PSR® Physicians for Social Responsibility

United States Affiliate of International Physicians for the Prevention of Nuclear War

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Mr. Francis Schwartz
GNEP PEIS Document Manager
Office of Nuclear Energy, NE-5
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Re: Comments on draft GNEP Programmatic Environmental Impact Statement

Dear Mr. Schwartz,

The following are PSR's comments on the U.S. Department of Energy's (DOE) draft Programmatic Environmental Impact Statement (PEIS) for the Global Nuclear Energy Partnership (GNEP). At its core, GNEP is simply a program to restart nuclear waste reprocessing in the United States. The DOE's draft PEIS for GNEP fails to seriously analyze the public health threats posed by reprocessing; it fails to analyze the proliferation risks; and it fails to analyze the costs of such a massive program. We request that DOE withdraw its PEIS and cancel the Global Nuclear Energy Partnership.

Failures of the Draft PEIS

The Draft PEIS Fails to Address Public Health Threats

Experience both in the US and in other countries has shown that reprocessing is the most polluting part of the nuclear fuel cycle. In the draft PEIS, DOE concludes that routine reprocessing operations would result in higher radiation doses to the public than not reprocessing. A reprocessing facility would release the highest doses of radiation to the public through the air, water, and food. From a public health perspective, it is clear that reprocessing should be rejected. It is long established that radiation is carcinogenic. The most recent report by the National Research Council's Committee on Biological Effects of Ionizing Radiation, BEIR VII, confirmed that any increase in radiation exposure increases a person's risk of cancer.[1]

[1] Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, National Research Council, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII-Phase 2*, Washington, D.C., The National Academies Press, 2006, http://books.nap.edu/catalog.php?record_id=11340.

Recent research also indicates that cardiovascular disease may be as important an effect of exposure to radiation as cancer.[2] The results of these studies are startling. Many of these studies involve patients with breast cancer or lymphoma treated with radiation who subsequently died of heart disease. An important study in 2005 found that patients treated with radiation for (non-cancerous) stomach ulcers had increased rates of coronary heart disease although cardiac radiation doses were low.

Studies of nuclear industry workers are particularly important in establishing the link between radiation and cardiovascular disease at low doses. A study of non-cancer disease in 64,937 employees of British Nuclear Fuels reported a significant association between death from cardiovascular disease and occupational exposure to ionizing radiation.[3] This link between radiation exposure and cardiovascular disease has major implications for public health. Radiation protection standards, now based solely on cancer risk, will likely have to change to include cardiovascular disease. These new findings ought to be taken into account in the evaluation of nuclear technology.

In the draft PEIS, DOE claims that the exposures would be "expected to meet" current regulatory limits. However, reprocessing results in numerous waste streams that must be managed and the draft PEIS does not analyze how the radioactivity will be safely captured and stored. Some of the most important waste streams include:

Uranium: The draft PEIS fails to analyze the management of uranium, which is both radioactive and toxic and can cause kidney disease and cancer in the lungs, bone, and soft tissues. The PEIS suggests that uranium, comprising 96% of a spent fuel rod, could be re-enriched or disposed, but neither option is viable. Only a very small amount of the world's reprocessed uranium is actually re-enriched for reuse (about 3.8% per year), because it uneconomical to do so. The vast majority of reprocessed uranium, which contains traces of plutonium, neptunium and fission products, is piling up in storage drums. According to the IAEA, "a disposal route for [reprocessed uranium] has not been proven on any commercial scale and the specific requirements for conditioning of [reprocessed uranium] prior to disposal have not been established."[4] The Nuclear Regulatory Commission has yet to determine how reprocessed uranium in the United States would have to be disposed. This complex issue should have been thoroughly and realistically analyzed in the PEIS.

Cesium and strontium: Radioactive cesium and strontium are both cancer-causing: cesium distributes uniformly throughout the body's soft tissues and can also be external, while strontium behaves like calcium in the body and is absorbed into bone. The draft PEIS suggests that cesium and strontium could be separated out from the spent fuel and stored onsite for 300 years. After 30 years of operation, an estimated 7.5 to 12.4 billion curies of these highly radioactive wastes

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[2] Little MP, Tawn EJ, Tzoulaki I, *et al*. "A systematic review of epidemiological associations between low and moderate doses of ionizing radiation and late cardiovascular effects and their possible mechanisms." *Radiat. Res* 2008;169:99-109.

