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Rulemaking Comments

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Public Comments Regarding

NRC's Consideration of the Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation

and

Waste Confidence Decision Update

Submitted to NRC via Rulemaking.Comments@nrc.gov

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SECY-02

Re: NUCLEAR REGULATORY COMMISSION, 10 CFR Part 51, RIN: 3150–AI47, [NRC–2008–0404], Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation, Nuclear Regulatory Commission, Proposed rule, Federal Register / Vol. 73, No. 197 / Thursday, October 9, 2008 / Proposed Rules, beginning at page 59547.

and

NUCLEAR REGULATORY COMMISSION, 10 CFR Part 51, [Docket ID–2008–0482], Waste Confidence Decision Update, Nuclear Regulatory Commission, Update and proposed revision

of Waste Confidence Decision, Federal Register / Vol. 73, No. 197 / Thursday, October 9, 2008 / Proposed Rules, beginning at page 59551.

Introduction

The U.S. Nuclear Regulatory Commission's (NRC) "Nuclear Waste Confidence Decision" is actually a confidence ***game***, a swindle by which NRC and the nuclear power industry attempt to gain the confidence of the American people that the high-level radioactive waste dilemma is well in hand, and therefore nuclear utilities can continue making unlimited amounts of forever hazardous irradiated atomic fuel. NRC uses its "Confidence Decision" to reject any challenges to new reactors, or old reactor license extensions, based on the solid contention that there is no safe solution for deadly radioactive waste. The problem is, 67 years after Enrico Fermi first split the atom during the Manhattan Project, and 52 years after the first commercial reactor in the U.S. began operations (and irradiated nuclear fuel generation) at Shippingport, Pennsylvania, we still have yet to permanently deal with the first cupful of high-level radioactive waste generated in a safe, sound, secure manner.

Now the Obama administration is poised to end, once and for all, the dangerous Yucca Mountain dumpsite as geologically unsuitable. This comes not a moment too soon, not only because Yucca Mountain would have leaked massively into the environment had waste ever been buried there, but because the Western Shoshone Indians refused to allow the dumping. Yucca Mountain is sacred to the Western Shoshone (traditional ceremonies are still held there), and within their homelands, as recognized in the "peace and friendship" Treaty of Ruby Valley, signed by the U.S. government in 1863.

Thus, we are back to where we started in 1957 – the year the first commercial atomic reactor fired up, and the year the National Academy of Science reported that geologic disposal was the preferred method for high-level radioactive waste management – with no known geology anywhere in the country, or even the world for that matter, that is guaranteed to safely isolate these wastes for the million years and more that they will remain harmful to humans and the environment.

Now NRC is poised to license a new generation of nuclear plants, by proposing to "reaffirm" that after over five decades of unsuccessful efforts by the US government to develop a safe permanent repository for radioactive waste, NRC still has "confidence" that it is technically feasible to find such a place. To hedge its bet, NRC has extended the time period in which it thinks that this can be accomplished to within 50-60 years

beyond the operating lifetime of a reactor, from its original prediction of 30 years. NRC is thereby "kicking the can down the road," deferring any acknowledgement that the high-level radioactive waste dilemma may in fact be un-solvable unless and until geology is identified that is guaranteed not to leak the deadly radioactivity into the living environment for as long as it remains hazardous, which is in fact much longer than even the one million years of hazards recognized by the U.S. Environmental Protection Agency. NRC is downplaying the severity of problems that come with the siting and licensing of a repository and incorrectly concludes that political resistance rather than legitimate technical problems is the reason that *no* country in the world has a repository.

At the same time, NRC is proposing to continue to allow radioactive waste to accumulate at reactor sites in high-density storage pools. While conceding the vulnerability of these pools to catastrophic fires caused by accidents or attacks, NRC refuses to require licensees to use hardened on-site storage, which would significantly reduce the acute risks of accidents and attacks (although the million year or longer hazard of irradiated fuel would remain, vulnerable to eventual release into the environment over time, if its containment system degrades and fails). Instead, NRC claims it has reduced the risk to an acceptable level by imposing secret security measures on pool storage.

NRC that it must conduct a full Environmental Impact Statement analysis, as required by the law.

NRC Uses its Waste Confidence Decision to Rubberstamp Permission Irradiated Nuclear Fuel Generation by Nuclear Utilities Despite the Lack of a Safe, Sound Permanent Solution for the Million Year Hazard Created

Despite its failure to evaluate whether and in what time frame irradiated nuclear fuel generated by atomic reactors can be safely disposed of, NRC has nonetheless rubberstamped 47 twenty year license extensions at old reactors in the U.S. since the mid-1990s, and is now considering permitting the construction and operation of dozens of new reactors.

Beyond Nuclear contends that the Environmental Reports (ERs) for new reactor Combined Construction and Operating License Applications (COLAs), as well as ERs for proposed twenty year license extensions at old reactors, are fatally flawed because they fail to

discuss the environmental implications of the lack of options for permanent disposal of

the irradiated (euphemistically called "spent" by NRC and industry) fuel that will be generated by the proposed new reactors if built and operated, as well as by twenty year license extensions at old reactors. Nor has the NRC made an assessment on which the American people can rely regarding the degree of assurance now available that radioactive waste generated by the proposed new reactors, and prolonged operations at old reactors, "can be safely disposed of [and] when such disposal or off-site storage will be available." Final Waste Confidence Decision, 49 Fed. Reg. 34,658 (August 31, 1984), citing *State of Minnesota v. NRC,* 602 F.2d 412 (D.C. Cir. 1979). Accordingly, the ERs for new reactors and license extensions fail to provide a sufficient discussion of the environmental impacts of the proposed new nuclear reactor.

The ERs for the proposed new reactors and license extensions commonly do not contain any discussion of the environmental implications of the lack of options for permanent disposal of the irradiated fuel to be generated. Therefore, it is fatally deficient. *State of Minnesota v. NRC,* 602 F.2d at 416-17.

For example, in the Calvert Cliffs Unit 3 COLA, at Part 3 of the Environmental Report at Chapter 5.7.6, about Uranium Fuel Cycle Impacts, the new reactor license applicant states:

> "Federal Law requires that high level and transuranic wastes are to be buried at a repository and no release to the environment is expected to be associated with such disposal because it has been assumed that all of the gaseous and volatile radionuclides contained in the spent fuel are no longer present at the time of disposal of the waste. In NUREG-0116 (NRC, 1976), which provides background and context for the high level and transuranic Table S–3 values, the NRC indicated that these high level and transuranic wastes will be buried and will not be released to the environment.
>
> The NRC has already concluded that for applicants seeking an Early Site Permit (ESP), these impacts are acceptable, and would not be sufficiently large to require a NEPA conclusion that the construction and operation of a new nuclear unit at the sites should be denied."

First, the U.S. Department of Energy recognizes that significant radioactivity releases from a Yucca Mountain repository would in fact occur over time. See, for example, U.S. DOE Office of Civilian Radioactive Waste Management, "NWTRB Repository Panel meeting: Postclosure Defense in Depth in the Design Selection Process," presentation for the Nuclear Waste Technical Review Board Panel for the Repository, January 25, 1999. Also, the U.S. Environmental Protection Agency's final Yucca Mountain radiation release regulations, requiring that such radiation release regulations extend out to a million years post waste burial, shows that such releases will continue for many hundreds of thousands of years into the future. EPA's proposed dose limit from Day 1 to Year 10,000 post burial is 15 millirems/year from all pathways of exposure. EPA's proposed dose limit from Year 10,000 to Year 1,000,000 post burial is 100 millirems/year from all pathways of exposure. Thus, the post Year 10,000 standard would allow for six to seven fold higher radioactivity doses to persons downstream than the pre Year 10,000 standard, a prima facie violation of the long established international moral and ethical norm referred to as "intergenerational equity." In summary, Yucca Mountain would experience significant radioactivity releases into the distant future, despite any license applicant or NRC statements to the contrary. See United States. Environmental Protection Agency. "40 CFR Part 197: Public Health and Environmental Radiation Protection Standards for Yucca Mountain , Nevada : Proposed Rule." Federal Register, v.73, no. 200, October 15, 2008, pages 61256-61287.

