

STATEMENT FOR THE RECORD

by

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to the

Subcommittee on Clean Air and Nuclear Safety
United States Senate

March 24, 2009

Chairman Carper, Ranking Member Vitter, and members of the committee, thank you for your interest in nuclear energy and in addressing the dramatic improvements in nuclear plant safety and efficiency that have occurred since the accident at Three Mile Island.

My name is Marvin Fertel. I am the president and chief executive officer of the Nuclear Energy Institute (NEI). NEI is responsible for establishing unified nuclear industry policy on regulatory, financial, technical and legislative issues affecting the industry. NEI members include all companies licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

Introduction

This month marks the thirtieth anniversary of the accident at the Three Mile Island 2 nuclear power plant. I'm proud to report that since then, the nuclear power industry and the government have dramatically increased their standards and developed a culture of safety among the best in American industry. No member of the public has been injured by radiation from a U.S. commercial nuclear power plant in over 50 years of commercial operation.

The accident at Three Mile Island had profound and lasting effects on virtually every aspect of nuclear power plant safety and operation, including training, maintenance and regulation. The lessons learned from the accident are permanently ingrained in the nuclear industry's training, procedures, regulations and culture.

One of the most significant outcomes of the accident was the formation by the industry of the Institute of Nuclear Power Operations (INPO) in Atlanta. INPO was formed nine months after the accident to drive operational excellence, open communications and continuous improvement among all U.S. nuclear plant operators. All energy companies that own and operate nuclear power plants in the United States are members of INPO and they continuously strive for excellence in reactor operations. As part of this commitment, INPO coordinates the sharing of operating experience

among all U.S. nuclear plants. The sharing of best practices and lessons learned from operating experience is instilled in the work force culture at all plants and this has been a model for worldwide sharing of information related to reactor operations.

Another noteworthy enhancement in the industry was the development of emergency planning and response programs at each nuclear energy facility. These programs are among the best in the nation. These also serve as model programs to other industries and to state and municipal emergency response programs.

Industry Commitment to Safety Is Paramount

The key lesson is that safety is paramount and must forever be the industry's highest priority. Workers at all levels are trained to focus on safety to protect the health and well-being of the public, their coworkers and the environment. Following the accident, all aspects of plant design, operations and equipment reliability were studied and substantially upgraded to ensure safety. Today, the U.S. nuclear energy industry is performing at the highest levels of safety, reliability, efficiency and productivity in its history and is the global leader in nuclear energy production.

The U.S. nuclear energy industry's top priority is, and always will be, the safe and reliable operation of our existing plants. Safe, reliable operation drives public and political confidence in the industry, and America's nuclear plants continue to sustain excellent levels of performance.

The industry's safety performance at 104 commercial reactors around the country has been sustained at exemplary levels, as indicated by numerous government and industry safety measures. This performance is the result of several factors, including high standards of operations, plant designs built and operated with a "defense-in-depth" safety philosophy, government and industry oversight of plant operations, and the dedication of a well-trained and experienced work force that recognizes that safety is the key to successful plant operations.

The U.S. Nuclear Regulatory Commission (NRC) recently highlighted the dramatic improvements in every aspect of nuclear plant performance over the last two decades: "The average number of significant reactor events over the past 20 years has dropped to nearly zero. Today there are far fewer, much less frequent and lower-risk events that could lead to reactor core damage. ... Radiation exposure levels to plant workers have steadily decreased to about one-sixth of the 1985 exposure levels and are well below federal limits. The average number of unplanned reactor shutdowns has decreased by nearly ten-fold."

In 2008, the average capacity factor for U.S. reactors was over 90 percent, and output of more than 800 billion kilowatt-hours represented nearly 75 percent of U.S. carbon-free electricity. According to the quantitative performance indicators monitored by the NRC, last year's performance was the best ever. This performance represents a solid platform for license renewal of existing plants and construction of advanced reactor designs.

No Public Health Impacts

TMI-2 was permanently shut down after the accident in 1979. It is now in long-term monitored storage, which means that no further use of the plant is anticipated. TMI-2 is no longer licensed to operate. FirstEnergy Corporation owns TMI-2 and is responsible for its eventual decommissioning. Exelon Corporation, owner of Three Mile Island-1, monitors the closed reactor and maintains equipment necessary to keep the plant in safe, long-term storage.