[3] McGeoghegan D, Binks K, Gilles M, *et al*., "The non cancer mortality experience of workers at British Nuclear Fuels." *Int.J. Epidemiol.* 2008; 37:508-18.

[4] International Atomic Energy Agency, *Management of Reprocessed Uranium Current Status and Future Prospects*, February 2007, page 81.

could accumulate at a GNEP facility.[5] The idea that the waste would decay sufficiently for disposal as low-level waste in only 300 years is unrealistic. It would more likely be 450 to 600 years before the cesium and strontium could be considered low-level waste.[6] Storing radioactive waste for 100 years is unprecedented and has proven to be extremely difficult, as shown by the experience with the radioactive waste at the Savannah River Site, Idaho National Laboratory, and Hanford Site in Washington. For example, Hanford has been unable to manage safely the 131 million curies of cesium and strontium created less than 70 years ago, which "have been described as the nation's most lethal single source of radiation other than inside an operating reactor."[7] DOE admits in the PEIS that there is no design for a storage facility for this waste, nor are there regulations in place.[8] Clearly, DOE's assumption that billions of additional curries can easily and safely be managed is not realistic.

Radioactive gases: Other waste streams created by reprocessing include gases such as krypton-85 and tritium. The U.S. Environmental Protection Agency requires that krypton-85, which particularly poses an external radiation hazard, would have to be captured and not released into the air. However, technologies for capturing radioactive iodine are extremely expense. The La Hague reprocessing plant in France releases krypton-85 into the air. Tritium, which has causes developmental, reproductive and genetic abnormalities, is also released in high quantities from a reprocessing and is very expensive to capture. Yet, there is no analysis in the draft PEIS of these problems.

The Draft PEIS Fails to Analyze Proliferation Risks

Reprocessing will make nuclear bomb material more vulnerable to theft and attack compared to leaving plutonium in a spent fuel rod. Yet, there is no analysis within the Draft PEIS of the proliferation risks posed by reprocessing. The National Nuclear Security Administration (NNSA) prepared a separate draft assessment of the proliferation risks, but DOE is not including this analysis as part of the NEPA process, which would require that DOE consider and respond to those comments. In the contrary, the public's comments on the NNSA analysis are crucial to a thorough analysis of GNEP and must be considered as part of the NEPA process.

Reprocessing of commercial nuclear waste around the world has resulted in the separation of 250 metric tons of plutonium, enough to make 30,000 nuclear bombs. Separated plutonium is a serious proliferation risk, because it no longer has the highly radioactive barrier provided by other radionuclides in the spent fuel rod, which hinders theft and diversion.

DOE states in the draft PEIS that it does not want to use existing reprocessing technology (called PUREX) that results in separated plutonium and that it wants to use "proliferation-resistant." But the reprocessing technologies that DOE is considering in the PEIS are not significantly more

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[5] Robert Alvarez, "Radioactive Wastes and the Global Nuclear Energy Partnership," *Institute for Policy Studies*, April 2007, page 15.
[6] *Ibid*, page 15.
[7] National Research Council, *Improving the Scientific Basis for Managing DOE's Excess Nuclear Materials and Spent Nuclear Fuel*, National Academy Press, Washington, DC, 2003, page http://www.nap.edu/catalog.php?record_id=10684
[8] DOE draft PEIS, page 2-37.

"proliferation-resistant" than PUREX. The resulting plutonium mixes from these technologies are not sufficient to prevent theft by terrorists. Moreover, these technologies can easily be undone to obtain pure plutonium using the PUREX technology. As DOE concludes in its separate non-proliferation analysis of GNEP, none of DOE's proposed schemes for mixing plutonium with other radionuclides would significantly reduce the risk of theft or diversion compared to pure plutonium.[9]

The Draft PEIS Fails to Analyze Cost

Quite remarkably, the Draft PEIS fails to include any cost estimates for GNEP. DOE has not publicly given an estimate of the lifecycle cost of reprocessing since it retracted its 1999 estimate of $280 billion. In 1996, the National Academies of Science concluded that the cost of reprocessing and use of plutonium fuel from existing U.S. reactors would cost $500 billion. These costs would be left to the U.S. taxpayer, given that nuclear industry has made it clear that it has no interest in paying for reprocessing.

