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Comments of the Institute for Energy and Environmental Research on the Draft Programmatic Environmental Impact Statement on the Global Nuclear Energy Partnership (GNEP), DOE/EIS-0396, published in October 2008¹

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These comments supplement oral comments made by Arjun Makhijani at the Idaho Falls hearing on the Draft GNEP PEIS (hereafter PEIS 2008) on November 20, 2008. There may be some overlap between the comments here and those made on November 20, 2008; both should be taken into account.

1. The “global” part of GNEP has been essentially dropped from the PEIS. Hence this PEIS process should be ended.

This PEIS is not about the Global Nuclear Energy Partnership at all, but about U.S: nuclear energy options. This is clearly and succinctly stated in the summary:

This GNEP PEIS provides an analysis of the potential environmental impacts of expanding nuclear power in the U.S. using either the existing fuel cycle or various alternative closed and open fuel cycles. DOE’s preference is to close the fuel cycle.²

The PEIS explicitly disavows any analysis of any global or international options. Rather, it only looks at U.S. programs that “could” have international implications:

At this time, DOE has no specific proposals for the international component of the GNEP Program. Rather, as a preliminary step in this PEIS, DOE addresses two potential international initiatives that could affect the global commons and the environment in the U.S.—**Grid-Appropriate Reactors** and **Reliable Fuel Services**.³

¹U.S. Department of Energy, Office of Nuclear Energy, *Draft Global Nuclear Energy Partnership Programmatic Environmental Impact Statement*, GNEP PEIS; DOE/EIS-0396, October 2008, links at <http://nuclear.gov/peis.html>; hereafter PEIS 2008.

² PEIS 2008, p. S-1.

³ PEIS 2008, p. S-59, emphasis in the original.

The essence of GNEP is that it is proposed as a global partnership. Assessing the generic potential impact to the global commons cannot be done satisfactorily without some framework of where the various activities would be handled. For instance, the volumes of spent fuel generated in various countries, that would be transported from specific places where there are reactors to the places where there are reprocessing plants (France, for instance), and the environmental impacts of those plants in those specific environments (the English Channel, the North Sea, and the Arctic Ocean in the case of reprocessing at La Hague in France, for instance) would need to be considered. Pollution of the oceans and the impacts on oceanic life would depend greatly on the scale and location of reprocessing facilities and on the type of technology used. As a corollary, the scale of reprocessing and spent fuel transport across the oceans would also have to be considered. None of these specifics are considered in the PEIS.

Further, the concept of GNEP would restrict enrichment and reprocessing to certain countries. Those countries need to be named and the impacts of concentrating these processes in a few countries in the context of global nuclear energy expansion need to be considered. At least as important, the erosion of rights of non-nuclear weapons states (the “inalienable right” to commercial nuclear technology) under Article IV of the NPT needs to be addressed. While GNEP is considered voluntary, the exclusion of other countries by GNEP members from certain commercial technologies is likely. Indeed, the underlying concept would be defeated if non-participants were allowed to gain access to reprocessing and enrichment. Given the strength of the global sentiment for pursuing Article IV rights, the environmental implications of many countries “going it alone” or in ad hoc alliances to pursue enrichment and reprocessing should also be considered. None of this is even broached in the PEIS.

Recommendation 1: It is clear that this PEIS is not about a global nuclear energy partnership but about U.S. nuclear energy options. Specifically, by DOE’s own admission, it is oriented to its “preference to close the fuel cycle” (see quote above). It is moreover, oriented to a U.S. fuel cycle “closure” (so-called). As such this GNEP PEIS process should be ended.

2. As a U.S.-oriented assessment for estimating the environmental impacts of nuclear energy under the National Environmental Policy Act, the PEIS is incomplete in essential ways and cannot be the basis for a decision-making process on U.S. options.

This PEIS is essentially about a limited range of nuclear energy options. As such it is highly incomplete. It is not an appropriate basis for a record of decision. U.S. consideration of nuclear energy, including “closure” of the nuclear fuel cycle has only two important contexts:

1. Options for dealing with U.S. nuclear spent fuel.
2. Options for U.S. energy policy in light of the need to greatly reduce CO₂ emissions from fossil fuel use, which are the primary source of U.S. greenhouse gas emissions.

These two are obviously connected. Dealing with U.S. nuclear spent fuel in a substantial way by the reprocessing and reuse of the plutonium and possibly the recovered uranium would involve greatly expanding the U.S. nuclear energy sector both in terms of electricity production and

massive new capital investments in new infrastructure, including new reactors and new reprocessing plants. Such investments have implications for reducing CO₂ emissions. Specifically, there is a cost per metric ton of CO₂ reductions that is implicit in them.

