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RULES AND DIRECTIVES
OFFICE OF ADMINISTRATION

RE: Docket ID NRC-2010-0029, Draft Supplement to EIS for Columbia Generating Station

To Whom it Concerns:

Though the issue of use of mixed plutonium-uranium fuel, so-called mixed oxide fuel (MOX), is not a formal part of the relicensing process, it is imperative that information be entered into the record given the known interest of Energy Northwest to investigate the use of MOX in the Columbia Generating Station (CGS).

I hereby include the two attachments for part of the docket record:

1. Issue brief of July 2011 which outlines the myriad of troubles with the Department of Energy's MOX program. Potential use of MOX by Energy Northwest is mentioned in the issue brief. (2 pages)
2. News release entitled "Secret plan exposed to use surplus weapons plutonium in Washington State reactor – FOIA documents reveal Energy Northwest plans plutonium fuel (MOX) experiments while seeking to control information leaks to the media." (3 p.)

As use of MOX fuel in the Columbia Generating Station would make the reactor harder to control, would lead to more radiation release in case of a severe accident, and would alter the way the hotter MOX spent fuel is stored, the idea to use MOX has already caused concern by the public. Especially given that the CGS is a GE Mark II boiling water reactor, similar in design to the reactors which suffered meltdown at Fukushima, any proposal to use MOX will be met with close scrutiny.

If a license amendment is sought to test MOX, which would be over a period of three fueling cycles, or to use MOX on a larger basis, it is clear that any review by the NRC will trigger formal public participation and involvement. We will thus be attentive to any licensing actions concerning MOX.

Thank you for posting this letter and the attachments both in the pertinent docket as well as ADAMS.

Sincerely,

Tom Clements

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*E-RIDS = ADM-03
Cdd = D. Doyle (dial)
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*SUNSI Review Complete
Temp file = ADM 2013*

Risky Plutonium Fuel (MOX) Proposed for Use in U.S. Reactors, At Taxpayers' Expense

The beleaguered nuclear industry, desperate for more handouts from taxpayers, wants the government to continue to fund a dangerous, multibillion dollar program in which it would use leftover weapons plutonium as fuel in commercial nuclear reactors.

There are two key reasons the this program is a bad idea and must be terminated. First, mixed oxide plutonium fuel, called MOX, is more dangerous than conventional nuclear fuel because it can burn hotter and also because it has the potential to cause more cancers in the event of a severe accident resulting in radiation release. Second, there are serious questions about the economic and technical feasibility of the MOX program, especially after a MOX test was prematurely halted in 2008. This means that when the project fails, taxpayers will be stuck with a multibillion dollar bill in return for little or no electricity generation.

Friends of the Earth is calling for the elimination of the U.S. MOX fuel program. Here's what you need to know.

Safety concerns, links to Japan, and proposals for use in the U.S.

- A French study found that "MOX fuel shows a higher failure potential than [traditional fuel] at comparable burnup."¹ In the event of a nuclear disaster, the releases from a MOX-fueled reactor will cause between 39 and 131 percent more fatalities than a traditionally fueled reactor.²
- The Department of Energy is building a \$4.8 billion factory in which MOX fuel would be produced at the Savannah River Site in South Carolina. The government-owned French plutonium company AREVA has been hired to build and operate the project,³ and would therefore be the prime financial beneficiary. The Department of Energy is considering sending fuel from this factory (if construction is ever completed and the plant is licensed by the Nuclear Regulatory Commission) to the Tennessee Valley Authority for use in its reactors.⁴
- Reactor 3 at Japan's Fukushima Daiichi plant, involved in the post-tsunami nuclear emergency, used MOX fuel, increasing the danger of radioactive releases from this reactor. MOX fuel made from plutonium separated from commercial spent fuel - so-called reactor-grade plutonium - was loaded into reactor 3 for the first time in the fall of 2010.⁵
- The U.S. Department of Energy is planning for the use of MOX fuel in U.S. reactors of the same faulty design as the Fukushima reactors. Three of the Tennessee Valley Authority reactors, located at Browns Ferry in Alabama, are boiling water reactors of the GE Mark I design, like five of the six reactors at Fukushima Daiichi.⁶ Three other reactors being considered for MOX use are pressurized water reactors; these are at the Watts Bar and Sequoyah plants in Tennessee.⁷
- A boiling water reactor with GE Mark II containment at Energy Northwest's Columbia Generating Station in Richland, Washington is also under consideration as a site for MOX fuel use. Government documents obtained by Friends of the Earth indicate that Energy Northwest hoped to keep its plans to use MOX fuel secret from the media.⁸

1 F. Schmitz, *Institute de Protection et de Sécurité Nucléaire*, "The Status of the Cabri REP-Na Test Programme: Present Understanding and Still Pending Questions" (paper presented at the NRC/Industry Meeting on High-Burnup Fuel Issues, Rockville, MD, November 18-20, 1997).