Thus, the Calvert Cliffs 3 COLA's assertion that "no release to the environment is

expected to be associated with such disposal" is obviously false. While Unistar Limited Liability Corporation may have intended to rely on the NRC's Waste Confidence decision, issued in 1984, and most recently amended in 1999, that decision is inapplicable because it applies only to plants which were then currently operating, not new plants, and especially not dozens of new reactors as are now proposed across the country. The second finding of the Waste Confidence Decision, as amended in 1999, is that the Commission has reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and that sufficient repository capacity will be available within 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of any reactor to dispose of the commercial high-level radioactive waste and spent fuel originating in such reactor and generated up until that time. Waste Confidence Decision Review: Status, 64 Fed. Reg. 68,005, 68,006 (December 6, 1999). But in the current proposal, NRC is removing any date certain for the opening of a repository, and prolonging the "wait" for off-site relief from 30 years post reactor shutdown to 50 to 60 years. This represents a game of kicking the radioactive can down the road, an irresponsible shirking of this generation's moral obligations to future generations.

The later finding revised the finding in the original decision that a mined geologic repository would be available by the years 2007 to 2009. Clearly, the Commission's finding applies to any existing reactor, including reactors whose licenses are revised or renewed. The Commission gives no indication that it has confidence that repository space can be found for irradiated nuclear fuel and other high-level radioactive waste from new reactors licensed after December 1999. Moreover, the revised second finding in the 1999 Waste Confidence review statement conspicuously fails to assert confidence in the likelihood that more than one repository will be licensed. In fact, the Commission has backtracked on its original 1984 "Nuclear Waste Confidence Decision," in which the Commission expressed confidence that "one or more" repositories would open between 2007 and 2009. Waste Confidence Decision, 49 Fed. Reg. at 34,673. The 1999 Status Report states merely that "at least one" repository will open by 2025. 64 Fed. Reg. at 68,006.

Although numerous previous ASLBs (NRC Atomic Safety (sic) Licensing Boards) have rejected similar intervention contentions against proposed new reactors, as well as old reactor license extensions – and such decisions have been supported and affirmed by the NRC staff and Commission itself -- we urge that such contentions not only be accepted for hearings by ASLBs, based on the fact that the U.S. Nuclear Regulatory Commission has yet again re-opened the Nuclear Waste Confidence Decision to revision, but also that the NRC staff and Commission take the unsolved high-level radioactive waste dilemma seriously, given the immense radiological safety, security, and environmental risks involved. This current re-examination of the NRC Waste Confidence Decision, shows clearly that there is no regulatory certainty regarding the high-level radioactive waste dilemma. See Waste Confidence Decision Update. 10 CFR Part 51 [Docket ID-2008-0482]; 73 FR 59551 10-9-08, online at http://edocket.access.gpo.gov/2008/pdf/E8-23381.pdf. See also the related Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation. 10 CFR Part 51, RIN: 3150–AI47, [NRC–2008–0404] 73 FR 59547, 10-9-08, online at http://edocket.access.gpo.gov/2008/pdf/E8-23384.pdf.

Applicants for new reactor COLs and ESPs (early site permits), as well as applicants for old reactor license extensions, and the NRC itself, should not be allowed to rely on the NRC Commission's Nuclear Waste Confidence Decision as constituting a safe, secure, and sound permanent solution for the high-level radioactive waste dilemma, for after all, the Decision continues to be revised over the decades, not in the direction of more safety certainty, but in the direction of uncertainty.

Furthermore, it is also clear that the inventory of irradiated nuclear fuel and other high-level radioactive waste being generated by the *current* generation of nuclear reactors is far greater than what can be accommodated in the single repository in which the Commission seemingly places its confidence, Yucca Mountain, Nevada. The proposed Yucca Mountain repository can only accept 63,000 metric tons of commercial high-level radioactive waste and irradiated nuclear fuel, at least until a second national repository becomes operational. Under the Nuclear Waste Policy Act ("NWPA"), 63,000 metric tons is the legal limit for commercial waste storage that can be "disposed of" at Yucca Mountain, Nevada, at least until a second repository is operational elsewhere in the U.S. As the NWPA states at Section 114(d):

> The [NRC] decision approving the first such application [for a license to open and operate a repository] shall prohibit the emplacement in the first repository of a quantity of spent fuel containing in excess of 70,000 metric tons of heavy metal or a quantity of solidified high-level radioactive waste resulting from the reprocessing of such a quantity of spent fuel until such time as a second repository is in operation..." 42 U.S.C. § 10134(d).

By long-established DOE policy, the first 70,000 metric tons of irradiated nuclear

fuel and solidified high-level radioactive waste "disposed of" at Yucca Mountain, Nevada would include 90% commercial nuclear reactor waste, and 10% DOE waste from the nuclear weapons production complex and nuclear energy research activities, as well as Department of Defense Nuclear Navy-related wastes, and even foreign research reactor "Atoms for Peace" waste. 90% of 70,000 metric tons means that only 63,000 metric tons of commercial irradiated nuclear fuel could be "disposed of" at Yucca Mountain, Nevada, at least until a second national repository is operational in the United States. See DOE's Yucca Mountain Final EIS at Appendix A, page A-1, Feb. 2002.

Even assuming only 40 years of operations with no operating license renewals and no new nuclear reactors, the U.S. Department of Energy (DOE) has known since at least the mid-1990s—since before the most recent (1999) NRC review of its "Nuclear Waste Confidence Decision"—that by the year 2030 or so, well over 80,000 metric tons of irradiated nuclear fuel generated at commercial nuclear reactors will exist in the U.S. U.S. Nuclear Waste Technical Review Board ("NWTRB") "Disposal and Storage of Spent Nuclear Fuel: Finding the Right Balance," Figure 2 at page 11 (March 1996). This is significantly in excess of the "disposal" capacity at Yucca Mountain.

As recently as March, 2008, at the U.S. Nuclear Regulatory Commission's Regulatory Information Conference, the director of the U.S. Department of Energy's Office of Civilian Radioactive Waste Management, Ward Sproat III, announced that 63,000 metric tons of commercial irradiated nuclear fuel—enough to fill Yucca to its legal limit—will exist in the U.S. by the spring of 2010. He added more recently that the U.S. Department of Energy recognizes the need for a *second* repository, as called for by the Nuclear Waste Policy Act as Amended, *unless* the capacity limit at Yucca Mountain is done away with.

Additionally, more recent statements by the Energy Department's OCRWM director, Ward Sproat III, to Congress, as reported by the Associated Press's Joe Hebert, indicated that the 70,000-metric ton limit Congress put on the capacity of the proposed Yucca waste dump will fall far short of what will be needed and has to be expanded, or else another dump built elsewhere in the country. Sproat said within two years the amount of waste produced by the country's 104 nuclear power plants plus defense waste will exceed 70,000 metric tons. Sproat suggested that Congress scrap the limit, or else empower the Department of Energy to search for another site for a secondary facility. See "Should Yucca Mountain Hold More Than 77,000 Tons of Nuclear Waste, or None?" by Eliza Strickland in Discover's Environment Department, November 10, 2008, online at http://blogs.discovermagazine.com/80beats/2008/11/10/should-yucca-mountain-hold-more-than-77000-tons-of-nuclear-waste-or-none/

Of course, changing the amount of high-level radioactive waste and irradiated nuclear fuel to be buried at Yucca Mountain would increase the environmental and public health risks and impacts downstream and downwind, as well as along the road, rail, and water routes used to ship the waste there from reactor sites across the country. Not only would a change in federal law be required, but new analyses to determine the extent of these increased impacts would be required. These analyses have not yet even been undertaken, much less completed. Given the many unknowns associated with requirements for changes in the law, new technical analyses, and additional regulatory proceedings associated with the proposal to expand Yucca's waste disposal capacity, any "confidence" in a waste solution for a new generation of reactors is entirely inappropriate.

NRC's now-routine approval of 20-year license extensions to old commercial nuclear reactors will only increase the quantity of high-level radioactive waste that exceeds the capacity limits at the proposed Yucca Mountain, Nevada repository. In its "Final Environmental Impact Statement for a Repository for Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada," (Feb. 2002) (hereinafter "Yucca Mountain EIS"), DOE predicted the generation of over 105,000 metric tons of commercial irradiated nuclear fuel by the year 2046. *Id.,* Table A-8, page A-16. While NRC's standard license extension term is 20

years, the DOE prediction assumed that the term of license extensions would be only 10 years. DOE also assumed no new commercial nuclear reactors in the U.S. Thus, the high-level waste and irradiated fuel generated by the *current* generation of reactors will far exceed the capacity of the single repository that the NRC has identified as feasible and likely in the next several decades.

