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-----Original Message-----
From: Howard Wilshire [mailto:howardgw@comcast.net]
Sent: Thursday, December 19, 2013 11:50 AM
To: RulemakingComments Resource
Subject: Comments on Waste Confidence DGEIS

Attached are my comments on the subject DGEIS
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Howard G. Wilshire

Were we a rational society, a virtue of which we have rarely been accused, we would husband our oil and gas resources._ M. King Hubbert

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Re Waste Confidence Draft Generic Environmental Impact Statement, NUREG-2157

Following are comments on the Waste Confidence DGEIS by Howard G. Wilshire. I am a geologist with a Ph.D. from the University of California, Berkeley, and 35 years experience as a senior Research Geologist with the U.S. Geological Survey, now retired. I am senior author of a book that deals substantively with a number of issues relevant to the DGEIS [Howard G. Wilshire, Jane E. Nielson, and Richard W. Hazlett, *The American West at Risk: Science, Myths, and Politics of Land Abuse and Recovery*, Oxford University Press, 2008].

It is my conclusion that this DGEIS is premature and establishes an impact rating system solely related to inferred magnitude of very poorly described potential environmental impacts. It is, in the general absence or severe shortage of relevant evidence, model-driven by use of "Reference guides." None of the critical storage items—casket performance in many different environments and inadequately tested over a very short time period (14 years, one casket), the potential for catastrophic impacts on storage facilities, which can have far greater environmental consequences than any considered in the GEIS, and the human impact factor that has great potential for environmental harm, but which doesn't fit the format for this GEIS and so is ignored. The evidence base is so deficient that the indefinite time frame considerations are not credible.

Introduction

Purpose and Need

p. 1-6. "The purpose and need for the DGEIS is stated to improve efficiency of NRC's licensing process, to provide a single document reflecting NRC's current understanding of generic environmental impacts, and to satisfy Court requirements."
Under the same heading, it is stated that "The NRC intends to codify the results of its analyses in this draft GEIS at 10 CFR 51.23. NRC licensing proceedings for nuclear reactors and ISFSIs will continue to rely on the generic determination in 10 CFR 51.23 to satisfy obligations under NEPA with respect to the environmental impacts of continued storage."
Comment:
Because of the major variations in climate, geologic, and other conditions of the various elements and "activities" related to continued-storage sites across coterminous U.S., generic descriptions of environmental impacts can at best provide only a framework for selected types of impacts. The procedures for establishing a generic basis for impact assessment omit some critical sources of potential environmental impact and rationalize the safety of others on the basis of very limited data.

Generic EIS

The approach is stated in the **Abstract, p. iii** as follows: "For the resource areas considered, this draft GEIS attempts to establish generic impact determinations that would be applicable to a wide range of existing and potential future spent fuel storage sites," using "some site-specific information in developing the generic impact determinations…" And further, a goal is stated to "…identify the types and assessing the magnitude of environmental impacts where generic findings can be established."

Comment:

These statements provide no information on exactly what characteristics/activities/properties of all elements of ISFSIs do not qualify for generic findings, and how many sites have such disqualified characteristics. These must be specified as they may (and do for some known characteristics) represent sources of environmental impacts that are of overriding importance in establishing and maintaining integrity and safety of continued storage. Information should be supplied on the number of sites, including all time frames, to which the chosen set of generic findings do **not** apply [the language quoted above "…establish generic impact determinations that would be applicable to a wide range of existing and potential future spent fuel storage sites" implies that the determinations are not universal].

An Important Factor That Does Not Lend Itself to Generic Assessments

History of Neglect

Comment:

Hallmarks of the nation's nuclear weapons program have been and still are extraordinarily sloppy record-keeping, careless handling of deadly materials, and blind faith in nature's ability to absorb anything. The Atomic Energy Commission (AEC) originally served as a watchdog and industry booster. The dual roles conflicted, so the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) were created to separate them. Both maintain cozy, mutually-supportive relations with the industry and neither is known for trying to protect public health or, least of all, the well being of other living entities.

Affected Environment [Resource Areas]

Comment:

Most of the identified elements of affected environment are described as widely ranging, variable, many are site-specific, or occur only at certain sites. This being the case how can environmental impacts be reduced to generic assessment?

