Re: Draft NUREG-1768

Public Comments on NRC's Package Performance Study Draft Test Protocols

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Nuclear Information and Resource Service (NIRS) is the information and networking center for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy issues.

The following comments are submitted on behalf of our thousands of grassroots individual and organizational members across the U.S., including many along targeted road, rail, and waterway routes for high-level radioactive waste transportation.

GENERAL ISSUES

It is unacceptable that a large scale high level radioactive waste shipping campaign to the proposed Private Fuel Storage Facility in Skull Valley, Utah could begin even before this Package Performance Study is complete.

Statements in the Draft Test Protocol document itself, as well as comments by officials from the NRC during the PPS public workshops, that the PPS is not intended to strengthen transportation container regulations reveals a presupposition of test results, bias, a closed-mindedness not appropriate for legitimate scientific investigation, and a failure on NRC's part of strengthen protections for public health, safety, the common defense, and the environment. Rather, NRC should constantly devote itself to strengthening and improving regulations to better protect the public health and environment, not weakening them to serve nuclear industry financial interests.

Given the very deadly radiological nature of high-level radioactive waste and irradiated nuclear fuel, low probability but high consequence events are still very important to investigate and should not be arbitrarily dismissed by NRC.

Institutional and administrative controls cannot be counted upon 100%. For example, although the Nuclear Energy Institute (under public pressure and after decades of stubborn refusal) has finally joined the Association of American Railroads in calling for the use of dedicated trains for transporting high-level radioactive waste, the U.S. Department of Energy (which would be in charge of huge numbers of shipments to

Yucca) is still resisting the use of dedicated trains for cost reasons. In addition, terrorists could hijack dedicated trains of nuclear waste and ram them into freight trains carrying other hazardous materials. Likewise, speed limits could fail, whether by human error, mechanical failure (as in runaway trains), or through malicious intent (terrorism, sabotage, etc.).

FULL-SCALE PHYSICAL SAFETY TESTING FOR ALL CASK DESIGNS

Full-scale physcial safety testing should be a requirement for NRC transportation cask certification, especially for any and all cask designs to be used in the large-scale transportation schemes proposed for the Yucca Mountain Project and Private Fuel Storage.

An important reason to test all cask designs is the widely divergent designs that exist, from steel/lead/steel, to monolithic steel, to steel/depleted uranium/steel, to overpack containing internal canister, to no overpack. There are also differences between cask designs in terms of neutron shielding, impact limiters, lid closure mechanisms. Because of all these differences, divergent cask designs would respond and hold up significanlty differently under the same accident conditions. These different capabilities of surviving accidents must be determined in order to compare the relative safety and security of different cask designs under accident conditions.

NRC has chosen the Holtech rail cask for use in the PPS. NRC has also chosen the Holtech rail cask to serve as the hypothetical cask in its analysis of the Baltimore Train Tunnel Fire of July, 2001. The Holtech rail cask design, with its welded inner canister, would be better able to withstand such a fire than, say, a steel/lead/steel rail cask design. For this reason, rail casks without welded inner canister must also be tested in this PPS, unless NRC is now willing to revoke their operating and construction licenses and certificates of approval for being vulnerable to intense fires.

Performing only one impact test and one fire test on only one truck cask and only one train cask is not good science. Multiple tests are needed to confirm repeatability. As Mr. Runyon of the Illinois Department of Nuclear Safety stated at the PPS public workshop in Chicago stated, performing multiple tests would better confirm the accuracy of the experiments by providing multiple data points that could be graphed.

As Mr. Halstead of the State of Nevada Agency for Nuclear Projects has pointed out, due to measuring instrument reliability issues, the fire tests need to be performed on "fresh" casks that have not already suffered impact tests. Short cuts on safety and the sacrificing of measurement reliability in an attempt to save money by using very limited numbers of casks is not acceptable given the deadly nature of the atomic waste that would be hauled in these containers and the need to ensure transportation cask safety.

THE MANY MISSING TESTS FROM THE DRAFT PPS PROTOCOL

NRC's PPS Draft Testing Protocols include only an impact test and a fire test for only one truck cask design and only one rail cask design. Although I provide comments upon the NRC's proposed impact and fire tests separately below, I first want to list the many other tests that are conspicuous by their absence and are essential to also be performed in the interests of public health, public safety, environmental protection, and common defense.