Experience also shows that the NRC has been overly optimistic about the opening of the first repository. It took from 1982 (the year the Nuclear Waste Policy Act was passed) until 2002 – 20 full years -- just for the DOE to recommend Yucca Mountain as "suitable" for repository development. This finding, however, has been consistently challenged by the State of Nevada, environmental groups, and numerous scientists. Even before DOE's suitability determination, the U.S. General Accounting Office (GAO) reported that a repository at Yucca Mountain, Nevada probably could not open to receive waste shipments till 2015 at the earliest, given nearly 300 unfinished scientific and technical studies. GAO-02-191, "Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project" (December, 2001). Thus, even though it took DOE two decades to declare the Yucca site suitable for a repository, it is now clear that DOE's declaration was not only rushed, but wrong, for Yucca's geology is unsuitable for radioactive waste burial, and would leak massively – and relatively quickly, at that -- if such wastes are ever buried there.

DOE later admitted that 2017 was the "best achievable" date for opening Yucca. Currently, however, DOE has admitted that it has no projected opening date for the Yucca repository. *See, e.g.,* U.S. NWTRB, "Technical Report on Localized Corrosion" (November 25, 2003, and Allison M. Macfarlane and Rodney C. Ewing, "Uncertainty Underground: Yucca Mountain and the Nation's High-Level Nuclear Waste," the MIT Press, Cambridge, MA, 2006). Yucca's predicted opening date has consistently retreated ever further into the future, from 1998 (in the Nuclear Waste Policy Act of 1983), to 2010, to 2012, to 2017, to 2020, until now, DOE has now date certain by which it says it can open Yucca. Such derailed schedules should not instill "confidence" in NRC that the high-level radioactive waste dilemma is well in hand.

In addition, several legal challenges have been filed against the Yucca Mountain repository and the proposed standards for operation, including a successful State of Nevada/environmental coalition challenge to the U.S. Environmental Protection Agency's radiation release regulations for the Yucca repository. On July 9, 2004, the U.S. Circuit Court of Appeals for the District of Columbia ordered EPA to revise its regulations, which EPA has only very recently done, in October 2008. See United States. Environmental Protection Agency. "40 CFR Part 197: Public Health and Environmental Radiation Protection Standards for Yucca Mountain , Nevada : Proposed Rule." Federal Register, v.73, no. 200, October 15, 2008, pages 61256-61287.

However, even this EPA Final Radiation Release Rule has been legally challenged by the State of Nevada. See Petition for Review in the United States Court of Appeals for the District of Columbia Circuit, State of Nevada, Petitioner, versus United States Environmental Protection Agency; Stephen L. Johnson, Administrator; and United States of America, Respondents, October 10, 2008.

Accordingly, the irradiated nuclear fuel and other high-level radioactive wastes generated at the proposed new reactors, such as Calvert Cliffs Unit 3 and dozens of others proposed across the country, in various stages of licensing before the NRC, could not be "disposed of" at Yucca Mountain unless and until a second national repository is operating. But the Commission has not expressed confidence that a second repository will open. Any irradiated nuclear fuel or other high-level radioactive waste generated after the spring of 2010 (after 63,000 metric tons of commercial irradiated nuclear fuel has been generated) would have nowhere to go, would lack "disposal" space at a repository, unless and until a second repository is opened and operating in the U.S. somewhere other than Yucca Mountain, Nevada – a process that could very well take many decades, based on the experience of trying to open the first repository at Yucca Mountain, Nevada.

Moreover, Congress has not given the NRC any basis for assuming that a second repository will be opened. Section 161(b) of the NWPA provides that: "[t]he Secretary [of Energy] shall report to the President

and to Congress on or after January 1, 2007, but not later than January 1, 2010, on the need for a second repository." 42 U.S.C. §10172a(b). Section 161(a) also states that: "The Secretary [of Energy] may not conduct site-specific activities with respect to a second repository unless Congress has specifically authorized and appropriated funds for such activities." 42 U.S.C. §10172a(a).

The Department of Energy, in its December 2008 "Report to the President and Congress by the Secretary of Energy on the Need for a Second Repository,"
(http://www.ymp.gov/info_library/program_docs/Second_Repository_Rpt_120908.pdf) made official what OCRWM director Ward Sproat III had announced at the NRC Regulatory Information Conference in March, 2008 – that unless Yucca is opened as a dumpsite, and any limitations on how much waste can be dumped there removed, then a second repository is indeed required. In its report, DOE identified dozens of states besides Nevada that had previously been considered as a repository "host," states with promising granite formations, and states with promising shale formations. (See the national map on page 12 of the report). However, despite DOE's report, Congress has not specifically authorized or appropriated funds for site-specific activities, as required by the Nuclear Waste Policy Act, as Amended. How can NRC or DOE have "confidence" that sites other than Yucca would safely contain high-level radioactive wastes for a million years or more, without having completed scientific site suitability studies first? To express "confidence" in such a case is not scientifically-based, but rather faith-based.

Any confidence that Congress will expand Yucca's capacity, or mandates a second repository elsewhere in the country, is premature until Congress actually acts. NRC should put no stock, and the nuclear utility license applicants should take no credit, for such hypothetical eventualities.

The Nuclear Regulatory Commission's failure to express confidence that a second repository will be opened any time soon also implicates the third and fourth findings of the current Waste Confidence Decision, *i.e,* that irradiated fuel and other high-level radioactive waste can be safely stored at reactor sites for up to 30 years. 64 Fed. Reg. at 68,006. If the Commission has no confidence that a repository will open at some reasonable time in the future, it must be assumed that irradiated fuel may sit at the proposed new Calvert Cliffs 3 reactor site, the other dozens of proposed new reactor sites, and even old reactors with twenty year license extensions, for an indefinite period of time. The environmental impacts of such indefinite storage must be evaluated before a Combined Construction and Operating License, or a twenty year license extension at old reactors, can be granted.

The Waste Confidence Decision should be reconsidered, in light of significant and pertinent unexpected events that raise substantial doubt about its continuing validity, *i.e.,* the increased threat of terrorist attacks against U.S. facilities.

In its 1999 "Nuclear Waste Confidence Decision" revision, NRC stated "the Commission would consider undertaking a comprehensive reevaluation of the Waste Confidence findings...if significant and pertinent unexpected events occur raising substantial doubt about the continuing validity of the Waste Confidence findings." 64 Fed. Reg. at 68,007.

Clearly, the catastrophic terrorist attacks upon the United States on September 11th, 2001 constituted significant and pertinent unexpected events that raise substantial doubts about the continuing validity of the third and fourth findings of the revised Waste Confidence Decision.

These findings are:

3. The Commission finds reasonable assurance that high-level radioactive waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of

all high-level waste and spent fuel. (This finding is identical to the finding in the original Waste Confidence Decision in 1984).

4. The Commission finds reasonable assurance that, if necessary, spent fuel can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations. (This finding is basically identical to that in the original Waste Confidence Decision with the addition of the consideration of license renewal and spent fuel storage 30 years beyond the licensed life for operation of a reactor). 64 Fed. Reg. at 68,006.

On its face, NRC's current proposal, to extend the 30 years mentioned above to 50 to 60

years in the current proposed revision to the Nuclear Waste Confidence decision, clearly shows that NRC's confidence since 1984, for the past 25 years, was false confidence.

The terrorist threat to irradiated nuclear fuel and high-level radioactive waste – whether it is being stored on-site at commercial reactors in storage pools or dry casks; stored in away-from-reactor Independent Spent Fuel Storage Installations; or transported by truck, train, or barge between nuclear plants and off-site interim storage facilities – demands an evaluation of whether (a) it is appropriate to store irradiated nuclear fuel and other highly radioactive waste for 30, 50, or 60 years, or more, post reactor shutdown, pending availability of a permanent repository, and (b) whether nuclear power should be phased out as quickly as possible as a matter of environmental protection, national security, public safety, and common defense.

The homeland security risks posed by indefinite temporary storage of irradiated nuclear fuel have been recognized by former Energy Secretary Spencer Abraham:

"Yucca Mountain is an important component of homeland security. More than 161 million people live within 75 miles of one or more nuclear waste sites, all of which were intended to be temporary. We believe that today these sites are safe, but *prudence demands we consolidate this waste from widely dispersed, aboveground sites into a deep underground location that can be better protected."* (emphasis added)

Statement of Spencer Abraham, Secretary of Energy, Before the Energy and Natural Resources Committee, U.S Senate (May 16, 2002), (the full statement can be viewed and

printed from: http://yuccamountain.org/abraham051602.htm)

It is undisputed that neither fuel storage pools nor dry storage facilities are designed to withstand the type of determined and sophisticated attack that was carried out on September 11, 2001. In fact, the U.S. National Academy of Sciences documented such security vulnerabilities in its report entitled "Safety and Security of Commercial Spent Nuclear Fuel," released on April 6, 2005.