2 Lyman, Edward. "Public Health Risks of Substituting Mixed-Oxide For Uranium Fuel in Pressurized-Water Reactors." *Science & Global Security*, 2000, Volume 9, pp. 9, 1. <http://www.nci.org/PDF/lyman-mox-sgs.pdf>

3 Areva. "NATIONAL NUCLEAR SECURITY ADMINISTRATION-THE MOX PROJECT." 13 June 2011. <http://us.aveva.com/EN/home-111/aveva-federat-services-mox-fuel-fabrication-facility.html>

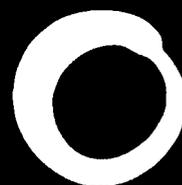
4 National Nuclear Security Administration Budget. Department of Energy FY2012 Congressional Budget Request. February 2011. <http://www.cto.doe.gov/budget/12budget/Content/Volume1.pdf> pg. 393

5 "Fukushima to Restart Using MOX Fuel for First Time." *Nuclear Power Industry News*. 17 Sept 2010. http://nuclearstreet.com/nuclear_power_industry_news/b/nuclear_power_news/archive/2010/09/17/fukushima-to-restart-using-mox-fuel-for-first-time-091704.aspx

6 Bill Deadman. "General Electric-designed reactors in Fukushima have 23 sisters in U.S." MSNBC. 13 March 2011. http://openchannel.msnbc.msn.com/_news/2011/03/13/6256121-general-electric-designed-reactors-in-fukushima-have-23-sisters-in-us

7 United States Nuclear Regulatory Commission. "List of Power Reactor Units." <http://www.nrc.gov/reactors/operating/list-power-reactor-units.html>

8 Friends of the Earth. "Secret Plan Exposed to Use Surplus Weapons Plutonium in Washington State Nuclear Reactor." 3 Feb 2011. <http://foe.org/secret-plan-exposed-use-surplus-weapons-plutonium-washington-state-nuclear-reactor>



Feasibility questions, economic concerns, and what it means for taxpayers

- The budget request for various aspects of the MOX program in Fiscal Year 2012 is around \$850 million, with \$385 million for the MOX plant construction. The MOX plant at the Savannah River Site in June 2011 was about 41 percent complete⁹ and its \$4.9 billion current cost is three times the \$1.6 billion estimate from 2004.¹⁰ The project is already 9-10 years behind schedule.¹¹
- MOX fuel made from weapons-grade plutonium, which has a higher content of plutonium-239 than reactor-grade plutonium, has never been used before on a commercial scale and such MOX has never been tested in a boiling water reactor.
- Due to “excessive assembly growth,” the only test of weapons-grade MOX in a pressurized water reactor was cancelled by Duke Energy before it was completed in 2008.¹² The abnormal expansion of the fuel assemblies and control rod guide tubes due to radiation exposure could have slowed the flow of coolant water in the reactor core and prevented proper insertion of control rods.¹³
- Testing and post-irradiation examination of MOX fuel will be required in the Tennessee Valley Authority reactors before full-scale use can be considered; such testing could take 8 years or more.¹⁴ After the test, it’s not guaranteed that TVA would pursue MOX use or that the Nuclear Regulatory Commission would license full-scale MOX use.
- When it is eventually completed, the MOX plant at the Savannah River Site is at risk of sitting idle. Before weapons-grade MOX is used commercially, it will have to be tested. The only other plant that has produced weapons-grade MOX, France’s Atelier de Technologie du Plutonium, has shut down.¹⁵ If the Savannah River Site MOX plant were to begin start-up testing in 2016¹⁶ and produce eight assemblies by 2018,¹⁷ it could then be forced to idle until testing results are obtained.¹⁸
- Capability exists at the Savannah River Site to mix the plutonium with existing high-level radioactive waste and immobilize it in a glassified form in robust containers, a safer disposal method.¹⁹
- Introduction of plutonium fuel into commerce presents a great nuclear non-proliferation risk and sends the dangerous message worldwide that use of plutonium as a nuclear power fuel is acceptable.



MOX plant at the Savannah River Site.

Recommendations

- While the goal of the MOX program -- to take plutonium and convert it to a form unusable for nuclear weapons -- is noble, management of plutonium as waste is cheaper, quicker, safer and poses fewer proliferation risks than attempting to use it as a risky fuel in aging nuclear reactors.²⁰
- Immobilization of plutonium in high-level waste storage casks should be the sole focus of this program.
- Congress must immediately begin proper oversight of this troubled program, including a comprehensive investigation by the Government Accountability Office (GAO).
- Funding for the DOE’s MOX program must be terminated by both the House and senate the Energy and Water Development Subcommittees (of the Appropriations Committees) and transferred to secure storage and disposition of plutonium as nuclear waste. The public should ask members of these subcommittees to terminate MOX funding.

