

Aircraft attacks

In response to a Markey query, Meserve noted that the NRC had not routinely required all nuclear plants to be designed to withstand a particular aircraft crash, but such considerations had entered into siting evaluations. Those evaluations considered the probability of accidental air crashes as a screening criterion to determine whether further evaluation was required. Specifically, Meserve continued, 10 CFR 100.10 requires, in part, that "reactors will reflect through their design, construction, and operation an extremely low probability for accidents that could result in release of significant quantities of radioactive fission products."

In addition, for applications after January 10, 1997, 10 CFR 100.20(b) requires that "the nature and proximity of man-related hazards (e.g., airports, dams, transportation routes, military and chemical facilities) must be evaluated to establish site parameters for use in determining whether a plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low."

The NRC issued NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 3.5.1.6, "Aircraft Hazards" (dated July 1981), which defines the agency's acceptance criteria for siting nuclear power plants near airports and/or airways. The probability of an accidental aircraft crash resulting in radiolog-

ical consequences greater than the exposure guidelines defined by 10 CFR Part 100 is considered to be acceptably low, Meserve noted, if the plant meets specified criteria regarding distance from airports, holding patterns, and approach patterns, as well as criteria regarding volumes of air traffic. If the plant does not meet these criteria, a detailed review of accidental aircraft hazards must be performed. If that detailed hazard review cannot demonstrate an acceptably low probability of an aircraft accident resulting in radiological consequences greater than the exposure guidelines defined by 10 CFR Part 100, engineering analyses of aircraft impacts are required. The probability is considered to be acceptably low if, based on a realistic assessment, it is less than about 10^{-7} per year (or 10^{-6} per year, given a conservative assessment).

If the plant cannot meet the probability criteria, the plant's structures, systems, and components must be designed to withstand the effects of the postulated aircraft impacts and fires without loss of safe shutdown capability, and without a release of radioactivity that would exceed the exposure guidelines defined by 10 CFR Part 100.

Meserve stated that the NRC has no criterion that would require nuclear power plant containment vessels to be designed to survive the crash of a falling Boeing 747, because the agency did not specifically consider attacks by aircraft such as Boeing 757s or 767s, and because nuclear power plants were not specifically designed to withstand such crashes. Meserve noted that the NRC was currently involved in detailed engineering analyses of a large airliner crash, and thus the agency could not yet provide Markey with an assessment of the likely consequences of such an attack. Variables considered in the analyses would include aircraft size and speed, as well as the amount of fuel.

Saying that, Meserve pointed out that nuclear power plants do have an inherent capability to protect public health and safety through such features as robust containment buildings, redundant safety systems, and highly trained operators. These plants, he noted, are among the most hardened structures in the country and are designed to withstand extreme events, such as hurricanes, tornadoes, and earthquakes. In addition, all NRC licensees with significant radiological material have emergency response plans to mitigate impacts on the public in the event of a release.

Storage cask fire

Meserve acknowledged that the capacity of spent fuel dry storage casks to withstand a fire for extended time, such as 24 hours, had not been analyzed, given the low probability that fire-fighting personnel would be unable to respond within 24 hours. Previous studies, though, have analyzed worst-case impact conditions for aircraft accidents, and these studies found that most of the aircraft fuel would be dispersed and burned off in a matter of minutes.

Meserve noted that a storage cask, if struck by a large commercial aircraft, would not be expected to be appreciably affected by a fire because the concrete and/or steel protective cov-

erings are not readily flammable and would not be burned away. Because of this, Meserve stated, NRC staff believed that a fire would not result in failure of the inner canister. But even if a spent fuel storage cask were to sustain an impact and penetration by an aircraft, he continued, the resultant effects could never be equivalent to a Chernobyl-type accident because the amount of radioactive material contained within the cask is orders of magnitude less than in an operating reactor, and the mechanisms for dispersal of the material are fewer than were present during the Chernobyl accident. In the event of a crash of a large commercial aircraft and if the cask were breached, however, the NRC could not exclude the possibility of localized effects, Meserve commented.

As a result of the NRC's review of the terrorist events of September 11, if the agency determines that additional or revised safety or physical protection actions or requirements need to be taken at independent spent fuel storage installations, appropriate actions would be taken to implement those measures, Meserve assured.