TMI-2 has been cleaned and safely decontaminated. The fuel was removed and shipped to Idaho for long-term storage at the Idaho National Laboratory. Low-level radioactive waste from the accident was shipped to Richland, Wash. Approximately 1 percent of the fuel and debris from the accident remains in the TMI-2 reactor vessel because it is in inaccessible parts of the vessel. This will be removed when the unit is fully decommissioned.

The TMI-2 cleanup took approximately 14 years to complete and cost about \$1 billion. Cleanup began in August 1979 and was completed in December 1993. In February 1991, the TMI-2 cleanup program was named by the National Society of Professional Engineers as one of the top U.S. engineering achievements completed during 1990.

The TMI-2 accident caused no injuries to workers or the public, but there was emotional distress as a result of the evacuation of residents near the plant. At least a dozen epidemiological studies conducted since 1981 have found no discernible direct health effects to the population in the vicinity of the facility. Studies of the consequences of the accident were conducted by the NRC, the Environmental Protection Agency, the Department of Health, Education and Welfare, the Department of Energy and the state of Pennsylvania. The average dose to about 2 million people in the area was only about 1 millirem, according to the results of these and independent studies. In comparison, a chest x-ray results in about 6 millirem of radiation exposure. The public's average dose from natural radiation is 100-125 millirem per year for that area.

A federal appeals court in 2003 dismissed the consolidated cases of 2,000 plaintiffs seeking damages against the plant's former owners for health problems they alleged were caused by the accident. The court said the plaintiffs had failed to present evidence they had received a radiation dose large enough to cause possible health effects.

Decades of research and scientific studies have shown no negative health effects on the population surrounding the plant. Several studies were conducted by the Pennsylvania Department of Health. The conclusions are summarized below:

- A 1981 study reported that if the accident had any effect on infant death rates, there would have been a significant increase in the six months after the accident. Instead, the infant death rate was lower than normal.

- A 1982 study found that the incidence of congenital hypothyroidism within a 10-mile radius of the plant was well within a normal range in the year after the accident.
- A 1982 study found no measurable impact on infant mortality within a 10-mile radius of the plant, compared with infant mortality rates for Pennsylvania for 1977-1979.
- A 1985 study found no significant difference in cancer mortality within a 20-mile radius of the plant during the five years preceding the accident and the five years following it. In a more detailed analysis of four communities downwind of the plant, the study found no significant abnormalities in either cancer mortality or cancer incidence among residents considered to be at potentially higher risk.
- A 1988 study found no connection between radiation or psychological stress and failed and complicated pregnancies, such as fetal and neonatal mortalities and other problems.
- A 1989 study found no significant abnormalities in cancer mortality or incidence among residents of selected communities near the plant.
- Two 1991 studies showed no increased cancer incidence among people who lived near the plant in 1979. One study involved the general population living within a 5-mile radius of the plant; the other involved women of child-bearing age who lived within a 10-mile radius.

In addition to the Pennsylvania Health Department studies, several other studies have examined the health impact of the TMI accident on the population:

- A study presented at the 1988 annual meeting of the American Public Health Association compared post-accident cancer deaths over a six-year period for residents within a 5-mile radius of the plant with cancer deaths of a large control population. The study concluded that the normal death rate and life expectancy for people around TMI were not affected by the accident.
- Another study presented at the meeting concluded that—based on a comprehensive analysis of statistical data by health researchers—fetal and infant mortality in the vicinity of the plant were neither significantly higher than expected nor significantly different from those in the years before the accident.
- Several prominent scientists from Columbia University and the National Audubon Society studied cancers among the nearly 160,000 residents within a 10-mile radius of the TMI plant. The principal cancers considered were leukemia and childhood malignancies. The study, issued in September 1990, concluded: “Overall, the pattern of results does not provide convincing evidence that radiation releases from the Three Mile Island nuclear facility influenced cancer risk during the limited period of follow-up.”