The NRC should put each cask design through the sequence of regulatory tests: the 9 meter/30 foot drop; the puncture test; the 30 minute 1475 degree Fahrenheit fire; the underwater submersion. But those regulations are too weak and need to be strengthened. For instance, much higher drops (or faster impact speeds), much hotter temperatures and longer duration fires, much more severe puncture scenarios, and much deeper submersions, are certainly possible than are contained in current, woefully inadequate regulations. In addition, the most damaging sequence should be determined and used to challenge the integrity of the casks' weakest links. For instance, would an intense fire make cask weak spots brittle and even more vulnerable to puncture?

Propane torch and explosion tests. Just before the Yucca Mountain votes in Congress a year ago, a train carrying huge amounts of highly flammable and explosive propane derailed in Potterville, Michigan near the state capital Lansing. The town was evacuated for several days, as the propane was in danger of exploding. The public and media questioned what could have happened had high-level radioactive waste been on that train, as that railroad route is targeted by the Dept. of Energy to haul irradiated nuclear fuel rods to Yucca Mountain, Nevada. In response, the nuclear industry stated that nuclear waste transportation containers have been shown to survive propane explosions. The part the industry disengenously failed to mention was that it was referring to tests conducted in Germany, which has propane explosion regulations for casks, whereas the U.S. does not.

In addition to propane, other hazardous materials that are transported on U.S. roads, rails, and waterways must be taken into account in PPS tests. There are many combustibles that burn at temperatures hotter than the NRC 1,475 degree regulation. There are such huge quantities of combustibles on – or immediately next to -- the roads and rails and waterways, that the 30 minute regulatory fire is woefully inadequate. Some train fires, including the Baltimore Train Tunnel Fire, have burned not for minutes, or hours, but for days. And what contribution to a fire's intensity could oxygen tankers make? Not only accident conditions, but also sabotage and terrorism potentials, must be considered for such scenarios, not only in terms of "probability" but also consequence.

In fact, the absence of terrorist scenario testing is perhaps the most glaring omission from the PPS. The capability of high explosives, shaped charges, depleted uranium armor piercing munitions, anti-tank missiles, and other military munitions and weaponry to breach high-level radioactive waste transportation containers must be addressed by the PPS. Previous initial but far-from-adequate terrorist attack scenario testing (at Sandia

National Labs in the late 1970's/early 1980's and at Aberdeen Proving Ground in 1998) reveals that nuclear waste transport casks are indeed vulnerable to terrorist attack. Given the high level of alert to potential terrorist attacks in the U.S., as well as the potentially catastrophic nature of high-level radioactive waste, the PPS must test the vulnerability of each cask design to terrorist attack or sabotage.

NIRS concurs with the Association of American Railroads that crush tests are necessary, to ensure that casks could withstand train pile ups or the fall of a heavy load on top of a cask from, say, an overpass or bridge above.

Given the Dept. of Energy's proposal in its Final Environmental Impact Statement to conduct as many as 3,000 barge shipments on inland and coastal waterways in the U.S., underwater submersion testing must be conducted in this PPS. Very significantly, NRC's submersion regulations are woefully inadequate. For instance, the 1 hour submersion under only 3 feet of water is a extremely low hurdle given that much deeper immersions for much longer time periods are very possible in rivers, lakes, and seacoasts throughout the U.S. The NRC's recent adoption of International Atomic Energy Agency submersion regulations likewise leaves much to be desired. How can an undamaged cask be assured for underwater submersion? If a cask finds inadvertently finds its way to the bottom of a body of water, is it conservative to assume that cask is undamaged? 200 meters is also not a deep enough depth at which to test casks. For example, Lake Michigan, across which DOE proposes to ship 453 casks, has canyons deeper than 200 meters. Is it realistic to expect that a crane capable of lifting a 125 ton weight from such depths in Lake Michigan can be delivered in less than 8 hours to raise the lost cask that quickly? Given that, when referring to the Great Lakes, the drinking water supply of many tens of millions of people is at stake, underwater submersion testing must be included as an essential part of the PPS.