To protect against and mitigate the impacts of terrorist attacks, the NRC has developed a system to maintain a constant state of alert, undertaken a comprehensive review of the adequacy of its safety and security regulations, and upgraded its security requirements for all operating nuclear facilities in the United States. Clearly, under NEPA it is also appropriate to consider whether the Commission continues to have a basis for

expressing confidence that stored irradiated nuclear fuel and other high-level radioactive waste is safe from terrorist attacks.

Beyond Nuclear is aware that the Commission has ruled that environmental impacts of terrorist attacks are not cognizable under NEPA. *See, e.g., Pacific Gas & Electric Co.* (Diablo Canyon Independent Spent Fuel Storage Installation), CLI-03-01, 57 NRC 1 (2003); *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), CLI-02-25, 56 NRC 340 (2002). Beyond Nuclear requests that the Commission reconsider this policy, in light of (a) the obvious attractiveness and vulnerability of irradiated nuclear fuel to terrorist attack; (b) the Secretary of Energy's recognition of the relationship between homeland security and assured capacity for timely irradiated nuclear fuel disposal; (c) the Commission's explicit statement in the Waste Confidence status review that it would undertake a comprehensive reevaluation of the Waste Confidence findings if "significant and pertinent unexpected events" occur raising substantial doubt about the continuing validity of the Waste Confidence findings; and (d) the decision of the 9th Circuit U.S. Court of Appeals. June 2, 2006 ruling by the U.S. Court of Appeals for the Ninth Circuit in San Luis Obispo Mothers for Peace (SLOMFP) v. NRC, 449 F.3d 1016. Clearly, the Commission's reconsideration is warranted.

Given that NRC *is* currently reviewing its Nuclear Waste Confidence Decision, and is soliciting public comment before issuing a final decision at some future unspecified date, it is inappropriate for NRC and the COLA applicants for new reactor licenses, ESP applicants for new reactor environmental approvals, and old reactor applicants for license extensions, to rely upon the Nuclear Waste Confidence Decision as a flippant justification for refusing to address the irradiated nuclear fuel dilemma that would be created by new reactors, or old reactors allowed to operate for two additional decades. Such uncertainties about the irradiated nuclear fuel that would be generated at these reactors, and the risks it would pose to the environment and the public health of neighboring communities, will persist at least until NRC issues its revised Nuclear Waste Confidence Decision. Beyond Nuclear demands the right to respond to any such final decision as an essential part of any and all COLA, ESP, and license extension proceedings.

Significant new information has recently developed that further bolsters the merit of our high-level radioactive waste concerns, contentions, and lack of confidence. For over twenty years, Yucca Mountain, Nevada has been the only site in the United States studied as a potential location for the first national repository for irradiated nuclear fuel and high-level radioactive waste. Although there have been countless doubts raised previously about the prospects of the Yucca Mountain dumpsite ever opening, such as NRC Commissioner Ed McGaffigan's public statements in early 2007 (see January 23, 2007 Las Vegas Review Journal article entitled "It May Be Time to Stop Digging"), presently the Yucca Mountain dumpsite looks less likely than ever before to actually open someday.

Specifically, in mid-December, 2008, the transition team representing President-Elect Barack Obama made clear that it, and the President-Elect himself, did not favor continuing forward with the proposed Yucca Mountain repository. Steve Tetreault reported in the Las Vegas Review Journal, in his December 17, 2008 article entitled "Energy pick signed report: Recommendations included Yucca licensing," that despite Obama Energy Secretary Steven Chu's previous support for the proposed Yucca Mountain repository, that:

"...An aide for the Obama transition office said Tuesday night that ultimately the incoming president will be calling the shots on Yucca Mountain.

"The president-elect will rely on Dr. Chu for advice, but like all members of his Cabinet, he will be charged with implementing the president-elect's policies," spokesman Nick Shapiro said.

"And President-elect Obama has been clear throughout the campaign that Yucca Mountian should not and will not move forward."

This article is posted at: http://www.lvrj.com/news/36287969.html.

It thus appears likely that the Obama administration will soon withdraw the Department of Energy's license application to NRC to construct and operate the repository at Yucca Mountain, Nevada. This would further undermine NRC's Nuclear Waste Confidence Decision, which has since the 1990 revision looked to the Yucca Mountain repository proposal as the one that would be opened by 2025.

Perhaps because of such developments, the NRC Commissioners have ordered a re-evaluation of the Nuclear Waste Confidence Decision, after previously rejecting calls for just such a re-evaluation. For instance, on March 1, 2005, attorneys representing the State of Nevada filed a petition for rulemaking to NRC calling on the Commission to amend its Waste Confidence Decision and Rule to avoid prejudging the Yucca Mountain license application (PRM-51-8). But on August 17, 2005 the NRC denied Nevada's petition for rulemaking (70 Federal Register 48329, and NRC Office of Administration "Items of Interest," Week Ending August 19, 2005).

Even as late as early 2008, NRC Chairman Dale Klein was saying that NRC would not be re-evaluating its Nuclear Waste Confidence Decision. Specifically, in his speech entitled "Waste Confidence and Waste Challenges: Managing Radioactive Materials" at the Waste Management Symposium in Phoenix, Arizona on February 25, 2008, NRC Chairman Dale E. Klein said "I personally do not feel that a new [Waste Confidence] rulemaking is necessary at this time..."

However, Chairman Klein's May 16, 2008 letter to U.S. Senator George Voinovich – Ranking Member of the Subcommittee on Clean Air and Nuclear Safety of the Senate Environment and Public Works Committee – showed that the NRC had changed course. Klein wrote:

"On September 7, 2008, following a public meeting where the Commission was briefed by the Nuclear Energy Institute and other industry representatives, the Commission "agreed with the nuclear industry view that it was appropriate to update the NRC's waste confidence findings in the near term."

Thus, the NRC Commission rejected Nevada's petition for rulemaking to update the NRC Nuclear Waste Confidence Decision, but embraced the nuclear power industry's call for just such a re-evaluation. In fact, that re-evaluation is currently underway. NRC has granted an extension to the public comment period on the draft revision to the Nuclear Waste Confidence Decision. We are meeting that deadline for public comment here. After receiving public comments by the deadline, NRC will then consider those comments in preparation of a final revision to the Nuclear Waste Confidence Decision, to be published at an unspecified future date.

Obviously, as worded in the 1999 review of the NRC Nuclear Waste Confidence Decision, "significant and pertinent unexpected events" must have occurred, "raising substantial doubts about the continuing validity of the Waste Confidence finding" (64 Federal Register 68005), for NRC is in fact re-evaluating its Waste Confidence finding as we speak. This further bolsters the merit of our contention for hearings regarding the obvious *lack* of waste confidence in new reactor COL, new reactor ESP, and old reactor license extension proceedings.

Given that the NRC Nuclear Waste Confidence Decision is under re-evaluation, it is inappropriate for NRC staff and nuclear utility license applicants to currently take credit for a renewed expression of "confidence" that the waste problem is completely under control, and will remain so for many decades to come. To inappropriately take credit for a "Confidence Decision" not yet made would be to turn the "Confidence Rule" into a confidence trick or confidence game, also known as a scam or swindle, that is an attempt to defraud a person or group by gaining their confidence, in this case the American public, tricking it into believing that high-level radioactive waste management is safe, sound, and secure, when it in fact is not.

Both NRC staff and the COL applicant Unistar, in the Calvert Cliffs 3 proceeding cited above, accused us of impermissibly attacking NRC regulations in our contention regarding the lack of waste confidence. But the

Commission itself has ordered a re-evaluation of its Nuclear Waste Confidence Decision. Thus, we repeat our request that once the NRC Nuclear Waste Confidence Decision review now underway is completed, that we be allowed to comment upon that new expression of "Confidence" as part and parcel of the Calvert Cliffs 3 proceeding. A similar right should be extended to all challengers against NRC reactor licensing proceedings.

Another significant recent development, previously mentioned above, is the December 2008 publication by the U.S. Department of Energy of "The Report to the President and the Congress by the Secretary of Energy on the Need for a Second Repository." Again citing the Calvert Cliffs 3 example previously mentioned, DOE indicates in its "Second Repository Report" that the State of Maryland itself could serve as the location for a high-level radioactive waste repository if the Yucca dumpsite is not opened and its capacity limits removed.