- In 1990, the National Cancer Institute of the National Institutes of Health released the results of a two-year study of cancer data in 107 U.S. counties that contained, or were adjacent to, major nuclear facilities that had begun operations before 1982. Among the counties were York, Lancaster and Dauphin near the TMI plant. The study found no increased cancer mortality for people living near nuclear installations. The study also found no evidence that leukemia for any age was linked to routine operations at the TMI reactors or to the accident at TMI- 2.
- In 2002, researchers at the University of Pittsburgh's Graduate School of Public Health (GSPH) conducted a 20-year follow-up study of mortality data on residents living within a 5-mile radius of the plant. The study found no significant increase in overall deaths from cancer. "This survey, which covers the normal latency period for most cancers, confirms our earlier analysis that radioactivity released during the nuclear accident at TMI does not appear to have caused an overall increase in cancer deaths among residents of that area over the follow-up period, 1979 to 1998," said Evelyn Talbott, professor of epidemiology at GSPH and principal investigator on the study.

Comprehensive Insurance Protection in the Event of an Accident

The nuclear power industry has an industry-financed umbrella of more than \$10 billion in liability insurance protection to be used in the event of a reactor incident. This protection consists of two tiers. The primary level provides \$300 million in liability insurance. This first-level coverage consists of the liability insurance provided by two private insurance pools. The pools are groups of insurance companies pledging assets that enable them to provide substantially higher coverage than an individual company could offer. If this amount is not sufficient to cover claims arising from an accident, secondary financial protection applies.

For this second level, each nuclear plant must pay a retrospective premium equal to its proportionate share of the excess loss, up to a maximum of \$100.6 million per reactor per accident. This includes a \$95.8 million premium and a 5 percent surcharge that may be applied, if needed, to legal costs. Currently, all 104 operating nuclear reactors are participating in the secondary financial protection program.

The TMI accident demonstrated the ability of this insurance to effectively provide care for the public. People who suffered financial losses as a result of the precautionary evacuation following the incident were promptly paid, demonstrating the effectiveness of the industry's liability insurance protection under the Price-Anderson Act. In addition, businesses were compensated for loss of revenue, and the state and local community were compensated for the expenses incurred during the response to the accident. There was no financial payment from federal funds.

Immediately following the accident, Pennsylvania's governor recommended the evacuation of pregnant women and families with young children living in the area closest to the plant site. At the time of the accident, the private insurance pools had \$140 million in first-level coverage in force.

The pools immediately assembled insurance adjusters from across the country at a central claims office in Harrisburg, Pa.

These adjusters advanced money to families affected by the governor's recommendation for living expenses incurred while away from their homes, with the request that any unused funds be returned. Recipients responded by sending back several thousand dollars. In addition, the insurance pools reimbursed 636 individuals and families for lost wages as a result of the accident.

In addition to the cash advances and reimbursements, the insurance pools later settled a class-action suit for economic loss filed on behalf of people living in a 25-mile radius of TMI-2. The last of the litigation was resolved in early 2003. Industry insurance pools have paid approximately \$71 million in claims and litigation costs connected with the Three Mile Island 2 accident. Utilities—not the public or the federal government—pay for this insurance.

A Watershed Event That Enhanced Nuclear Safety

The Kemeny Commission—established by President Carter to investigate the TMI accident—recommended that:

- The nuclear power industry should establish a program that specifies appropriate safety standards, including those for management, quality assurance, and operating procedures and practices, and that conducts independent evaluations.
- There must be a systematic gathering, review and analysis of operating experience at all nuclear power plants coupled with an industry-wide international communications network to facilitate rapid flow of this information to affected parties.

As a result of TMI and the commission's recommendations, the industry began safety and operational performance improvements that have now reached a level considered to be the premier benchmark of global nuclear plant performance.

The industry formed the Institute of Nuclear Power Operations and charged it with promoting the highest levels of safety and reliability in the operation of nuclear power plants. Accordingly, it does not supplant the role of the government regulator, but rather complements a strong and capable NRC by providing a means for the industry, acting collectively, to make nuclear operations safer and more reliable.

INPO has had a profound impact on the way nuclear plants are managed and operated. The proof is the steady improvement in plant performance in the nearly 30 years since the accident.

To improve training, INPO in 1985 formed the National Academy for Nuclear Training to focus and unify industry efforts to continually improve training and qualification programs and to promote

professionalism of nuclear plant personnel. The academy reviews nuclear utilities' training programs for key positions at each plant.

Nuclear professionals from all levels of their organizations attend training at the INPO facility in Atlanta and take various INPO online courses. INPO also evaluates individual plant and utility training programs to identify strengths and weaknesses and recommend improvements. Selected operator and technical training programs are accredited through an independent National Nuclear Accrediting Board composed of academic scholars and business executives.

