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Christine Pineda
Project Manager
Office of Nuclear Material Safety and Safeguards
Mailstop EBB-2B2
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001.

Dear Ms. Pineda:

My background includes substantial experience with commercial spent nuclear fuel and my current assignment with the NNSA/DOE provides direct experience with nuclear fuel production from DOE materials. There are many issues such an EIS needs to consider beyond what the draft report currently contains.

Missing from the report is the human factors evaluation to indicate how the current substantial knowledge base of nuclear fuel handling is to be maintained. At current commercial nuclear power plants there is a large and technically skilled workforce that may not be there in 300 years. With at least some new commercial nuclear plants being built, there would be a minimal degree of continuity of such knowledge. This would get us to the 200 years assumed in the draft report. Where this knowledge is critical is in the area of Extended Storage Research, (Draft Report Section 10).

One key area of needed research covers spent fuel pool gates and their seals and overall pool integrity. As shown in the Japan accidents this past year, loss of covering and cooling water is the root cause of those releases of radioactivity. Hence, addressing robust power and water supply needs is a must. I would refer you to the attached article in PE Magazine on one such robust power and water supply scheme.

Please consider the following more specific comment.

Scenario 4 – Interim onsite storage and shipment to at least one reprocessing facility

This scenario should take into account NRC regulation of the DOE Mixed Oxide Facility (MOX) at Savannah River Site. This MOX site will have some experience handling the Plutonium from spent fuel if NRC would allow such experiments. This experience would provide the means to validate assumptions and to indicate what degree of reprocessing of commercial spent nuclear fuel would be possible.

Thank you,

Sidney Keener, PE
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National Nuclear Security Adminstration
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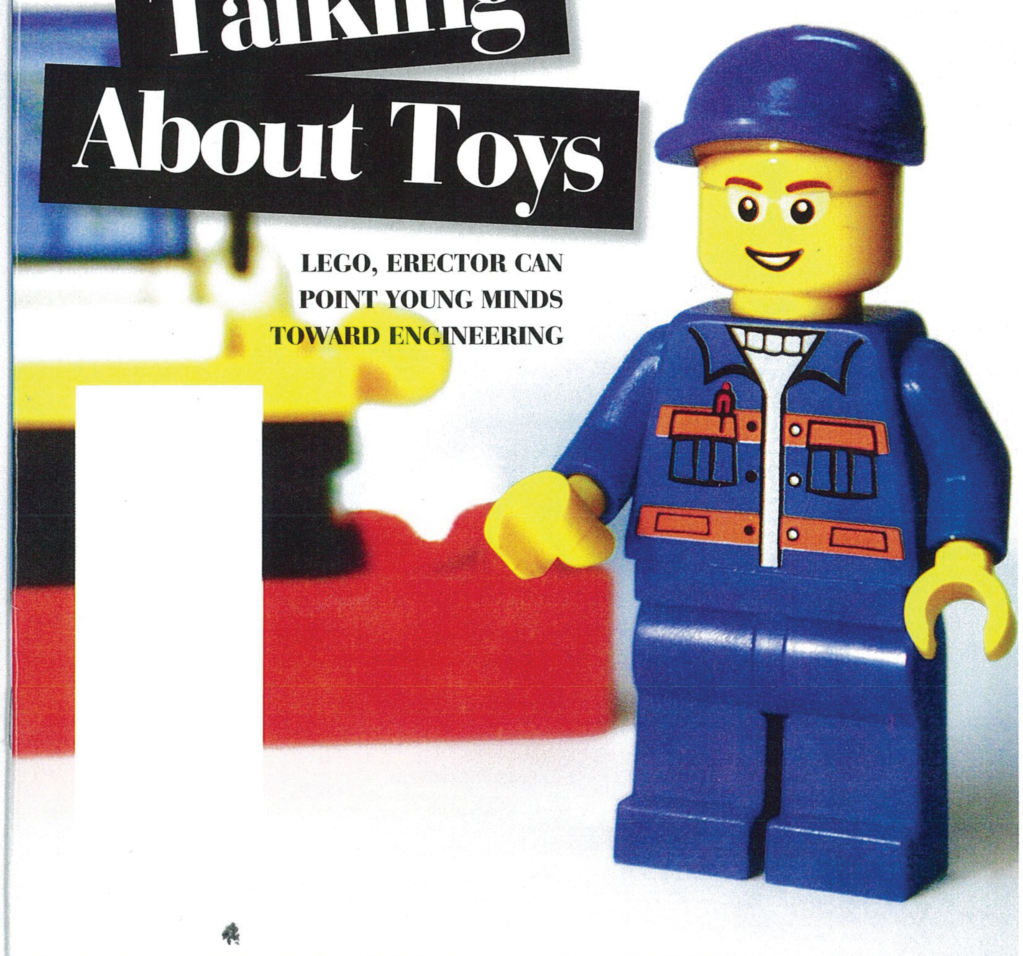

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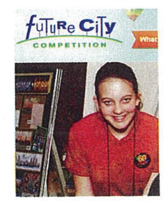

Beyond Design Basis Accidents Are Now Credible Accidents

BY JOHN F. HENEAGE, P.E.