On page 11 of this report, viewable at

http://www.ymp.gov/info_library/program_docs/Second_Repository_Rpt_120908.pdf,

DOE states that "DOE reference documents...identify 17 states within which there were granitic bodies believed to be adequate for investigation for siting a repository for the second repository program." This list of 17 states included not only Maryland, but also such neighboring states as Pennsylvania, Delaware and Virginia, all within the Chesapeake Bay watershed. If opened, repositories in the Chesapeake Bay watershed could eventually leak overtime, thus risking environmental and public health damage in the Chesapeake Bay region. Such risks do not instill "confidence" in the long-term, safe, sound, secure management of high-level radioactive waste.

Figure 3 on page 12 of the same report, entitled "Map of the United States Illustrating First Repository Program Sites, Second Repository Program Areas Under Consideration, and Shale Deposits Potentially Suitable for a Repository," shows shale deposits in western Maryland, as well as under all of West Virginia, much of Pennsylvania, and various parts of western and central Virginia, that DOE is considering as potential repository locations. If eventually opened, such repositories in the Chesapeake Bay watershed could likewise leak overtime, thus also risking environmental and public health damage in the Chesapeake Bay region.

This new DOE report shows that, without a repository at Yucca Mountain, Nevada that has current waste amount limits removed, the State of Maryland itself, or other states in the Chesapeake Bay watershed, could be targeted for the nation's high-level radioactive waste dump. The uncertainties concerning high-level radioactive waste management in the U.S., clearly evidenced by the new Obama presidential administration's opposition to the Yucca Mountain dumpsite proposal, NRC's current revision of its "Nuclear Waste Confidence Decision," and DOE's new report on the potential of states such as Maryland to be targeted for the national radioactive waste dump in lieu of Yucca Mountain, all serve to bolster the legitimacy of our high-level radioactive waste contentions. We urge that, contrary to NRC staff's and Unistar's arguments in the Calvert Cliffs 3 proceeding, our contention be granted a hearing on the merits. Similar "lack of waste confidence" contentions at COL proceedings, ESP proceedings, and old reactor license extension proceedings across the US should likewise be heard on the merits, rather than rejected, as is the typical response by license applicants, NRC staff, ASLBs and the Commission itself.

Beyond Nuclear wishes to re-emphasize that the U.S. Environmental Protection Agency's Yucca Mountain radiation release regulations show that contrary, to many COL new reactor applicants' assertions that no radioactivity would be released to the environment from the Yucca Mountain dumpsite, that radioactivity releases would in fact occur for hundreds of thousands of years into the future. For the first 10,000 years post burial of the wastes at Yucca, EPA has proposed a final rule that would allow for 15 millirems per year of radioactivity to dose persons downstream. After 10,000 years and out to a million years, EPA would allow for 100 millirems per year of radioactivity to dose persons downstream – a six to seven fold increase in allowable levels of harmful radioactivity dosage. EPA's regulations are currently being challenged legally by the State of Nevada. Our point is that, contrary to reactor license applicants' assertions that zero radioactivity would escape the Yucca Mountain dumpsite, that in fact EPA recognizes that radioactivity doses will be delivered to persons living downstream of the leaking dumpsite for a million years into the future. This would, of course, be an environmental and public health impact caused by new reactors if built and

allowed to generate forever deadly high-level radioactive wastes, as well as by old reactors granted license extensions henceforth.

On-Site and Away-From-Reactor Dry Cask Storage Is Also Dangerous

The Dangers

"Spent" nuclear fuel is a misleading term. Irradiated nuclear fuel rods discharged from commercial nuclear power plants are highly radioactive, a million times more so than when they were first loaded into a reactor core as fresh fuel. If unshielded, irradiated nuclear fuel just removed from a reactor core could deliver a lethal dose of beta, gamma and neutron radiation to a person standing three feet away in just seconds. Even after decades of radioactive decay, a few minutes unshielded exposure time would be enough to deliver a lethal dose. Certain radioactive elements (alpha emitters such as plutonium-239) in "spent" fuel will remain hazardous to humans and other living beings for hundreds of thousands of years. Military high-level radioactive wastes – the highly radioactive liquid and sludge "leftovers" from reprocessing irradiated fuel rods to extract the uranium and plutonium for making nuclear bombs – has the same hazardous characteristics as "spent" commercial fuel. Irradiated fuel rods and high-level nuclear wastes are perhaps the most hazardous poisons ever created. There is the added danger that fissile materials still present in highly radioactive wastes will form a "critical mass," causing an inadvertent nuclear chain reaction that could radiate a deadly beam of neutrons and possibly even generate enough heat to melt through the container within which it is held. Thus, these wastes must be shielded for centuries, prevented from going critical, and isolated from the living environment for hundreds of millenia.

Past and Present Storage Techniques

With every operational cycle of 18 to 24 months at a U.S. nuclear power plant, the reactor is shut down and approximately one-quarter to one-third of its now extremely radioactive fuel assemblies are removed. These thermally hot and highly radioactive fuel assemblies are then transferred into the plant's irradiated fuel storage pool. These large, indoor water-filled storage ponds shield much of the high radiation underwater, and allow the assemblies to thermally cool down from the reactor's high operational temperatures.

These pools were originally designed for temporary storage only. Nuclear utilities assumed their high-level wastes would be shipped off for reprocessing to extract fissionable uranium and plutonium for making new fuel rods, or else transported for dumping at a "permanent geologic disposal site" -- an underground national sacrifice area. However, reprocessing of commercial wastes was abandoned in the 1970's as economically unfeasible and a threat of nuclear weapons proliferation (not to mention a source of serious radioactive pollution into water and air), and geologic disposal remains mired in technical and political controversy. Consequently, high-level waste inventories at commercial U.S. nuclear reactors have dramatically mounted in storage pools. After decades of "re-racking" to cram pools as full as possible, growing numbers have filled to capacity. This has complicated continued operations and waste generation at certain reactors, while at the growing number of closed down reactors, irradiated fuel assemblies sit in their storage pools even while the plant sites are dismantled and "decommissioned" around them.

Dry Storage Casks

As pools have filled, the nuclear industry and the U.S. Nuclear Regulatory Commission (NRC) have developed dry cask storage systems, or Independent Spent Fuel Storage Installations (ISFSI's), to expand "interim" storage of wastes both on-site at plants and away from reactors. As of March, 2003 there were 28 operating licensed ISFSI's located in 22 different States. Numerous additional potential ISFSI sites in many more States may open in the near future (see U.S. Nuclear Regulatory Commission Spent Fuel Project Office's March, 2003 map of ISFSI locations at www.nrc.gov/waste/spent-fuel-storage/locations.html, as well as its "Nuclear Fuel Pool Capacity" graph at www.nrc.gov/waste/spent-fuel-storage/nuc-fuel-pool.html, showing the growing number of pools filling to capacity, an indication of impending moves to opening ISFSI's at those reactors).

After a minimum of five years of thermal cooling in "wet" storage pools, irradiated fuel assemblies can be transferred to NRC certified "dry" storage casks made of concrete, steel alloy, and neutron shielding materials.

Resembling a giant metallic thermos (solid on one end, open on the other), inner canisters are loaded underwater (to shield workers from the high radiation). The pool water is then pumped out, multiple shield lids are welded or bolted on to seal shut the open end, and the interior of the canister is filled with inert gas (such as helium) intended to prevent deterioration of the fuel rods from oxidation with air, as well as to conduct heat away from the waste. These canisters are then transported to concrete storage pads either immediately nearby the reactor (an on-site ISFSI), or else away from the reactor at an off-site ISFSI. They are loaded into either horizontal "bunkers" or vertical silos (depending on the dry cask system design) made of concrete, which provide shielding against the gamma and neutron rays that emanate out from within the surprisingly thin metallic inner canister. Natural convection through vents in the concrete silo or "bunker" provides passive air cooling, but the inner metal canister can still reach temperatures of 400 degrees Fahrenheit or higher due to the waste's on-going radioactive decay. NRC approved lSFSI sites can accept irradiated fuel from more than one reactor.

Problems with Dry Cask Storage Surfaced Immediately:

A Meltdown of Democracy, a Retreat from Regulation

Under a provision in the Nuclear Waste Policy Act of 1982, the NRC can approve ISFSI's under a nuclear plant's general operating license. This means even the nominal safeguards for protecting the environment and involving the public -- normally required for licensing a nuclear facility -- are done away with: no site-specific study is required, no environmental impact statement (EIS) is made, and no adjudicatory public hearing process is allowed. The original EIS for the reactor itself – prepared decades earlier, long before ISFSI's were even envisioned – is relied upon for licensing the dry cask storage site. An environmental assessment is issued by the NRC which automatically finds no adverse impacts on the environment based upon the earlier EIS.