July 2011

9 National Nuclear Security Administration, Nuclear Nonproliferation Program, Savannah River Site. Presentation by Kevin Hall, SRS official, to SC Governor’s Nuclear Advisory Council, June 9, 2011

10 Defense Nuclear Nonproliferation, FY2004 Budget Summary, <http://www.cfo.doe.gov/budget/04budget/content/defnn/nn.pdf> pg. 780.

11 Defense Nuclear Nonproliferation, FY2002 Congressional Budget, <http://www.cfo.doe.gov/budget/02budget/defnucl/defnucl.pdf> pp. 170, 192.

12 Catawba Unit 1 Cycle 18. Memo from Duke Energy to Nuclear Regulatory Commission. June 10, 2008. <http://www.foe.org/sites/default/files/Catawba%20core%20report%206.08.pdf>

13 AREVA Fuel Assembly Test Failure Dooms Plutonium Fuel Test. 6 Aug. 2008. <http://prismwebcastnews.com/2008/08/06/areva-fuel-assembly-test-failure-dooms-plutonium-fuel-test/>
04/08-09/2008, Fuel Performance Meeting Slides, Available on U.S. NRC Web-based ADAMS. Accession Number: ML081300390

14 Energy Northwest. “MOX Fuel – Board Presentation.” June 2009. http://www.foe.org/sites/default/files/2010-02_Clements_Partial_Response_3-8-2010-1.pdf pp. 22-23.

15 French Nuclear Safety Authority 2005 Annual Report. <http://annual-report2005.asn.fr/chap13/chap13-12.html>

16 National Nuclear Security Administration, Nuclear Nonproliferation Program, Savannah River Site. Presentation by Clay Ramsey, Federal Project Director, Mixed Oxide Fuel Fabrication Facility. January 6, 2011 <http://www.foe.org/sites/default/files/MOX%20overview%20to%20BRC%20by%20Ramsey%201.6.11.pdf>

17 TA Keys. “Evaluation of Using MOX Fuel in TVA Reactors.” <http://pbadupws.nrc.gov/docs/ML1017/ML101740637.pdf> pg. 10.

18 National Nuclear Security Administration Budget. Department of Energy FY2012 Congressional Budget Request. February 2011. <http://www.cfo.doe.gov/budget/12budget/Content/Volume1.pdf> pg. 377

19 “Surplus Plutonium Disposition Supplemental Environmental Impact Statement.” Notice in Federal Register, July 19, 2010. <http://www.spdsupplementaleis.com/>

20 Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site. <http://www.nci.org/pdf/doe-pu-2152002.pdf> pg. ES-2

<http://www.foe.org/secret-plan-exposed-use-surplus-weapons-plutonium-washington-state-nuclear-reactor>



Thursday, February 3, 2011

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Secret Plan Exposed to Use Surplus Weapons Plutonium in Washington State Nuclear Reactor

FOIA Documents Reveal Energy Northwest Plans Plutonium Fuel (MOX) Experiments While Seeking to Control Information Leaks to the Media

Columbia, SC -- Department of Energy (DOE) documents released to Friends of the Earth reveal that the public utility Energy Northwest hopes to bring experimental radioactive plutonium fuel into Washington State for use in risky tests in a nuclear reactor not originally designed for that purpose. The documents also reveal that the utility has sought to keep information secret the about the controversial and risky pursuit of use of surplus weapons plutonium as nuclear reactor fuel.

The environmental watchdog group Friends of the Earth believes that the plutonium mixed oxide fuel (MOX) should be kept out of the state and that such tests would pose unacceptable safety risks and lead to unacceptable costs.

According to a DOE document dated January 6, 2011, and confirmed by documents obtained under the federal Freedom of Information Act, Energy Northwest is "formally evaluating the potential use of MOX fuel" in the company's single nuclear reactor - the Columbia Generating Station reactor - located at the Department of Energy's Hanford site near Richland, Washington. The reactor is a GE boiling water reactor (BWR) and was licensed in 1984. The Hanford site, where it is located, has produced about 65 metric tons of weapons plutonium in now-closed reactors dedicated to military use.

"It is foolish for Energy Northwest to continue down this costly and risky path and we urge the utility to drop the controversial MOX plans," said Tom Clements, Southeastern Nuclear Campaign Coordinator with friends of the Earth in Columbia, South Carolina. "Due to non-

proliferation and safety concerns, weapons plutonium should not be used as fuel in the Columbia Generating Station or any other nuclear power reactor.”