Environmental Impacts At-Reactor Continued Storage of Spent Fuel

p. 4-3. "In this chapter, the NRC uses the License Renewal GEIS (NRC 2013) to inform some of the impact determinations regarding continued storage. In many of these cases, the analysis in this draft GEIS considers how the environmental impacts of continued storage compare to the impacts considered in the License Renewal GEIS. In the License Renewal GEIS, the NRC evaluated the potential impacts in each resource area by reviewing previous environmental analyses for past license renewal reviews, scientific literature, and other available information. Where appropriate, this draft GEIS also considers analyses and impact determinations made in

previous ISFSI licensing and renewal environmental assessments (EA) and environmental impact statements (EISs) and in reactor license renewal and new reactor licensing EISs to inform the impact determinations in this analysis."
Comment:
Since this statement indicates unspecified assessments of unspecified environmental impacts on unspecified resource areas, it is both uninformative and says nothing about how it fits into a generic impact statement.

Sections 4.1 through 4.17 evaluate the potential impacts on various resource areas

p. 4-18 to 4-20. **Climate Change**. This is not a resource area. "The NRC's evaluation of the effects of climate change on the intensity and frequency of natural phenomena hazards that may cause spent fuel storage accidents is provided.
Comment:
The assessment is not related to environmental impacts of climate change, only to increased hazards, which occur also with man-made climate change phenomena. The impacts described are related entirely activities that increase atmospheric GHGs, which are (correctly) dismissed as "Small". The section does not consider environmental impacts resulting from the effects of climate change on ISFSI facilities and their constituent dry storage casks. The integrity of dry casks is based on extremely limited data on performance of one cask in one geographic/climate setting, and then extrapolated for a period of 100 years to all casks of whatever design, located in whatever climatic zone.

This matter puts the use throughout this GEIS of "reference models" of various continued storage components on a very shaky basis, and dilutes actual potential environmental impacts with a host of assumptions rather than facts. Buttressed by a large assortment of regulations that ensure permanent protection of the integrity of constructed systems managed by humans, leads directly to an assessment of "SMALL" unspecified environmental impacts.

p. 4-20 to 4-21. Geology and Soils. "Continued spent fuel pool operation is not anticipated to increase impacts on local geology and soils," but "spent fuel leaks could result in radiological contamination of offsite soils."
Comment:
The "cure" for offsite soil and groundwater contamination is ensured by regulation and monitoring, which translates to a "SMALL" assigned impact. However, migration of contaminants in soils involve soil biota and biota all the way up the predatory scale, which can lead to distant off-site migrations. The preparers of this document need to study Hanford's remarkable history of biological pathways for spread of contaminants. The ready dismissal of leaking storage facilities is not warranted by their commonplace occurrence in nuclear power plant facilities.

p. 4-21 to 4-24. Surface-Water Quality and Use. Consumptive use of surface water is dismissed as unimportant after license expiration and ending of plant operations, which absorb most of the surface water needs. "Surface water quality may be affected by groundwater contamination. The NRC has completed a review of its overall regulatory approach to groundwater protection (NRC 2011b). The NRC started this review in response to recent incidents of radioactive contamination of groundwater and soils at nuclear power plants.

Contaminated groundwater at some sites may discharge to nearby surface waters, resulting in indirect effects on surface-water quality. The concentrations of radionuclides in offsite surface waters would depend on the rate of release from the spent fuel pool, direction and rate of groundwater flow, the distance to nearby offsite surface waters toward which groundwater flows, the velocity 1 or transport rates of radionuclides through the subsurface and radioactive decay rates. However, because surface waters in the vicinity of nuclear power plants are usually large to meet reactor cooling requirements, a large volume of surface water is usually available to dilute groundwater contaminants that flow into the surface waterbody. This dilution ensures that contaminants that may have been present above applicable groundwater-quality standards are diluted well below limits considered safe."