An airplane crash test on casks is an important one to consider. The NRC Atomic Safety Licensing Board on March 10, 2003 ruled that the likelihood of a military jet crash on the proposed Private Fuel Storage dump in Utah is high enough that it needs to be considered before a license can be granted. Likewise, military overflights above Yucca Mountain threaten the specter of crashes into nuclear waste transport or storage casks on the surface of the land. Accidental crashes are one issue, and intentional airplane crashes – as happened on Sept. 11th – another. An airplane crash test into nuclear waste casks has been conducted in Germany. NRC should conduct such a full-scale physcial safety test here in the U.S.

TEST TO FAILURE

Testing to failure should be an essential part of the PPS, and a requirement for cask certification. For, as the Association of American Railroads spokesman at the Rockville PPS public workshop stated, let's see what it would take and how long it would take to fail a cask, and then defend against that. Failure means the creation of a pathway to the environment through which radiation or radioactive particles could escape from a cask. Loss of radiation shielding and loss of radioactive particle containment are the two main

categories of cask failure. Testing to failure will reveal vital information about what accident or terrorist attack conditions casks can be expected to withstand. Emergency responders and emergency management officials could use such vital insights to determine, for example, when to risk their own health and safety in order to intervene to put out an intense fire before catastrophic radiation releases occur with the potential for causing large numbers of deaths and injuries downwind, not to mention millions if not billions of dollars in damages.

FIRE TEST

As expressed by Kalynda Tilges of Citizen Alert at the Las Vegas PPS public workshop, the PPS fire tests much take account of the hottest burning materials moving about on our country's roads and rails and waterways in significant quantities, and how long duration fires at such high temperatures would impact the weakest spots on casks. The position of the test cask in the fire should be at the location of highest temperature. Long-lasting, wind-fed fires should be taken into account and simulated.

Dedicated trains are not even required at this point. Even if they were to be required, breakdown of administrative controls, or intentional sabotage or terrorism, could bring trains carrying large quantities of explosive and flammable materials in close proximity to nuclear waste train cars.

For how long a duration should the fire tests be conducted? Fire tests should be conducted until failure of the cask, in order to clearly determine that threshold, and to get the most data out of the experiment for the money and resources invested.

Such intense fire tests should be immediately followed by immersion in 33 degree Fahrenheit water, to test the thermal shock to both the transportation container as well as to the irradiated fuel itself. For, as the official from the State of Missouri stated at the Chicago PPS public workshop, train tracks often parallel such flatland waterbodies as rivers and lakes, where such hot fire/cold immersion accidents are certainly possible, especially where bridges or port/railhead transfer facilities might be involved.

The Baltimore Train Tunnel Fire was brought up by NRC at each of the PPS public workshops. But NRC's flippant conclusion that nuclear waste casks would have survived such an accident without releasing radiation is oversimplified and misleading. The choice of the Holtech train cask with its welded inner canister – the same cask chosen for the train cask to be tested in the PPS – is of a design most capable of withstanding such a fire. Too bad DOE abandoned its welded canister program years ago! What if a more vulnerable rail cask design – such as a steel/lead/steel cask – had been in such a fire? What if a truck cask, for whatever reason, had been loaded onto a train car and then had been involved in such a fire? With its much smaller mass and thus much shorter heat up time, wouldn't such a truck cask have certainly failed and released its deadly contents in such a fire? What if more combustibles had been present to fuel the fire for a longer duration? What if hotter burning combustibles than tripropylene had been on that train? What if explosives had been present? What if the Howard Street Tunnel's ventilation

system had been stuck on, providing oxygen to feed the fire, and the water main had not broken after three hours? NRC's claim that a Holtech cask would have survived the Baltimore Train Tunnel Fire is overshadowed by the such questions. The PPS should address such troubling questions.

Especially unacceptable are NRC statements, in the PPS Draft Test Protocols and at the public workshops, that because these tests will exceed the regulatory limits for fires, containment is not going to be verified after the fire tests. Fires worse than NRC's current, inadequate regulation are all too possible, and must be safeguarded against.