“It’s no surprise that the utility tried to keep its controversial plans to use reactor fuel containing weapons-quality plutonium secret. Myriad technical and public relations problems are posed by the potential use of a fuel that has never before been tested in a boiling water reactor. Bringing plutonium back to Hanford to be used as fuel and stored as waste will set back cleanup efforts at the site. It’s hard to see how the public could accept bringing plutonium back to Hanford after most of it has been shipped off the site,” Clements said.

MOX fuel made from surplus weapons-grade plutonium has never before been used in any country on a commercial scale and presents a host of political and licensing problems for Energy Northwest. MOX containing approximately five to seven percent weapons-grade plutonium presents technical challenges to reactor operation and fuel management and storage, poses security risks in transport and handling, and presents the threat of larger radiation release in an accident. One of the undated FOIA documents from Energy Northwest states, “It does not make sense from either an economic perspective or risk perspective for Energy Northwest to pursue the use of MOX fuel.” But nuclear officials have pushed ahead in spite of those concerns.

Over 200 pages of FOIA documents reveal that officials at Energy Northwest have been developing plans with the Pacific Northwest National Laboratory and the Department of Energy to begin a “three-phased approach to integrating MOX fuel” into the reactor. According to the documents, testing would begin with irradiation of 10 to 20 fuel pins fabricated by the laboratory in 2013 or 2105, followed by the use of up to eight “lead use assemblies” (LUAs) around 2019 for three or more two-year irradiation cycles (a total of six or more years), with loading of up to 30 percent of the reactor’s core with MOX fuel beginning around 2025. Each step would require license amendments from the Nuclear Regulatory Commission.

The Department of Energy is currently constructing a \$5-billion facility to make MOX fuel at its Savannah River Site in South Carolina and construction continues even though no nuclear reactor has been identified that will use the MOX fuel. Duke Energy began testing of experimental MOX fuel in 2005 but dropped out of the program after a test in its Catawba reactor in South Carolina failed after two rather than the necessary three 18-month irradiation cycles (the three cycles would have lasted a total of 54 months). Now, the Energy Department, via the contractor Shaw AREVA MOX Services, is focused on discussions for MOX use with the Tennessee Valley Authority and Energy Northwest as wider interest in the problematic fuel is lacking.

A March 2009 Memorandum of Understanding between the Tennessee Valley Authority and Energy Northwest regarding the exploration of whether MOX could be used in boiling water reactors is among the FOIA documents obtained by Friends of the Earth. Fuel fabricator GE-Hiatchi has also been involved in the MOX-use discussions and participated in a secret meeting with Energy Northwest, the Pacific Northwest National Laboratory, Shaw AREVA MOX Services, and DOE at the Savannah River Site in September 2009.

The MOX program laid out in the documents is speculative as it would have to be licensed by the Nuclear Regulatory Commission and would be dependent on capacity to fabricate MOX test assemblies made from weapons plutonium. No such production capacity currently exists, so the MOX plant at the Savannah River site, scheduled to undergo startup testing in 2016 or later (if construction finishes and if it can overcome an operating license challenge by public interest groups), would have to be used to fabricate “lead use assemblies.” This means that the MOX plant at the Savannah River Site is at risk of sitting idle for years as no MOX fuel beyond that used in testing could be produced during the test phase as NRC approval for the fuel’s quality and performance would be lacking.

Energy Northwest presentations obtained via the Freedom of information Act point out potential problems with MOX use, saying that there must be “no negative impact on reactor operation” and that MOX use must be “cost neutral” for Energy Northwest. An Energy Northwest senior engineer in charge of fuel management wrote in a December 2009 email that those at Energy Northwest and the Pacific Northwest National Laboratory pursuing MOX use “don’t want any unexpected press releases about burning MOX fuel in [the Columbia Generating Station reactor].” That same official commented that the DOE’s lack of utilities interested in using the MOX fuel “doesn’t look good politically.”

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Notes: Links to documents at <http://www.foe.org/secret-plan-exposed-use-surplus-weapons-plutonium-washington-state-nuclear-reactor>

1. FOIA documents from Energy Northwest ([partial](#), [final](#))
2. [DOE Presentation on Status of MOX Plant, January 6, 2011](#)
3. [Friends of the Earth letter to Energy Northwest CEO Mark Reddemann, Jan. 31, 2011, urging the end of MOX use.](#)
4. Friends of the Earth news release “[Duke Energy Abandons Plutonium Fuel \(MOX\) Testing Program in South Carolina Reactor,](#)” November 12, 2009
5. Alliance for Nuclear Accountability (ANA) MOX fact sheet - “[Plutonium Disposition Remains In Disarray](#)”
6. Information on NRC website about [Columbia Generating Station](#)
7. [Energy Northwest overview](#)