In addition, cost data from actual international experience with reprocessing is available. Approximately $100 billion has already been spent globally trying to commercialize plutonium, about $40 billion of which has been used to reprocess commercial and fast reactor spent fuel the Japanese reprocessing plant Rokkasho, which is less than half the size that the US would need to reprocessing its annual output of spent fuel, cost $20 billion and 14 years to build and continues to have technical problems that have prevented it from operating. The French government has even concluded that reprocessing is uneconomical. According to a July 2000 government-commissioned report, reprocessing costs about $25 billion more than a "once-through" fuel cycle.[10]

A meaningful cost analysis would include the total lifecycle cost of the GNEP proposal, including all of the reprocessing facilities, fast reactors and fuel fabrication facilities, required to fully implement GNEP. It must also include clean-up of the reprocessing facilities, as well as decommissioning of fast reactors and fuel fabrication facilities.

The PEIS Contains Unrealistic Assumptions and Inherent Contradictions

Unrealistic Schedule: DOE assumes that this technology will begin operation in about 5 years and that the government will compensate for the extreme costs. It is hard to imagine how this policy will be implemented, since major technical hurdles remain and Congress has shown no interest in funding construction of GNEP facilities or of the program in general. The 2009 Omnibus zeroed out GNEP funding.

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[9] Office of Nonproliferation and International Security, *Draft Nonproliferation Assessment for the Global Nuclear Energy Partnership Programmatic Alternatives*, December 2008, pages 68-70, http://nnsa.energy.gov/nuclear_nonproliferation/documents/GNEP_NPIA.pdf

[10] Annie Makhijani, "French Report Doubts Merits of Reprocessing and MOX," *Science for Democratic Action Vol.9 No.2*, February 2001, http://www.ieer.org/sdafiles/vol_9/9-2/charpin.html.

Underestimated Technical Hurdles: The Draft PEIS also underestimates the overwhelming technical hurdles that would have to be overcome in order to implement any of the alternatives, from separations technologies to reactor technologies to waste disposal. As just one example, the history of fast reactors throughout the world has been marked by serious safety failures, including fires, explosions, leaks, and a partial meltdown. Only about twenty of these reactors built worldwide since 1951 in seven countries, all of which have been funded by governments. The only commercial-scale fast reactor is in Russia, and it has had 15 sodium fires. Nothing new has been developed with the technology to indicate that fast reactors could be commercially built by 2070. Given the dismal history, it is unrealistic for DOE to assume that 800 MWe would produced by fast reactors in the future.

Unrealistic Energy Demand: DOE cites the Energy Information Agency's 2008 estimate that U.S. electricity demand will increase 1.1 percent per year through 2030, and an earlier draft of that report that the U.S. electricity demand will increase by 1.3 percent per year. Inexplicably, DOE chose to use the 1.3 percent as its baseline from the draft report. Given the current recession, energy demand in the U.S. is highly unlikely to grow at this rate. EIA is currently projecting a decline of 1.7 percent in total electricity consumption in 2009[11] and a 1 percent decline in consumption in 2030 from its 2008 projections.[12]

Unrealistic Growth of Nuclear Power: DOE assumes that the U.S. will double the amount of nuclear energy produced in the United States by 2070 (200 GWe), which means that the U.S. would have to build about 200 new light-water reactors. The cost of these reactors, according to the credit rating agency *Moody's* May 2008 estimate of $7,000 per kilowatt, would be over $1 trillion, not including uranium mining clean-up, decommissioning, and low- and high-level waste management. A total of 200 GWe of electricity from nuclear power by 2070 is highly unlikely. Currently, 34 reactors have been proposed, but several have already been put on indefinite suspension. Nuclear utilities have stated that new reactors are contingent on energy demand and massive taxpayer and ratepayer subsidies that have yet to be made available. NRC Chair Dale Klein recently stated that the global credit and economic crisis has calmed an "excessive exuberance" for building new reactors.[13]

Irrational Conclusion About Generational Responsibility: As stated in the PEIS, reprocessing still requires a geologic repository. However, DOE should not assume that the U.S. is planning for any particular site, given that President Obama has announced that Yucca Mountain is no longer an option and that his Administration is devising "a new strategy toward nuclear waste disposal." DOE is completely incorrect in its conclusion that "leaving [high level waste] and [spent nuclear fuel] in storage while awaiting the potential development of new recycling technologies is inconsistent" with the principle of taking generational responsibility for spent fuel. It would be *highly* irresponsible to create reprocessing waste streams, as described in the