The Titanic, an unsinkable ship, sunk. Prior to the Titanic disaster, passenger ships did not carry enough life boats for all on board. After the sinking, common sense prevailed and passenger ships were required to have life boat capacity for everyone. In a similar fashion, the evolving accident at the Fukushima Dai-Ichi Reactor Complex in Japan has exposed fundamental flaws in the design basis for light water reactors.

LWR design requirements are based on defining the maximum stresses, known as design basis events (DBE), that a plant is expected to encounter in its operating lifetime. Exceeding a DBE can lead to a design basis accident. DBEs include, for example, fire, tsunami, coolant pipe break, earthquake, hurricane, loss of offsite power, and station blackout. In mitigating design basis accidents, there are allowances for a single failure in the plant safety systems. Plants, including Fukushima Dai-Ichi, have two redundant safety systems, which were, until now, considered adequate for addressing design basis accidents. The design methodology implied that if the plant could handle a DBE, then it would be safe. Some events are considered beyond design basis events (BDBE). Since BDBEs are considered highly unlikely, based in part on probabilistic risk analysis, there are few provisions to deal with them.

At Fukushima Dai-Ichi two BDBEs occurred, first the earthquake and then the tsunami. The earthquake caused the loss of offsite power and the tsunami destroyed the plant's critical cooling water intake structures and the emergency generators. The resultant reactor meltdowns confirm that present LWRs are probably not capable of withstanding BDBEs and that their occurrence is possible.

TOKYO ELECTRIC POWER CO.'S FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT IN FUKUSHIMA PREFECTURE, JAPAN.

PHOTO BY GETTY IMAGES

To safely operate an LWR, four items must pass to and from the plant: electricity, water, air, and people. Accidents can impact all of these. In an accident, the critical immediate needs are electricity and cooling water. A plant is in serious trouble if BDBEs occur that inhibit their passage. The Fukushima Dai-Ichi disaster occurred because electric power and the plants' service water systems were made inoperable by the BDBEs. Without cooling water, the reactor and fuel pools overheated and the resultant meltdowns are now history.

The flaw in the original design basis—no backup systems for the key electric and cooling water systems—can be addressed by providing each light water reactor with backup service water and electrical supply systems (BSWESS) that are independent of all external systems. The addition of these systems can be likened to the use of ballistic parachutes for airplanes. When all else fails, the parachute will lower the plane safely to the ground.

After watching the Japanese plants literally explode, no assurances will satisfy the public—only concrete action with realistic explanations. Nuclear plants need a big life boat when the unlikely becomes reality.

A BSWESS on each plant most likely would have mitigated the Fukushima Dai-Ichi accident. BSWESS would consist of stand-alone hardened concrete structure with watertight and impact resistant louvers and doors. The concrete enclosure would house large fan-cooled radiators, electric and diesel driven pumps, a large generator(s) and approximately seven days of fuel. If the normal service water or electric systems were damaged, this system would be activated to provide radiator-cooled service water and electricity to the plant. Two of these structures would be located adjacent to each existing plant, but at separate locations to minimize the possibility of a common accident impacting both.

Clearly the nuclear industry has not adequately addressed the risks of BDBEs. Unsinkable ships do sink. Murphy's Law is still valid: "If it can go wrong, it will go wrong." It is going to take some time for all the Fukushima Dai-Ichi accident facts to be cataloged, analyzed, published, and a course of action agreed to by the industry and regulators. Historically, major nuclear accidents (e.g., Three Mile Island, Chernobyl) have frozen the nuclear industry while the collective response is formulated. With three major accidents, it is unlikely that the public will be willing to accept industry assurances that these plants are "safe." Indeed a number of national referendums on nuclear power have already canceled this option (e.g., Germany, Italy, and Switzerland).

The industry should take the initiative and begin making plant modifications to address possible but extremely unlikely BDBEs. If the industry freezes here, then we may see the end of the emerging nuclear renaissance, and the world will have to wait for alternate nuclear technologies to be developed and accepted.

Practically and politically speaking, the continued and future use of light water reactor technology is in question. Right now, it is obvious that some sort of BSWESS should be installed at all of the operating plants. The industry would be well advised to begin design and installation of such systems as well as insist that long-term storage and reprocessing be reinstated to offload the excessive amount of spent fuel stranded at the operating plants.

The Japanese government has just required additional emergency generators for all nuclear plants, that is, they have endorsed one half of this proposal. Now the industry needs to recognize that additional redundant and isolated service water systems are also required. Electricity alone will not cool a nuclear power plant. The industry needs to acknowledge that some aspects of the critics' concerns are valid, especially as the operating life of existing plants is extended.

After watching the Japanese plants literally explode, no assurances will satisfy the public—only concrete action with realistic explanations. Nuclear plants need a big life boat when the unlikely becomes reality.

NSPE member John F. Heneage, P.E., is a practicing nuclear engineer employed by URS Corp. He has participated in the design, operation, analysis, and licensing of over a dozen national and international nuclear power facilities. He holds a senior reactor operator's license for a plant similar to Fukushima Dai-Ichi.

The views expressed are his own and not those of his employer. He can be reached at jheneage@gmail.com.

***Conceptual Sketch:* Backup Self-Contained Service Water System and Emergency Generator Enclosure**