Since spent fuel management by reprocessing and reduction of CO₂ emissions are connected issues, the alternatives in a U.S.-oriented PEIS on nuclear energy would be far broader than those considered in the draft GNEP PEIS. Examples of such alternatives that are not in the PEIS that are essential in a U.S.-oriented PEIS would include:

1. At-reactor hardened storage of spent fuel for extended periods, with a renewed repository program that does not include Yucca Mountain, coupled with pursuit of renewable energy options. Various combinations of renewable energy sources are possible and these would constitute alternatives within this overall scheme.
2. Comparison of nuclear electricity with carbon capture and sequestration technologies using coal and or natural gas.
3. Drastically increasing the efficiency of electricity use, coupling that with a smart grid, and coupling that with various approaches to reducing CO₂.
4. Nuclear energy options that include the full use of the recovered uranium – which would involve a massive increase in the use of breeder reactors and reprocessing, with attendant environmental, cost, and proliferation consequences.

In all of these cases, comparing the costs of various approaches to meeting electricity requirements and comparing their security implications is essential. None of these options are considered in the PEIS. The PEIS does not have the appropriate range of alternatives for it to serve as a basis for deciding how to deal either with the spent fuel management problem in the United States or the CO₂ problem, much less the intersection of the two.

Recommendation 2: If the GNEP PEIS process is continued, a new draft should be issued to consider the full range of options for addressing both the climate-related CO₂ issues and the spent fuel management problems arising from existing and potential future stocks of spent fuel, with the latter varying according to the scenario.

3. The PEIS is fundamentally deficient in regard to its consideration of disposition of spent nuclear fuel, high-level waste, Greater than Class C waste, low-level waste, and depleted uranium.

Since Yucca Mountain is likely on a course to being stopped, this leaves the PEIS essentially incomplete with respect to spent fuel as well as high-level reprocessing waste. Further, assumption in the PEIS that any repository would have impacts similar to Yucca Mountain is presented without technical foundation. Indeed, if one examines the DOE's own estimates for Yucca Mountain developed over the last decade, they vary by orders of magnitude.⁴

⁴ See Arjun Makhijani, *Comments of the Institute for Energy and Environmental Research on the U.S. Nuclear Regulatory Commission's Proposed Waste Confidence Rule Update And Proposed Rule Regarding Environmental Impacts of Temporary Spent Fuel Storage*, Institute for Energy and Environmental Research, Takoma Park, Maryland, 6 February 2009.

The PEIS also does not consider the problem of reclassification of depleted uranium as a new kind of waste under NRC regulations, an issue which is now on the table at the NRC. It does not consider that the low-level waste compact system has not produced any new disposal site in over two decades. In other words, it does not consider the obvious fact that the problem of radioactive waste is festering on all fronts.

Recommendation 3: If the GNEP PEIS process is continued, proper consideration to disposition of all waste streams, and alternatives to Yucca Mountain for high-level reprocessing waste and/or for spent fuel would need to be in a revamped draft. The uncertainties involved in long-term dose calculations for various kinds of waste over the times for which they are expected to present risk to the public should be properly represented and fully reflected in the analysis.

4. The PEIS proposes to separate the non-proliferation impacts and shunt them to a separate document. This is inappropriate.

Contrary to comments provided to the DOE on the scope of the GNEP PEIS,⁵ the draft PEIS does not consider non-proliferation impacts:

Separate from the GNEP PEIS, the National Nuclear Security Administration (NNSA), a separately organized agency within DOE, is preparing a Nonproliferation Impact Assessment (NPIA) that will analyze the nonproliferation aspects of the programmatic alternatives evaluated in this GNEP PEIS. The assessment framework is based on a qualitative evaluation of U.S. government policy factors and on internationally-accepted Proliferation Resistance and Physical Protection methodology (GIF 2006). This framework addresses: 1) the ability of the alternative nuclear fuel cycles to support established nuclear nonproliferation policy objectives, and 2) a technical evaluation of the nonproliferation features of the alternative processes and technologies. NNSA intends to make a draft of the NPIA publicly available in the same time frame as this Draft GNEP PEIS. The final NPIA will be publicly available prior to the Record of Decision (ROD) for this GNEP PEIS, and will be considered by DOE in decisions regarding the GNEP Program.⁶

However, no adequate evaluation of the environmental impacts of GNEP alternatives is possible without a non-proliferation assessment. For instance, the environmental impacts depend critically on the location and type of reprocessing facilities, the extent of re-use of plutonium, the type of reactors in which the plutonium is used, and the scale of such use. The assessment of non-proliferation impacts also depends largely on the same factors. It is not possible to evaluate options and produce a final PEIS with proper consideration of environmental impacts without a non-proliferation assessment. It matters a great deal whether there will be just a few giant reprocessing facilities based say in France, Russia, and the U.S., or whether they will be scattered more widely and include, for instance, Japan, China, Britain, and possibly other

⁵ See PEIS 2008, Appendix H.