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[11]Energy Information Agency, *Short-Term Energy Outlook*, December 2008 http://www.eia.doe.gov/emeu/steo/pub/contents.html?featureclicked=4&#Electricity_Markets

[12]Energy Information Agency, *Annual Energy Outlook Early Release Overview*, December 2008, http://www.eia.doe.gov/oiaf/aeo/overview.html#trends

[13]Reuters, *Economy to slow U.S. nuclear power growth: NRC head*, March 10, 2009, http://www.reuters.com/article/environmentNews/idUSTRE52A03120090311?feedType=RSS&feedName=environmentNews

"Draft PEIS Fails to Address Public Health Threats" section, with no viable management plan. It is safer to address one nuclear waste problem – that of spent fuel – than the dozens of radioactive waste streams created by reprocessing.

Contradictory Alternatives: The PEIS states that the United States will get a geological repository under the GNEP plan, but not under the "No Action Alternative." For the No Action Alternative, DOE assumes that waste will have to sit onsite between 2010 and 2060-70. However, under the GNEP alternative, the high level radioactive waste from reprocessing and fast reactor burn up "would be disposed of in a geologic repository." Even in the best case scenario, the DOE plans to store the most radioactive materials at the reprocessing facility for hundreds of years while they decay. The other long-lived waste from reprocessing will be dangerous for tens of thousands of years, and will require geologic storage. There is currently no licensed site in the U.S. for geologic storage, so the waste will remain indefinitely at the reprocessing site.

Underestimates the complexity of radioactive waste transportation: Reprocessing would dramatically increase the frequency of radioactive waste transport; not only would DOE be moving spent fuel, but also potentially MOX or fast reactor fuel, cesium/strontium waste, Greater-Than-Class-C waste, low- and high-level waste and aqueous uranium. Yet, the PEIS fails to address the complexity of the task. According to a February 2006 National Academy of Sciences (NAS) report on the transport of spent fuel, "the social risks and related institutional challenges may impinge on the successful implementation of large-quantity shipping programs."[14] The committee expressed concerns about the DOE's ability to plan and manage a safe program, finding that "the challenges of sustained implementation should not be underestimated." It is clear from the report's recommendations that DOE has not met the basic requirements for safe transport of spent fuel, much less the myriad reprocessing wastes and fresh fuels containing plutonium.

Unreasonable "No Action" Alternative: DOE's "No Action" alternative , to store waste at reactor sites where it is currently located until direct disposal of spent fuel in a geologic repository is available, does not represent a sufficient range of realistic alternatives. DOE must also consider safeguarding spent fuel from terrorist attack in hardened facilities at reactor sites, a concept supported by over 125 national and grassroots organizations in the "Principles for Safeguarding Nuclear Waste at Reactors."[15] On-site storage makes sense from safety, security, and economic perspectives and should be incorporated into the PEIS analysis. Moreover, the "No Action" alternative should not include reprocessing research under the Advanced Fuel Cycle Initiative (AFCI). It is not reasonable to assume that reprocessing research will make technical or economic sense. The AFCI program should be analyzed separately and not assumed to be "necessary for its energy future" as DOE offhandedly claims in the draft PEIS.

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[14] National Academy of Sciences, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*, 2006, http://fermat.nap.edu/catalog/11538.html.

[15] The Principles for Safeguarding Nuclear Waste at Reactors, as well as the full list of signatories, are available at http://www.citizen.org/documents/PrinciplesSafeguardingIrradiatedFuel.pdf.

Conclusion

The bottom line is that reprocessing will not solve our country's nuclear waste problem. Reprocessing will not eliminate the need for a geologic repository and will increase the number of waste streams to be managed and therefore the threats to public health from radioactive waste. The draft PEIS fails to seriously analyze the threats to public health, national security, and our economy posed by reprocessing. Reprocessing is dangerous, polluting, and expensive and won't solve the radioactive waste problem. DOE should withdraw its PEIS and cancel the Global Nuclear Energy Partnership entirely.

Sincerely,

Michele Boyd
Director, Safe Energy Program

Peter Wilk, MD
Executive Director