IMPACT TEST

Dr. Ross Landsman of NRC Region III made a comment at the Chicago PPS public workshop that two trucks hauling high-level radioactive waste casks traveling at high speeds and colliding head-on could create a quite high impact speed. The official from the State of Missouri at the Chicago PPS contradicted John Vincent of Nuclear Energy Institute's statement to the contrary and pointed out that stretches of Interstate-70 in Missouri – and presumably elsewhere on highways in the U.S. – make such head-on collisions all too possible. For example, two trucks traveling 70 miles per hour each – the speed limit in some states – would collide head-on at a grand total speed of 140 miles per hour. Even higher speeds are possible. And it should be pointed out that one of the first suspected Al Qaeda operatives to be arrested post-911 was accused of obtaining a hazardous materials truck drivers license (including a permit to haul radioactive waste) in the tiny town of Three Oaks, Michigan, near the Cook nuclear reactors and was suspected of having malicious intent. The FBI subsequently warned the trucking and railroad companies across the U.S. to keep careful watch for suspicious activities surrounding hazardous and radioactive waste transportation, including within their own ranks. My point is, high speed impacts can be intentionally caused by suicidal terrorists, or by psychologically deranged individuals for that matter, and such collisions could certainly involve high-level radioactive waste trucks. So probabilities of such collision impacts cannot be arbitrarily ruled out as too remote to address.

The spokesman from the Association of American Railroads at the Rockville PPS public workshop made a similar statement about two trains colliding head-on at high speeds. Even if a train hauling high-level radioactive waste were obeying the AAR's 50 mile per hour speed limit for high-level radioactive waste hauling trains, the train coming from the other direction could be traveling at 80 mph, resulting in a combined collision of 130 mph. Runaway trains can travel at 90+ mph.

So, my recommendation for what speed to test at is 90 mph, to encompass such possibilities as raised above. The highest possible speeds should be tested. For, as one participant suggested at a PPS public workshop, since you're going to spend the money anyways, why not test at the full 90 mph?

To further emphasize the point, I once was passed by a so-called "low level" radioactive waste semi truck on Interstate-80 in Nebraska that was traveling at approximately 80 to

85 mph. If licensed nuclear waste truck drivers go that fast on the highway, then such high speed impacts are certainly possible.

And there are certainly nearly unyielding surfaces on or near the roads and rails across the U.S.: bridge abutments, especially those sheathed in steel for seismic protection; granite surfaces; solid rock on the edge of the road, as along I-70 in Missouri; tunnels and other structures. There are also high bridges, and highways and railroads on the edge of steep cliffs. The potential for multiple impacts down such rocky faces at high speeds, with a final high speed crash into solid rocks below, raises the necessity to consider conducting not just a single drop test per cask, but multiple drop tests on the same cask in the PPS. Otherwise, how could cask survivability in such multiple impact accident scenarios be proven?

Both the backbreaker and the impact on the lid end should be conducted on each truck cask design. The backbreaker would challenge the cask shielding; the lid impact would challenge the cask containment. Both tests should be followed by an intense fire test. Truck casks of the design for hauling bare naked (uncanistered) irradiated fuel assemblies within should be tested. The trailer carrying the cask could make worse such a backbreaker accident if still attached to the cask, and thus this should be tested in the PPS. Given the potential for high speeds discussed above, a backbreaker impact at 75+ mph should also be tested.

QUALITY ASSURANCE/QUALITY CONTROL, OR LACK THEREOF

As discussed by Corey Conn of Nuclear Energy Information Service and George Crocker of North American Water Office at the Chicago PPS public hearing, QA/QC with high-level radioactive waste transportation containers is a vital safety issue. There are well substantiated allegations that Holtech casks in particular are in major violation of QA/QC standards. Thus, the structural integrity of the Holtech casks is questionable. This could lead to very dire consequences if Holtech casks are involved in transport accidents.

Such QA/QC problems have plagued the nuclear cask industry for over a decade. Ventilated Storage Casks at Palisades nuclear power plant in Michigan and at Arkansas Nuclear One exhibited defective welds. QA/QC at VSC-24 manufacturer Sierra Nuclear Corp. was so bad that NRC threatened to revoke its operating license.

The allegations of QA/QC failures with the Holtech storage/transport casks is especially troubling considering that Holtech claims to have 25 nuclear plant dry cask storage clients, and would serve as the basis for the 4,000 cask Private Fuel Storage facility (meaning, 4,000 train cask shipments of high-level radioactive waste, predominantly from the Eastern U.S., across thousands of miles and dozens of states, to Skull Valley, Utah). In addition, NRC has selected Holtech as its train cask of choice not only for the PPS testing protocol, but also for its analysis of the Baltimore Train Tunnel Fire. NRC must address the Holtech's QA/QC problems before using it as the basis for the PPS and Baltimore Train Tunnel Fire analysis; NRC must forbid Private Fuel Storage from

utilizing Holtechs, and must halt the manufacturer of Holtechs, until these QA/QC failures are rectified.