The industry also performs evaluations of nuclear power plant operation. INPO provides a unique form of self-regulation and recognition that the nuclear industry standard is excellence. INPO teams conduct on-site, two-week inspections at each plant once every two years to assess the knowledge and performance of plant personnel, the condition of systems and equipment, the quality of programs and procedures, and the effectiveness of plant management. INPO provides a detailed report and a formal post-inspection briefing with the company leadership, including the chief executive officer of the company that operates the plant, to report on plant strengths and areas for improvement and to provide an overall assessment of performance relative to industry standards of excellence.

Yearly, INPO conducts a private meeting of all industry chief executive officers, in which both good and poor performance is openly discussed, providing accountability for plant performance at the highest levels of management. INPO also shares plant assessment information with Nuclear Electric Insurance Limited (NEIL), providing one source of information used in each company's insurance rating.

INPO also reviews significant events at nuclear plants and communicates lessons learned and best practices throughout the industry. INPO provides assistance with specific technical or management issues in areas related to plant operation and support.

TMI Lessons Ingrained in Industry Training and Procedures

The lessons learned from the TMI accident will not be forgotten because they are permanently ingrained in the industry's training, procedures, regulations, and the culture of its work force. The accident profoundly and forever changed how the industry operates and maintains the plants and where it focuses its attention. That focus is on safety.

The industry and the NRC acted swiftly after the accident to determine the causes and take action to prevent any similar occurrence. All aspects of plant design, operations and equipment reliability related to nuclear safety were substantially upgraded throughout the industry. Expanded capabilities were put in place for accident prevention, mitigation, radiation monitoring and emergency preparedness. This includes greatly enhanced notification and communications systems, dedicated emergency response facilities, rigorous training and NRC-graded exercises that include local, state and federal authorities to test each plant's ability to respond to emergency conditions. Immediate

NRC notification is required for plant events and the NRC staffs an operations center 24 hours a day.

As a result of the accident, the industry increased staffing levels and the number of reactor operating crews was expanded. Reactor operator training is extremely rigorous, including biennial NRC licensing examinations and the use of a full-scale, state-of-the-art control room simulator at every plant. Every nuclear reactor operator in the nation is trained on the TMI accident so they can understand how it happened, how it was responded to, and the changes that have been made to ensure it doesn't happen again.

The NRC said, "The TMI-2 accident had the greatest impact on nuclear generation of any single event in history." After the incident, the NRC greatly expanded and intensified its controls and oversight and introduced additional regulations requiring numerous plant modifications that increased the operational safety margin. Other improvements include upgrading and strengthening of plant design and equipment, including instrumentation and controls, fire protection, piping systems, auxiliary feedwater systems, containment building isolation, reliability of individual components (pressure relief valves and electrical circuit breakers), and the ability of plants to shut down automatically. The NRC also expanded its resident inspector program— first authorized in 1977— whereby at least two inspectors live nearby, have unlimited access to the plant, and work exclusively at each plant to provide daily surveillance of licensee adherence to NRC regulations.

The industry also introduced plant-specific simulators at each site. Before the event, there were only four simulators for the use of all nuclear plant operators. The number of operating crews was expanded and each crew is rotated through training in the plant simulator every six weeks. Companies that operate U.S. reactors also introduced additional and more detailed administrative, engineering and operational procedures. Most importantly, the emphasis given to training was significantly increased, not only for operators but also for support personnel. Each plant had to attain accreditation through the independent National Nuclear Accrediting Board.

Although emergency preparedness procedures had been in place prior to the TMI accident, it was clear from the events that additional action was necessary. As a result, the industry developed comprehensive emergency preparedness and response programs in cooperation with federal, state and local leaders. Additional requirements by the NRC and Federal Emergency Management Agency improved public alerts and public communication. Sirens were required to be installed and protocols were established with local communities and officials to ensure the local population was aware of what actions to take in the event of an accident.

Once the initial TMI modifications had been completed, the industry embarked on a series of additional assessments to identify possible latent vulnerabilities. The insights and recommendations from these assessments resulted in additional plant modifications and procedural enhancements that further increased the operational safety margins and reduced the probability of a reactor accident. The assessments covered plant transients as well as events caused by natural phenomena, such as extreme hurricanes and floods.