Fire protection

Markey requested information on the ability of passive fire barriers in nuclear power plants to resist airline crashes, and Meserve responded that the objective of the NRC's current fire protection requirements is to ensure that a single internal fire event does not adversely affect the ability of a plant to achieve and maintain safe shutdown. He noted that fire barriers are only one of the many elements of the defense-in-depth principle that is applied to nuclear power plant fire protection, and so licensees do not solely rely on installed fire barriers to achieve and maintain safe shutdown.

According to Meserve, the specifications for the qualifications of fire barriers installed in nuclear power plants to meet the NRC's objective are founded on the testing protocol described by the American Society of Testing Materials, Standard Test Methods for Fire Tests of Building Construction and Materials (ASTM E-119).

This standard is used to measure and describe the properties of fire barrier materials under controlled laboratory conditions, and is widely used as the basis for rating the fire barriers that are used in many types of industrial facilities, in addition to nuclear power plants.

Meserve noted that increasing the length of time required for passive barriers installed at a nuclear power plant to resist a laboratory fire would not ensure that these barriers would be able to protect important safety systems, because the scenario in which a commercial airliner hits and penetrates a structure would likely also result in damage to the fire barriers from debris from the aircraft or the structure. He concluded that changes to the length of time that passive barriers need to resist a fire would not, by themselves, be an effective means of addressing the aircraft crash threat.

Potassium iodide

Through questioning, Markey implored that the NRC make potassium iodide (KI) available to the public in a quick manner in

House proposals aimed at security revisions

Legislation introduced to the U.S. House of Representatives in October by Rep. Edward Markey (D., Mass.) is aimed at prompting the Nuclear Regulatory Commission to revise rules regarding design basis threats to nuclear power plants. It also would require the NRC to open an office to oversee its Operational Safeguards Response Evaluation (OSRE), a program through which physical security at nuclear plants is tested.

Markey's legislation would require that regulations revised by the NRC would take into account the potential for suicide attacks on nuclear power plants; attacks assisted by persons working inside the plants; water- and air-based attacks; attacks by coordinated teams of at least 20 individuals; attacks by persons with sophisticated knowledge of nuclear plant operations; use of explosive devices of considerable size and other modern weaponry; and fires of long duration.

Revisions to NRC regulations also would be required pertaining to protection of spent fuel storage pools and dry cask storage. In addition, the legislation would require armed escorts for all used fuel shipments.

Prior to any revisions, the NRC, under Markey's proposal, would be required to consult with officials of the Federal Bureau of Investigation, the Central Intelligence Agency, the Department of Defense, and the Office of homeland security.

In other House actions, several separate proposals adopted by the House Committee on Energy and Commerce on October 3 involve antiterrorism measures at nuclear plants. The proposals include amending the Anti-terrorism and Effective Death Penalty Act of 1996 with respect to the responsibilities of the Secretary of Health and Human Services regarding biological agents and toxins; clarifying the application of cable television system privacy requirements to new cable services; and imposing new security requirements at certain nuclear facilities, which would authorize armed guards at NRC-regulated facilities to make arrests and use force to protect those facilities.

the event of a successful terrorist attack on a nuclear power plant. Meserve responded that the NRC, in January 2001, revised a portion of its emergency response regulations to require that consideration be given to including KI as a protective measure for the general public to supplement sheltering and evacuation in the event of a severe nuclear power plant accident. In doing so, the agency found that KI is a reasonable, prudent, and inexpensive supplement to evacuation and sheltering for specific local conditions.

While the NRC left it to the individual states to make a final decision on the use of KI as a supplemental measure, it did decide to fund the initial purchases of KI for any state making a decision to stockpile it. The NRC set aside \$400 000 in fiscal year 2001 and has requested similar funding in FY 2002 to purchase KI.

Meserve noted that together with the Federal Emergency Management Agency (FEMA), the NRC is looking to develop and implement a program to distribute KI to states that decide to include it in their range of public protective actions.

The NRC also formally requested that a federal subcommittee on KI be formed with representatives from the Food and Drug Administration and the Environmental Protection Agency, as well as the NRC and FEMA. The purpose of the subcommittee is to expedite review and revision of federal KI policy, encourage the finalization of FDA guidance, and coordinate KI implementation issues. That subcommittee had its initial meeting on September 25, 2001.