Comment:

The NRC apparently did not do a very exhaustive review, because the assertion that surface waters in the vicinity of nuclear power plants are usually [emphasis added] large and therefore ensures dilution to levels well below those considered safe is incorrect. The lesson that large amounts of water will not dilute contaminant streams has been demonstrated for decades. At Hanford it was shown long ago the migration of radionuclides and other toxic substances into the Columbia River were concentrated by biological uptake to concentrations far higher than river water. The ultimate fate of these contaminants is the important question, which is not addressed in this GEIS. Furthermore, climatic impacts have shown both in the US and France that reactors located on and dependent on inland rivers have been shut down due to drought limiting the supply of cooling water. Use of the word "usually" also implies conditions where the surface water supplies are not large—they would be even more vulnerable to effects of drought. In addition, the account above admits the uncertainties of rates of leakage from SNF pools, direction and rate of groundwater flow, and distance to offsite waters. We cannot predict future risks from the toxic and radioactive wastes in the environment with any confidence because we do not know all of nature's pathways.

p. 4-25 to 4-27, Groundwater Quality and Use "…The impacts 1 of a spent fuel pool leak on offsite groundwater depend on many factors, including the volume and rate of water released from the spent fuel pool, the radionuclide content and concentration and water chemistry of the spent fuel pool water, the direction of groundwater flow, the distance to an offsite groundwater receptor, the velocity or transport rates of radionuclides through the subsurface, and radioactive decay rates. A recent revision to the NRC's regulations that explicitly requires monitoring of subsurface areas will further ensure leaks are detected. Besides these measures, the hydrologic characteristics associated with typical nuclear power plant settings (see Section E.2.1.3)—such as their location near large waterbodies (due to cooling requirements), shallow water table flow direction toward these waterbodies, flat hydraulic gradients in the shallow water tables, large distance to local groundwater users, and the likelihood that local groundwater usage is in deeper confined aquifers—will act to impede the offsite migration of future spent fuel pool leakage. Finally, current and future spent fuel pool sites are required to have routine environmental monitoring programs in place that should take samples at offsite groundwater sources (e.g., potable or irrigation) in areas where the hydraulic gradient or recharge properties are suitable for contamination (NRC 1991c,d). Further, any detection of onsite contamination would likely result in additional monitoring, including additional sampling of any nearby private wells, as part of an expanded environmental monitoring program. With these measures and characteristics in place, it is unlikely that offsite migration of spent fuel pool leaks will occur or go undetected. Based on

resulting from a spent fuel pool leak during the short-term timeframe would be SMALL."
Comment:
The same comments made under the heading of Surface-Water Quality and Use apply here. There are so many "likely", "unlikely" and "likelihood" modifiers used that a high degree of uncertainty attaches to the assurances that nothing bad will happen if the pools leak. The statement that the small number of leak releases of contaminants to the environment, "based on the available data, have not affected the health of the public" is less than reassuring, especially if only impacts on humans is looked for.

p. 4-55 to 4-61. Waste Management. "This section describes potential environmental impacts from low-level radioactive waste (LLW), mixed waste, and nonradioactive waste management and disposal caused by the continued storage of spent fuel in spent fuel pools and at-reactor ISFSIs."
Low-Level Radioactive Waste. For the Long-Term and Indefinite time frames in which casks would be replaced, disposal of cask materials that have been contaminated by contact with SNF rods will be disposed as Low-Level Radioactive Waste (LLRW).
Comment:
Considering that materials classified as LLRW can contain long-lived species, information should be provided on the types and concentrations of radionuclides present in cask wastes for all types of casks, storage mode, and ISFSI location factors. LLRW disposal sites across the nation have all leaked presenting, depending on the leaked constituents, environmental risks that must be analyzed.

p. 4-67 to 4-83. Environmental Impacts of Postulated Accidents.
p. 4-68. The consequences of a severe (or beyond-design-basis) accident, if one occurs, could be significant and destabilizing. The impact determinations for these accidents, however, are made with consideration of the low probability of these events. The environmental impact determination with respect to severe accidents, therefore, is based on the risk, which the NRC defines as the product of the probability and the consequences of an accident. This means that a high-consequence low-probability event, like a severe accident, could still result in a small impact determination, if the risk is sufficiently low.
Comment:
Consider, for example, that a storage facility location makes it vulnerable to a catastrophic event of uncommon occurrence. How many facilities located in such places would it take to make a low-probability event be categorized is having a greater than SMALL impact? For example, the NRC recognizes six US reactor sites to have "high" vulnerability to severe flooding by upstream dam failure, and an additional nine reactors have "medium" vulnerability. This information was obtained from a memo entitled "Identification of Generic External Flooding Issue Due to Potential Dam Failures" prepared by the Chief of the Probabilistic Risk Assessment Operational Support Branch of the NRC. The memo further states that "Since dam failures were excluded from consideration of most [safety reviews], its risk contribution has not been addressed to date," and "There is an increase in the estimated frequency of potential dam failure of an order of magnitude" from previous assessments. It is evident from the testimony of Fukushima that one such event would have enormously greater environment impact than all the generic factors considered in the GEIS put together. The left hand of NRC needs to know what the right hand is doing. This particular issue must be evaluated in this GEIS.