As an ongoing issue of QA/QC, the deterioration of transport containers (metal and other component fatigue) must be factored into the analysis of cask performance or failure in the PPS. At this point, the PPS proposes using brand new casks. But largescale transportation schemes such as PFS and Yucca would re-use the same small number of transport casks over and over and over again. The same casks would be transported over many thousands of miles from Eastern reactors to Western dump sites. So what about testing "used" casks for the PPS. Of course, we caution against using radioactively contaminated used casks for such tests, to protect the environment and PPS workers.

COMPONENT TESTING

Each cask tested should be done so both with and without impact limiters, to see how well these "shock absorbers" work, as was suggested by Judy Treichel of the Nevada Nuclear Waste Task Force at the Las Vegas PPS public workshop.

Experiments must be done to determine at what temperature the seals on casks would fail. The same should be done for welded inner canisters, bolted lids, etc.

THE IRRADIATED FUEL ITSELF

So much discussion of transport casks often blurs the significance of what is actually being transported. Highly radioactive irradiated nuclear fuel assemblies are among the most deadly and long-lasting poisons ever generated by human beings. The "performace" or "behavior" or integrity of the irradiated fuel rods within the casks during accidents or terrorist attacks is all-important and must be a central area of concern to the PPS.

Statements at public workshops by those leading the PPS show just how bad our ignorance of this vital issue actually is:

Dr. Murphy: "...Just at this time there is very little to no data on how the fuel itself behaves in these kinds of [accident] scenarios..."

Dr. Sorenson: "...There is not a lot of test data available frankly in terms of how fuel assemblies perform under these extreme loading environments..."

In addition, Bill Lake of DOE did a presentation at the Packaging and Transportation of Radioactive Materials (PATRAM) conference in Chicago in 2001 about the transportation of damaged fuel. In short, Lake stated that DOE has little to no experience in transporting damaged fuel. And yet, there is a lot of damaged irradiated fuel across the U.S. In addition, as time goes on, irradiated fuel continues to deteriorate in storage pools and dry casks across the country.

So the condition of the irradiated fuel and its ability to hold up under accident conditions is vitally important to know.

Both PWR and BWR fuel rods must be tested for their characteristics and conditions within transportation containers, due to differences in thermal heat and radioactivity. Internal thermal stresses from real fuel must be accounted for in PPS tests.

Fuel cladding and fuel pellet condition is vitally important. At what temperatures and G forces would fuel cladding burst and fuel pellets turn to fine powder that would be much more easily dispersed downwind and downstream?

How would high burn up fuel assemlies, more radioactive and thermally hot, not to mention more deteriorated and fragile, hold up in accidents? The PPS must account for the huge difference between cold dummy fuel assemblies versus real-world, thermally hot, highly radioactive, and often times deteriorated or damaged irradiated nuclear fuel assemblies. In fact, PPS test casks should be completely loaded with surrogate fuel and even artificial heaters, in order to simulate real irradiated fuel as closely as possible given the importance to transport cask function. Such experimentation would document the different stresses on fuel assemblies at different locations within the cask.

The on-going, inevitable, and highly problematic degradation of irradiated nuclear fuel must be better understood. For instance, the dynamics and consequences of the loss of the internal inert atmosphere within a nuclear waste transportation container upon the degradation of fuel must be looked into, whether such loss be due to an accute accident situation (sudden loss of containment), or a chronic deterioration (slow leak) process.

PPS must make such understanding of fuel degradation a key aim of its research and experimentation. NRC and its subcontractors should be advised, however, that high-level radioactive waste is one of the most deadly poisons ever created by humans, so any laboratory experimentation with it must be very carefully controlled and kept to an absolute minimum in order to avoid harmful radiation doses to researchers and others downwind, and to avoid harmful radiation releases into the biosphere.