Concerned citizens and community groups regard this "generic licensing process" as a meltdown of democracy. Michigan's Palisades nuclear plant was the first in the U.S. to receive the go-ahead from NRC to set up an ISFSI under the reactor's general operating license. In May, 1993 NRC allowed Consumers Energy Company to install a dry cask storage site on a sand dune identified by the Michigan Department of Natural Resources, the Army Corps of Engineers, and the University of Michigan as a "high risk erosion zone" just 150 yards uphill from the waters of Lake Michigan, the source of drinking water for tens of millions of people. Whereas the Palisades

reactor itself is anchored to bedrock, its two dozen dry storage casks fully loaded with irradiated nuclear fuel (each one weighing 120 tons) sit on a three foot thick concrete storage pad, anchored to nothing but shifting sand.

In early 1994, an NRC inspector stated "it's the consequences that might occur from an earthquake that I'm concerned about. The casks can either fall into Lake Michigan or be buried in the loose sand because of liquefaction." He concluded "It is apparent to me that NMSS [NRC's office of Nuclear Materials Safety and Safeguards] doesn't realize the catastrophic

consequences of their continued reliance on their current ideology," the generic licensing process. Over a decade later, these concerns have not been addressed. NRC continues to generically license IFSFI's, rubberstamping nuclear utility applications at an accelerating rate.

Cask Fabrication Before Certification: Build 'Em First, Ask Questions Later

Manufacturers of dry cask systems must go through the NRC's "certificate of compliance" (CoC) process. This covers a host of issues, including the development of the cask design technical specifications, operational limits, maximum radiation dose limits and the condition of irradiated fuel that can be stored inside. As of Feb. 5, 2003, NRC had approved 16 different dry cask storage systems for general use at or away from reactors (see www.nrc.gov/waste/spent-fuel-storage/designs.html). NRC cask certification is valid for 20 year intervals, with reviewed extensions available. NRC has stated that dry cask storage is safe and reliable for up to 100 years.

However, problems with dry casks have surfaced not after decades or a century, but almost immediately in the first few years, raising serious questions about the NRC cask certification process itself. Evidence documents that the NRC's CoC process has been taken over by cask manufacturers' and nuclear utilities' profit-driven

pressure for expediency. The consequent lack of rigorous regulatory oversight has resulted in a complete lack of field testing of cask designs, NRC approval for exemptions allowing manufacturers to build casks before receiving the certificate of compliance, and mounting evidence of poor quality assurance and quality control of cask manufacturing.

In fact, a whisteblower fired by the largest nuclear utility in the U.S. alleges major quality assurance (QA) violations involving Holtec storage/transport containers. Oscar Shirani served as a lead QA inspector for Commonwealth Edison/Exelon of Chicago for many years, earning impeccable credentials. A consortium of nuclear utilities invited Shirani to lead a QA inspection of Holtec cask design and manufacturing in 2000. Shirani identified 9 major QA violations (such as unauthorized welding, large numbers of departures from design specifications, and use of potentially shoddy materials), leading him to question the structural integrity of the containers, especially under severe transportation accident conditions. Shirani's discovery followed an NRC-led QA inspection just months earlier that had identified no problems with the Holtec casks, casting huge doubt upon the competence and credibility of NRC's QA regulatory oversight. Shirani sought a "stop work order" against the manufacture of the Holtec casks until the QA violations were rectified. Instead, Exelon harassed and ultimately fired him. Shirani has been blacklisted from the nuclear industry ever since, and his allegations have never been addressed. Frighteningly, Holtec casks are already in use at 33 U.S. nuclear reactors (see locations under "Spent Fuel Systems Division" at www.holtecinternational.com/).

Numerous technical problems with fully loaded dry casks are popping up around the country at an alarming rate, leading to charges from concerned citizens living nearby that ISFSI's (pronounced "is-IF-sees") are very "iffy," and represent "nuclear experiments" in their backyard.

Bubble, Bubble, Toil and Trouble: Cracks, Corrosion, and Explosion

A May 28, 1996 explosion at the Point Beach reactor in Wisconsin jolted public confidence in the dry cask storage program. While sealing shut a VSC-24 (a Ventilated Storage Cask built by Sierra Nuclear Corporation (SNC) holding 24 irradiated fuel assemblies; this cask design has now been taken over by British Nuclear Fuels, Ltd.), a welding torch ignited pent up hydrogen gas with enough force to dislodge the cask's 4,000 pound shield lid several inches in the air and tilt it ajar on top of the cask.

After allowing SNC to manufacture several VSC-24 units even before its CoC, NRC certified the cask design in May, 1993. The explosion was later determined to result from an electro-chemical reaction between an anti-corrosion zinc liner within the cask and the borated "spent" fuel pool water. The chemical reaction between zinc and boric acid to generate explosive hydrogen gas -- familiar to many high school chemistry students -- somehow escaped the notice of all the "experts" at NRC, the cask manufacturer, and the nuclear utility company Over a dozen VSC-24 casks had already been loaded around the country before the explosion. Utility employees had observed bubbles in the "spent" fuel pools during these loadings, yet had failed to understand that they were flammable hydrogen gas and did not report them to the NRC. In fact, a blue flame was observed burning within another VSC-24 loaded at Point Beach previous to the explosion, but had been shrugged off by employees as resulting from excess cleaning solvents and went unreported.

The explosion led to NRC inspecting SNC's cask manufacturing facility, revealing confusion, inadequate testing and poor quality control. It also led to a three year halt on the loading of VSC-24's in the U.S. so that the NRC, nuclear utilities, and the cask manufacturer could get a grip on the situation. However, the next VSC-24 to be loaded, at Palisades in June, 1999 again experienced two separate "hydrogen ignition incidents." Again there was a breakdown in administrative controls. The NRC inspectors, thinking all was in order, had already gone home for the day before the "burns" occurred. A welder ignited a "burn" but did not report it, which led inevitably to a welder on the next shift igniting a second "burn". Days passed before NRC was notified. Just the next week later, a suspicious fire in the dry cask storage administrative office trailer at Palisades destroyed many documents, including those about the recent "burns". Concerned citizens cried foul, but NRC did not cite Palisades for any violations of regulations. In 2001, Palisades officials admitted to the NRC that the very same irradiated fuel that was involved in the hydrogen "burns" had actually cooled for less than five years in the storage pool. Loading it in dry casks had been in violation of the casks' technical design specifications, and thus federal regulations. Suspiciously, the less-than-five-years-cooled fuel had been evenly distributed between a number of casks, leading critics to charge that the "mistake" had in fact been intentional. However, records pertaining to the suspect loading procedure had been destroyed in the earlier suspicious office fire (for which fire inspectors never ruled out the possibility of arson).

Shortly thereafter, a VSC-24 cask loading at the Trojan nuclear plant in Oregon had to be suspended when so many hydrogen bubbles were generated in the fuel pool that workers could not see well enough to complete the job. In June, 2000 NRC cited the VSC-24's new owner, British Nuclear Fuels, for poor quality control and assurance in cask manufacturing and maintenance. Obviously, four years since the Point Beach explosion (1996-2000) was not long enough for NRC and industry to resolve problems with the VSC-24.

A March, 1997 NRC inspection report revealed another defect with VSC-24's: delayed cracking in welds supposed to seal shut the multiple shield lids on casks at Palisades, Point Beach, and Arkansas One nuclear plants. Such cracks can allow the inert helium gas within the cask to escape, making the irradiated fuel assemblies vulnerable to contact with air, oxidation, and deterioration. Such degradation could lead to serious irradiated fuel handling and transportation problems in the future. Again, weld failure in shield lids was unanticipated and unanalyzed by industry and the NRC.

Over the past several years, NRC has identified serious problems in other dry cask systems. Three NUHOMS casks, manufactured by VECTRA Technologies (now owned by Transnuclear, Inc., a subsidiary of the French nuclear giant COGEMA) and fully loaded at the Davis-Besse nuclear plant in Ohio, were discovered to have been built below technical specifications: the aggregate used to fabricate the casks' outer concrete shells was poor quality, and the shells themselves were ground too thin. In January, 2000 NRC reported that a TN-32 cask (manufactured by Transnuclear, containing 32 irradiated fuel assemblies) at the Surry nuclear plant in Virginia had developed six inch long cracks in its outer concrete shield, loose bolts, and a helium leak.