Foreign ownership

Regarding a question on nuclear power operating licenses controlled by foreign entities, Meserve responded that the NRC had valid reasons for removing the statutory ban on for-

eign ownership. Meserve said the statutory ban in Sections 103d and 104d of the Atomic Energy Act of 1954 is unqualified, applying to all foreign entities, making no distinction between friend (such as the United Kingdom) and foe (such as Iraq). Moreover, he continued, the ban fails to accomplish its primary goal of preventing transfer of nuclear power technology, because, unlike in 1946 when the statutory ban went into effect, this technology is well known abroad. In the absence of the ban, there still would be ample protection against an inappropriate licensee because the NRC would be prohibited from issuing any operating license to a foreign entity if that ownership would be inimical to the common defense and security or the health and safety of the public, Meserve argued. Before making such a determination, the NRC would be able to obtain the views of the Executive Branch.

Insider threats

Markey showed concern that a worker in a nuclear power plant could be a member of a terrorist organization. Meserve replied that since September 11, the FBI has provided the NRC with frequently updated lists of individuals who may have ties or information related to terrorist activities. At the request of the FBI, the NRC provided these lists to officials at nuclear power plants, nonpower reactor facilities, decommissioning plants, and selected fuel facilities to be checked against utility employment and visitor records. Meserve noted that the Nuclear Energy Institute also has been provided the lists to be checked against a database of temporary nuclear utility workers. Results of any employee matches are being provided by NRC to the FBI for resolution.

In accordance with 10 CFR 73.56, background investigation of a potential worker includes employment history, education history,

criminal history, military service, and credit history, as well as a psychological evaluation, interview of developed references, and fitness-for-duty testing. With and without authorization for unescorted access, all individuals working inside a nuclear plant's protected area are subject to continued behavioral observation, as required by 10 CFR 73.56, to identify aberrant behavior or other indications that the individual is, or has become, untrustworthy, Meserve stated. Workers at nuclear power plants, however, do not have to be permanent residents or citizens of the United States.

Nuclear materials

Regarding Markey's concern about exporting nuclear materials, Meserve stated that provisions of the Atomic Energy Act of 1954, as amended by the Nuclear Non-Proliferation Act of 1978, the Energy Policy Act of 1992, and other acts, place strict controls on U.S. exports of nuclear materials and other materials and equipment of significance for nuclear explosive purposes. Meserve noted that to date, the NRC's licensing specialists have not identified any of these provisions that should be changed in light of increased concerns about terrorist attacks.

From a broader perspective, he added, the NRC's export regulations are only one of sev-

eral facets of U.S. and multilateral export controls. The agency anticipates and is prepared to participate in interagency reviews involving Executive Branch agencies (such as the Departments of State, Energy, Commerce, Defense, and Transportation) to address those controls that bear on terrorist intentions and acts. Meserve indicated that the NRC also would support federal government efforts in the Nuclear Suppliers Group and the International Atomic Energy Agency.

Attack prevention

Markey highlighted the fact that nuclear power plants, under 10 CFR 50.13, do not need to be protected "against the effects of . . . attacks and destructive acts, including sabotage, directed against the facility by an enemy of the United States, whether a foreign government or other person . . .," because this protection would be provided by national defense. In light of the September 11 attacks, Markey asked if the NRC and the nuclear industry should shoulder the burden of appropriate measures to protect the public from the consequences of acts of terrorism on nuclear plants.

Meserve answered that the NRC could not currently determine what changes may be appropriate regarding the responsibilities of the industry to protect against acts of terrorism

and the responsibilities of U.S. security agencies. Meserve added that the NRC had started a full review of its security standards, and that this review may bring to light some need to change the division of responsibilities between the government and the private sector. Moreover, Meserve commented, the NRC's interactions with the newly established Office of Homeland Security and other agencies should help to further clarify where the lines between the industry's responsibilities and the national government's should be drawn.

Currently, consistent with 10 CFR 50.13, licensees are not required to protect against offensive military actions by foreign governments (such as aircraft attacks). Such actions, Meserve stated, have ramifications for U.S. security (not only the security of an individual facility) and, as a practical matter, may be beyond the defensive capability of private organizations. Protection against these types of attacks may be more appropriately the responsibility of the national defense establishment.

On the other hand, 10 CFR 73.1(a)(1) requires that nuclear power plants must be protected by well-trained and well-equipped guards against violent actions, and Meserve assured that these guards and other protections are in place.