FUNDING

Sacrificing and taking short cuts on public safety and environmental protection in an attempt to save money is not acceptable from an agency whose mission is supposedly protection of public health, safety, and the environment.

PPS funding should not come from the Nuclear Waste Fund, which was intended to provide for the long-term safe management of high-level radioactive waste. Rather, the funding should come directly from the nuclear utilities themselves, as well as the transportation cask vendors, and the Dept. of Energy and Dept. of Defense nuclear weapons programs. After all, these are the institutions that have generated the high-level radioactive waste in the first place, or that propose to profit from its transportation. Why should ratepayers, or taxpayers for that matter, be forced to pay for costs associated with

transporting the deadly wastes that the rogue nuclear establishment generated, very often against the will of the public they claim to "serve"?

NIRS agrees with the State of Nevada that 1% of the overall Yucca Mountain transport budget would be a good investment in public safety and environmental protection in order to test the GA-4 truck cask and the four rail casks most likely to be used, as opposed to only testing one truck cask and one train cask in an attempt to save money. In fact, all cask designs should be tested at full-scale as a basic licensing condition. The investment is important considering the millions to billions in damages – not to mention people killed and injured – if an actual high-level radioactive waste cask fails on the roads, rails, or waterways of America.

MORE PUBLIC PARTICIPATION NEEDED

NRC's consultation with Native Americans was unsuccessful. Although a number of representatives of Western Shoshone and Paiute tribes were invited to the table at the Las Vegas PPS public workshop, NRC was not effective at involving them meaningfully in the discussion. They were only allowed to say very little, or they chose to say very little. In either case, NRC did not effectively involve them in the conversation. And what of tribes elsewhere? What about tribes whose communities and nations are on road, rail and waterway routes leading to Yucca or Skull Valley. Not only does NRC have an environmental justice obligation to tribes, it also has a nation to nation responsibility to respect tribes' sovereignty, to deal with tribes as equal and sovereign nations. NRC's PPS process has thus far failed to do so, as reflected in frustrated comments by Native spokespeople at the Las Vegas public workshop.

Public meetings during week days effectively excluded most concerned citizens who either had to work or attend school.

At the Rockville public workshop, NRC facilitator Chip Cameron asserted that "...the Chicago meeting...gives an opportunity for all the corridor states that are effected to come to the table...". This is far from true. Concerned citizens in scores of corridor states across the U.S. have been effectively ignored, not meaningfully invited not even alerted by NRC to take part in the PPS public comment process. How can NRC justify not holding workshops elsewhere, especially in Salt Lake City and Tooele County, Utah – hard hit would they be not only by PFS, but also by Yucca? Why weren't public interest groups such as Citizen Action Coalition of Indiana and Nukewatch of Wisconsin not invited to the table in Chicago? Why weren't corridor states such as Missouri, Nebraska, Colorado, Ohio, New York, and many others granted workshops?

As part of the PPS, funding should be made available for meaningful public involvement, such as paying the transportation, room and board costs for grassroots concerned citizens to travel in and take part in the public workshops.

NRC absolutely needs to conduct public comment resolution meetings, and publish a public comment resolution document. Otherwise, public comments will seem to have

disappeared down a black hole. This would repeat what NRC did to public comments on the Part 63 Yucca Mountain licensing regulations, and what DOE did to public comments received during the Yucca environmental impact statement: ignore them completely. Such betrayal of the public trust results in long-lasting public bitterness.

And furthermore, the final, detailed testing plans require additional public meetings and and an additional public comment period.

PUBLIC CONFIDENCE IS NONE OF YOUR BUSINESS, NRC.

NRC should not be worried about increasing public confidence. NRC's mission is supposed to be to protect public health, public safety, the environment, and the common defense. NRC is not supposed to serve as a supplement to the nuclear power industry's already well-funded public relations industry.

NRC must not dare allow the misuse of films taken of the PPS tests by the industry to prove that nuclear waste transportation is inherently safe. Films taken of the Sandia tests of the late 1970's have been misused by the nuclear power industry and the Dept. of Energy for decades to lull the public, the media, and emergency response officials into a false sense of safety and security about inherently dangerous high-level radioactive waste shipments. Such misuse of films would confirm that the NRC PPS is little more than a public relations exercise on behalf of the nuclear power industry.

Thank you for considering these comments. We look forward to your written response to them.