In late May, 2000 NRC discovered an unreported flaw with the neutron shielding material supplied to New Jersey-based cask manufacturer Holtec International by Nuclear Assurance Corporation. Holtec hopes to deploy

no less than 4,000 HI-STORM dry casks for use at the proposed Private Fuel Storage, LLC high-level nuclear waste dump targeted at the tiny, impoverished Skull Valley Goshutes Indian Reservation in Utah. Transportation of irradiated fuel rods to Utah in Holtec HI-STAR containers – the first dual purpose storage/transport cask to be certified by NRC -- from Eastern, Southeastern, and Midwestern reactors would traverse dozens of States, past the homes of millions of Americans, raising unprecedented safety concerns.

In April, 2001 the Sacramento Municipal Utility District halted loading its first Transnuclear West Nuhoms dry storage cask at the Rancho Seco reactor in California due to an unexpected mishap. A faulty O-ring leaked air underwater in the irradiated fuel storage pool during loading operations, threatening to contaminate the fuel-holding inner canister with radioactive pool water.

In Sept., 2001 an Exelon Corporation spokesman at the Dresden nuclear reactors in Illinois admitted to a visiting group of nuclear power officials touring the plant's new dry cask storage facility that the NRC had granted Dresden an exemption when its recently, poorly poured dry cask storage concrete pad did not meet specifications.

Atomic Brinksmanship

The explosion within the VSC-24 took place immediately above 24 irradiated fuel assemblies already loaded into the cask, containing the equivalent amount of long-lasting radioactivity released by 240 Hiroshima-sized atomic bombs; the nearby "spent" fuel pool held the full inventory of high-level radioactive waste generated at that plant over the course of decades. Although the NRC and utility reported that no radiation was released, no damage was done to the irradiated fuel assemblies in the cask, and no one was injured by the blast, the forceful explosion occurred near the plant's "spent" fuel pool , not a place to "play with fire" or make mistakes with objects weighing many tons.

Loaded dry storage casks, weighing more than 100 tons, are among the heaviest loads moved within a reactor during power operation. Human error and equipment failure raise issues of worker and public safety during cask handling and moving activities. Dropping either a loaded or unloaded cask inside the fuel pool building can severely damage plant safety equipment, jeopardizing reactor operation and the cooling of irradiated fuel in the storage pond.

On May 13, 1995 a loaded TN-40 cask became stuck in the hoisted position above the Prairie Island, Minnesota plant's irradiated fuel storage pool for 16 hours. This incident occurred just after NRC had granted Northern States Power (now Xcel Energy) an exemption from regulatory requirements for reviewing cask loading procedures. Over 120 tons of metal storage cask and irradiated fuel assemblies dangled precariously over 22 years' worth of the reactor's accumulated irradiated fuel assemblies in the pool below – many hundreds of tons of deadly nuclear waste. This dangling "sword of Damocles" risked dropping back into the pool, damaging irradiated fuel stored there, or punching a hole in the pool leading to a loss of coolant accident and potentially catastrophic consequences. Luckily, nothing happened – that time.

Some reactor designs, such as in G.E. boiling water reactors, have placed the irradiated fuel storage pools several stories up in the reactor building. Consequently, cask movement can place heavy loads up to ten stories high inside the reactor building. A cask drop would send the heavy load crashing down through several floors of the building which house vital safety systems, with untold consequences.

When in Doubt, Rush Full Speed Ahead Anyway

These widespread problems make clear that NRC's high-level waste storage and handling regulations are dangerously inadequate and in need of comprehensive review. Despite this, NRC continues to expedite ISFSI licenses: there are scores of nuclear power reactors in dozens of states planning to open ISFSI's in the next several years due to the fact that their indoor storage pools are completely filling up. In addition, NRC continues to allow vendors to manufacture casks before they have received their certificates of compliance. Once casks are already built, the pressure is on NRC to help "fix" any problems that surface via an "efficient and effective" (i.e., quick, cheap and easy) CoC amendment process, which again locks out involvement of concerned citizens, and leads to changes on the casks that leave NRC itself unsure that its "Safety Evaluation Report" still applies. The nuclear industry has even pushed for NRC permission to "fix" cask problems without even notifying the federal agency charged with protecting public health and safety and the environment!

As more and more utilities quickly run out of pool space and seek to store fuel in dry casks or even to transport fuel off-site, NRC certification of cask designs is accelerating: in February, 2000 alone, NRC was engaged in certifying five new cask designs, and beginning review of an additional three applications for cask certification. As Bill Brach, director of the NRC's Spent Fuel Project Office (which is in charge of cask certification) cheerfully reported to the NRC Commissioners in February, 2000, "We've been extremely busy." Given the history of past mistakes and the current rush job, future certification, manufacturing, and operational mistakes are inevitable.

The First Rule of Holes: When You're in One, Stop Digging

Incredibly, not a single dry storage cask, once loaded, has ever been unloaded in the U.S. This has led critics to charge that no safe unloading procedure exists.

In May, 1993 local environmental groups and the State of Michigan filed for an injunction in federal court against the loading of VSC-24's at Palisades, alleging that there was no proven safe method for unloading the casks. The NRC and Consumers Energy assured the court that in an emergency, casks could be safely unloaded simply by reversing the loading procedure. The court denied the injunction and allowed the casks to be loaded. Just over a year later, in August, 1994 Consumers Energy discovered that its fourth loaded VSC-24 dry cask had weld flaws. To demonstrate its commitment to public safety and the environment, as well as to live up to its promise to the court, Consumers announced it would unload the irradiated fuel in the cask back into the storage pool. Only then were the difficulties discovered.

Reintroducing the 400 degree Fahrenheit fuel assemblies back into the 100 degree fuel pool water would result in a radioactive steam flash hazardous to workers, and would thermally shock the fuel assemblies threatening to further degrade them. Also, the welded-shut inner canister would have to be cut open in a timeframe of less than 50 hours, for the cooling process could not be maintained during the unloading procedure and the fuel within would begin to overheat. In addition, there was no procedure yet developed to remove steel shims that were pressure fit inside the cask lid. Rather than leading to a pause for reflection, however, Consumers rushed to immediately load nine more VSC-24's, a move taken by local concerned citizens to be in very bad faith. Ten years after Consumers announced it would unload the defective cask #4, it still sits fully loaded on the Lake Michigan shoreline, alongside two dozen more fully loaded VSC-24's of questionable structural integrity.

The failure to safely unload dry casks has concerned other neighbors next to reactors. The Prairie Island Mdewakanton Dakota Tribe in Minnesota petitioned the NRC to prohibit Northern States Power from loading any more TN-40 casks until a safe unloading procedure had been

demonstrated, but to no avail. 17 dry casks sit fully loaded just several hundred yards from the nearest homes and a tribal child care center on this tiny island on a flood plain in the middle of the Mississippi River. Recently, Xcel Energy pressured the Minnesota state legislature to permit it to load scores more casks at Prairie Island, violating an agreement made in 1994 to limit the number of casks to 17.

Adding further to worries about cask unloading, corrosion between the metallic inner canister and the metallic lining of the outer shell of VSC-24's could cause a bonding together that would be very difficult to pry apart. Even if the casks were to malfunction, or the waste to leak, or a repository to open that could accept the wastes, it remains unclear whether dry casks could be safely unloaded back into fuel storage pools or into transport casks for shipment off-site.

So What's To Be Done?! Leave it in the pools? Ship it away to be buried? Stop making it!

High-level nuclear waste presents us with an unprecedented dilemma – poisons that remain deadly for hundreds of thousands of years. If dry cask storage is so problematic, why not keep the wastes in wet storage pools? Wastes are dangerous there too, for cooling pumps must operate 24 hours per day, 7 days per week, for decades. Without pumps circulating cooling water, the thermally hot waste could boil away the pool water in a matter of hours. A recent NRC report admitted that even decades-cooled irradiated fuel could spontaneously combust if overheated or put in contact with air. A pool fire could release disastrous amounts of radioactivity to the environment. A puncture of a pool and consequent loss of water could lead to similar catastrophic consequences So could a simple loss of power, causing the cooling and water circulation pumps to stop working. A raccoon at the Fermi reactor in Michigan once caused such a loss of power to the cooling pumps. For these reasons, many see dry cask storage as safer than wet pool storage. Dry casks have no moving parts, and individually contain smaller amounts of high-level waste than cram-packed pools. The word "safer" is relative, for high-level nuclear waste is dangerous no matter how or where it is stored.