One of the nuclear energy industry's tenets is never becoming complacent in our vigilance to safely operating nuclear energy facilities. An industry culture that evaluates operating issues of many types and applies lessons learned from them across all nuclear power plants continues today. This was most recently demonstrated after reactor vessel head corrosion was discovered at the Davis-Besse plant in Ohio. The industry's detailed examination of this event and the lessons learned from it resulted in a multi-million dollar commitment by industry leaders to expand research into materials issues at all nuclear power plants. The industry is taking a proactive approach to identify and resolve emerging materials issues more effectively. The goal is to identify materials performance problems well in advance of a significant impact on plant operation.

Industry Performance

The nuclear industry measures its overall progress through the World Association of Nuclear Operators Performance Indicator Program. The 2010 goals, which are based on individual unit goals and current industry performance, provide challenging benchmarks of excellence against which safety and operational progress can be measured. These indicators are: collective radiation exposure, fuel performance, unplanned automatic scrams, forced loss rate, unit capability, safety system performance, industrial safety and chemistry performance. An example of the continuing drive toward excellence and guarding against complacency are the steps INPO took in 2003 to establish principles of safety culture:

- Nuclear safety is everyone's responsibility.
- Leaders demonstrate commitment to safety.
- Trust permeates the organization.
- Decision-making reflects safety first.
- Nuclear is recognized as different.
- A "what-if" culture is cultivated.
- Organizational learning is embraced.
- Nuclear safety undergoes constant examination.

Performance at Three Mile Island-1 Is World-Class

Three Mile Island 1, which is owned and operated by Exelon Nuclear, has one of the best safety and operating records in the industry. It has held four world records for continuous operation and was rated among the top 20 reactors in the world for capacity factor, a measure of plant efficiency, in 2008 by Platts. TMI-1 operated at 99.37 percent capacity factor during 2008, according to Platts.

TMI-1 generates 852 megawatts of clean, safe and reliable electricity for more than 800,000 homes in Pennsylvania. Power needs across central Pennsylvania and the United States are projected to increase, and there is growing concern about climate change. To help meet that growing demand and to help keep our environment clean, Exelon Nuclear applied in 2008 to the NRC for a 20-year extension to the plant's operating license. The current license expires in 2014. With license

extension, TMI can continue to provide central Pennsylvania with safe, clean, reliable power until 2034.

Without TMI-1, the region would need an alternative energy source to meet electricity demand. By replacing TMI-1 with a coal-fired power plant similar in size, 271 metric tons of carbon dioxide *per hour* would be emitted into the environment by the coal plant. The operation of Three Mile Island avoids harmful air emissions and improves the region's air quality.

The plant generated about 7,768,614 kilowatt-hours of electricity in 2008. This low-cost electricity helped keep energy prices affordable in the Mid-Atlantic Area Council sub-region, where the plant is located. Three Mile Island's production cost was 1.76 cents per kilowatt-hour in 2004, compared with an average production cost of 2.84 cents per kilowatt-hour for the rest of the regional market.

Three Mile Island's economic impact reaches beyond the local community to the state and nation, according to a 2005 study by the Nuclear Energy Institute. In 2004, plant operation increased Pennsylvania's economic output by \$86.1 million, including \$5.8 million in Dauphin County, where the reactor is located.

Conclusion

The accident at Three Mile Island had profound and lasting effects on virtually every aspect of nuclear power plant safety and operation, including operation, maintenance and regulation. The lessons learned from the accident are permanently ingrained in the nuclear industry's training, procedures, regulations and culture.

One of the most significant outcomes of the accident was the formation by the industry of the Institute of Nuclear Power Operations (INPO) in Atlanta. INPO drives operational excellence, open communications and continuous improvement among all U.S. nuclear plant operators and all energy companies that own and operate nuclear power plants. We continuously strive for excellence in reactor operations.

Given the improvements in operational and design safety margins, the modifications and increased accident mitigation measures and procedures, and the increased emphasis on training and quality, nuclear power plants will continue to operate safely. Through the embedded safety culture and principles that have been established through INPO and strict NRC oversight, complacency among the industry's well trained and professional workforce is kept at bay.

Thirty years after the TMI accident, the industry has become more efficient, more productive, more professional, and, above all, more committed to safety. We will not allow history to repeat itself. Safety is, and will continue to be, our highest priority. It is only by operating our 104 reactors safely that nuclear energy will continue to be a vital part of our nation's low-carbon energy portfolio.