Furthermore, this section fails to include an important cause of accidents or exacerbation of accidents: the human factor: There is a very large literature on the contributions of human errors to accidents that have significant impacts on the environment. That history is ignored in this GEIS, but it needs to be factored in for all time frames considered. Human errors are not a given, but their frequency and persistence throughout our grand nuclear experiment have a certain generic flavor. The opportunity for mistakes with environmental consequences is enhanced by the large, and getting larger, number of dry cask designs, which require broadened knowledge for activities designed to ensure cask integrity, including inspection, monitoring, and replacement repeated at intervals greater than typical life-times of the inspectors—that is, the "activity" may be the same or similar forever, but those implementing the actions have by comparison a very rapid turnover. The historical record shows clearly that the majority of significant accidents are due to, or exacerbated by human errors, so calling on the "protections" of design, construction, and regulations is irrelevant. The opportunity for human error, especially considering the time that continued storage at a reactor is rationalized as generically safe (up to 140 years), warrants assessment. In effect, most of the environmental impact assessments are best case scenarios.

p. 4-76 to 4- Design Basis Events in Dry Cask Storage Systems.
Comment:
Potential impacts assessed by unverified assumptions of deterioration of spent fuel pools, canisters, and casks, are as site-dependent as risks related to site-specific geology, geohydrology, and climate change with its attendant increase in severe weather events. Obvious problems of guesswork appear in use of existing environmental impact determinations of particular sites as "reference models for impact assessment;" for example the FEIS for the Skull Valley Utah ISFSI, which does not yet exist. The same difficulties apply to canister/cask environmental impact assessments, which are based on assumptions of reliability of a growing set of different designs, from which a "reference" model is selected which itself has no verified reliability.

It is stated (p.2-12) that most dry cast storage systems fall into two main categories depending on how they are loaded. Loading is very differently handled for the two categories, posing different handling risks and different deterioration rates dependent on geographic location. Additional categories are implied by the statement that most dry casks fall into two categories. Other variants among the two categories are implied by the statements that "bare fuel casks…tend to be all metal construction" and in the canister-based system, "the canister is usually loaded while inside a transfer cask" and "transferred vertically into either a concrete or metal storage overpack or horizontally into a concrete storage module." So what "reference model is used for environmental impact assessment?"
As no dry transfer systems exist in the U.S. (p. 2-19) and no design has been approved by the NRC, impact analysis is based on an arbitrarily selected reference DTS, which will be needed under the Long-Term and Indefinite storage scenarios. Performance can only be assumed and will be unverified, so no generic environmental impact assessment can be made. Reliance (p. 2-21) on the Transnuclear-EPRI DTS leads to an NRC conclusion "that some environmental impacts of the facility would be comparable to a DTS." So, how many elements of comparability satisfy a generic assessment?

In conclusion, it is my opinion that this DGEIS is premature and establishes an impact rating

system solely related to magnitude of very poorly described potential environmental impacts. It is, in the general absence or severe shortage of relevant evidence, model-driven by use of "Reference guides." None of the critical storage items—casket performance in many different environments and tested over a very short time period (14 years, one casket), the potential for catastrophic impacts on storage facilities, which can have far greater environmental consequences than any considered in the GEIS, and the human impact factor that has great potential for environmental harm, but which doesn't fit the format for this GEIS. The evidence base is so deficient that the indefinite time frame considerations are not credible. I would give pigs a better chance of flying than protocols followed indefinitely would protect the environment.

Thank you for the opportunity to comment,

Howard Wilshire
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