The terrorist threat to nuclear power reactors -- brought home so clearly by the attacks of Sept. 11, 2001 as well as the U.S. federal government's admission that nuclear reactors are high on al-Qaida's list of potentially catastrophic terrorist targets – also raises concern about waste stored on-site at reactors. Pool fires caused by terrorist attacks could release massive amounts of radioactivity into the environment for hundreds of miles downwind, risking death and injury to hundreds of thousands of people. But dry casks, stored in concentrated rows (not unlike bowling pins) in clearly visible outdoor locations, are also very vulnerable to terrorist attack. Some concerned citizens groups have advocated "hardening" at-reactor waste storage, fortifying it against terrorist attack, such as by emptying vulnerable pools and dispersing and bunkering dry storage casks behind thick concrete, steel, and earthen shields to defend against attacks by high explosives or missiles (see www.nukebusters.org/issues/hoss).

If irradiated fuel rods are dangerous in pools and dry casks, then why not ship them to the proposed Yucca Mountain site in Nevada for burial? For one thing, Yucca Mountain is not a scientifically suitable site. Yucca Mountain is an active earthquake zone, prone to volcanic activity. Yucca leaks water like a sieve into the aquifer below, the sole source of drinking water for nearby farming communities. If waste were buried there, it would eventually leak into that drinking water, harming people downstream. In addition, shipping many tens of thousands of irradiated fuel casks cross country through 45 states plus Washington, D.C. (according to the U.S. Energy Dept.'s 2002 Final EIS for Yucca Mountain), through major metropolitan areas and America's breadbasket, past the homes of 50 million Americans carries unprecedented risks. The transport containers have been inadequately safety tested, most

emergency responders are poorly trained and equipped for dealing with a radiation accident, and the health and economic impacts of a radiation release would be immense. Going forward with Yucca Mountain and such cross country transportation is ill-conceived and would make the nuclear waste dilemma worse, not better.

An ounce of prevention is worth a pound of cure. The U.S. must stop generating radioactive waste. NRC estimates that 52,000 metric tons of irradiated nuclear fuel will be stored at commercial reactors in the U.S. by 2005. If currently operating reactors continue generating waste until the end of their 40 year licenses, the mountain of waste will more than double in size. If NRC continues to allow old reactors to extend their operating lifetimes from 40 to 60 years, the amount of waste will increase still more. If new nuclear reactors are built, yet more waste would be produced. Nuclear power must be phased out and replaced with safer, cheaper, cleaner ways to meet our electricity needs: conservation, efficiency, and renewable sources such as wind, solar, and fuel cells.

Nuclear Industry Whistleblower and Safety Advocate Oscar Shirani Revealed that Major Quality Assurance Violations with Dry Cask Storage Go Unaddressed by NRC

Summary of Oscar Shirani's Allegations of Quality Assurance Violations Against Holtec Storage/Transport Casks.

Holtec storage/transport casks are the first dual purpose container for irradiated nuclear fuel certified by the U.S. Nuclear Regulatory Commission (NRC). According to Holtec International's website (http://www.holtecinternational.com), Holtec casks are already deployed at 33 U.S. nuclear power plants. Up to 4,000 rail-sized Holtec storage/transport casks would also be used at the proposed Private Fuel Storage interim storage facility in Utah. Given the U.S. Department of Energy's (DOE) recent decision to use "mostly rail" transport to the proposed Yucca Mountain repository, Holtec casks could very well become among the most used shipping containers for highly radioactive waste.

Exelon, the largest nuclear utility in U.S., uses Holtec casks for irradiated fuel storage at its reactor sites. In 1999 and 2000, Oscar Shirani, as a lead quality assurance (QA) auditor for Exelon, identified numerous "major design and fabrication issues" during a QA inspection of Holtec International (the cask designer), Omni Fabrication, and U.S. Tool & Die (the subcontractors responsible for manufacturing the casks). In fact, he identified a "major breakdown" in the QA program itself. The problems were so severe that Shirani sought a Stop Work Order against the manufacturer of the casks until the problems were addressed. Instead, he was run out of Exelon. According to Shirani, these design and manufacturing flaws mean that the structural integrity of the Holtec casks is indeterminate and unreliable, especially under heat-related stress such as during a severe transportation accident.

Although NRC has dismissed Shirani's concerns, NRC Region III (Chicago office) dry cask inspector Ross Landsman refused to sign and approve the NRC's resolution of Shirani's concerns, concluding that this same kind of thinking led to NASA's Space

Shuttle disasters.[1] He stated in September 2003, "Holtec, as far as I'm concerned, has a non-effective QA program, and U.S. Tool & Die has no QA program whatsoever."[2] Landsman added that NRC's Nuclear Reactor Regulation division did a poor follow-up on the significant issues identified, and pre-maturely closed them.

Shirani alleges that all existing Holtec casks, some of which are already loaded with highly radioactive waste, as well as the casks under construction now, still flagrantly violate engineering codes (such as those of the American Society of Mechanical Engineers [ASME] and American National Standards Institute [ANSI]), as well as NRC regulations. He concludes that the Holtec casks are "nothing but garbage cans" if they are not made in accordance with government specifications.[3]

Specific examples of the QA violations and related problems alleged by Shirani include:

- Welding problems, such improper "fast cooling" of hot cask welds and metal using fans and air conditioning equipment, which are in violation of ASME and ANSI codes and risk tearing and cracking of the unevenly cooling welds and metal, in order to meet production goals. Welds on the casks were also performed by unqualified welders. Even NRC has acknowledged that "weld quality records are not in agreement with the code requirements."[4]
- Inadequate controls on the quality of materials used in the manufacturing process, risking brittleness and weakness in the casks.
- Holtec's failure to report holes in neutron shielding material (neutrons are especially hazardous emissions from highly radioactive waste).
- US Tool & Die's failure to use coupon (a small physical sample of metal) testing, and Post Weld Heat Treatment on a regular basis, as required by ASME code and in violation of the codes that were part of the license agreement with NRC.
- Holtec and U.S. Tool & Die quality control inspectors' bypass of hundreds of non-conforming conditions, departures from the original design during cask manufacture. The departures from the original design amount to design changes that require revised analysis to guarantee that manufactured casks actually live up to the structural integrity of the original design. The fact that this revised analysis was never done is in violation of ASME and ANSI codes, and thus NRC regulations, and means the actual manufactured casks' structural integrity is questionable, according to Shirani.
- Holtec's consent to allow U.S. Tool & Die to make design decisions and changes, despite the fact that U.S. Tool & Die does not have design control capability under its QA program.
- Failure to conduct a "root cause investigation" of Holtec's QA program, even though root causes are the main reason for repeated deficiencies.
- Exelon's obstruction of Shirani from performing any follow-up of the audit to confirm that problems had been solved, despite knowing that the fabrication issues identified would have a detrimental impact on the design.
- Exelon's falsified quality-assurance documents and the misleading of the NRC investigation, stating that Shirani's allegations of QA violations were resolved when in fact they were not.
- Lack of understanding in the NRC of the design control process and

Holtec's QA program, relating to flaws in welding, design, manufacturing, and materials procurement control. NRC lacks a corrective action mechanism for repeated findings. Shirani alleges his audit findings embarrassed NRC because it had also audited the Holtec casks just a few months previously but found no problems whatsoever.

Shirani concludes that these numerous design and manufacturing flaws call into question the structural integrity of the Holtec casks, especially under heat-related stress such as during severe transportation accidents. He also warns that his eight-day audit showed him only a snap shot of problems, and that there could in fact be additional ones yet to be identified.

[1] Elizabeth Brackett, "Nuclear Controversy," " Chicago Tonight," WTTW Channel 11 Television, Chicago, Illinois, January 29, 2004.

[2] J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

[3] *Ibid.*

[4] April 2002 NRC review panel memo, cited in J.A. Savage, "Whistleblower Alleges PG&E Proposed Dry Casks Slipshod," California Energy Circuit, Vol. 1, No. 1, Berkeley, California, September 5, 2003.

NRC Region III dry cask storage inspector, Dr. Ross Landsman, fully supported Oscar Shirani's assertions. See Dr. Landsman's official allegation, at http://www.nirs.org/radwaste/atreactorstorage/nrc_holtec.pdf

All aspects of U.S. high-level radioactive waste management are risky. See "Radioactive Wreck" by Beyond Nuclear Radioactive Waste Watchdog, Kevin Kamps, at http://www.nirs.org/mononline/nm643.pdf, for a summary of these risks.

In conclusion, NRC's "Nuclear Waste Confidence Decision" has Orwell rolling in his grave so fast, he's qualify for energy production tax credits. It is a radioactive waste confidence game, putting present and all future generations out to a million years at unnecessary risk, given the non-radioactive electricity alternatives we have, such as energy efficiency and safe, clean, affordable and reliable renewable sources such as wind and solar.

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