⁶ PEIS 2008, p. 1-8.

countries. Since there are no international considerations in the PEIS, even putting together a list of countries is impossible, much less assessing environmental impacts.

Similarly, transportation impacts will depend on facilities location. Will plutonium and spent fuel shipments pass through the Straits of Malacca or the Red Sea, both of which currently have piracy risks associated with them? How many shipments will there be? Evidently, this matter concerns both environmental impacts and proliferation risks.

As another example, the Draft PEIS considers a thorium fuel option that would utilize 19.9 percent enriched uranium.⁷ This option would represent a major increase in the proliferation risk of commercial nuclear fuel since it would greatly reduce the separative work needed to make weapon-grade highly enrichment uranium compared to present low-enriched uranium fuel. Since it is less difficult to make nuclear bombs with HEU than with plutonium, the proliferation issues and environmental and health risks associated with the thorium cycle need to be addressed in that context.

Further, it is essential that all such options be transparent at the draft PEIS stage, so that the public and evaluate them and comment on them.

Recommendation 4: If the GNEP PEIS process is continued, the non-proliferation impacts and environmental impacts should both be considered in a new draft. The links between these impacts should be explicit.

5. Consideration of past reprocessing performance is very incomplete and inadequate.

Commentors on DOE's implementation plan had asked for an evaluation of reprocessing history. The draft PEIS considers only U.S. reprocessing history, noting only that other countries, such as France, Britain, Japan, and Russia "have been reprocessing for many years."⁸ Regarding the U.S. program, the Draft PEIS notes:

Preparing these [U.S. reprocessing] liquid wastes for disposal will cost tens of billions of dollars. Some alternatives analyzed in this GNEP PEIS would produce similar liquid radioactive wastes. To avoid repeating problems associated with past reprocessing operations, DOE would support prompt conversion of such liquid HLW to solid forms, and would not support any long-term storage of such waste.⁹

Simply assuming that the program would convert reprocessing "HLW to solid forms" does not solve the problem of high-level waste. First, some storage of acidic waste from UREX+ or PUREX reprocessing technologies would be required, as it is in France and Britain, for instance. Failure of cooling to the storage tanks could result in catastrophic accidents. Such a failure could occur, for instance, in case of a complete power failure. This occurred at the French

⁷ PEIS 2008, p. 4-93.

⁸ PEIS 2008, p. 1-4, see footnote 8.

⁹ PEIS 2008, p. 1-5.

reprocessing plant in La Hague in 1980. Though an emergency generator saved the day in the instance, the impacts of catastrophic explosions of high-level waste tanks in which liquid acidic wastes are stored needs to be considered. It is not in the list of accidents considered in the draft PEIS for nuclear fuel reprocessing.¹⁰

Further, a high-level waste tank explosion actually occurred in the Soviet Union in 1957. Its consequences were very severe. This history is also missing from the Draft PEIS.

Further, the problem of recovered uranium needs to be discussed in a waste context. While it is possible that this could be reused fully, it would require thousands of breeder reactors worldwide to deal with the present stock of uranium in existing spent fuel within a reasonable time (on the order of 100 years). The environmental, proliferation, and cost consequences of such an approach need to be considered (as noted above); they have not been considered in the draft PEIS, as noted above. In the alternative, the contaminated recovered uranium would have to be disposed of as a waste. This would be considerably more radioactive than depleted uranium from enrichment plants, which the NRC staff now admits is not like other low-level radioactive waste and would need special consideration as to its environmental impacts.¹¹ This would be even more true of uranium recovered from reprocessing plants. Indeed, both DU, and *a fortiori*, recovered uranium would likely have to be disposed of in a geologic repository in order to have a reasonable prospect of keeping long-term doses within those allowed by present low-level waste regulations.¹²

Recommendation 5: A full history of global reprocessing, including high-level waste tank accidents, needs to be considered in all reprocessing alternatives. The risks of such accidents should be evaluated with specific reference to actual accidents and near-misses that have occurred at reprocessing plants and high-level waste storage tanks not only in the United States, but globally.

¹⁰ The list of accidents considered is in Table D-2.2.1.2-1, PEIS 2008, p. D-36.

¹¹ R.W. Borhardt. Subject: *Response to Commission Order CLI-05-20 Regarding Depleted Uranium*, Rule Making Issue. SECY-08-0147. Washington, DC: NRC, October 7, 2008. On the Web at <http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2008/secy2008-0147/2008-0147scy.pdf>.

¹² See discussion in Arjun Makhijani and Brice Smith. *Costs and Risks of Management and Disposal of Depleted Uranium from the National Enrichment Facility Proposed to be Built in Lea County New Mexico by LES*. Takoma Park, MD: Institute for Energy and Environmental Research, November 24, 2004. On the Web at <http://www.ieer.org/reports/du/lesrpt.pdf>. "Version for Public Release Redacted March 20, 2007."