

**South Carolina ist kein Entsorgungsplatz für deutschen Atommüll**

**South Carolina is not a Nuclear Waste Dump for Germany**

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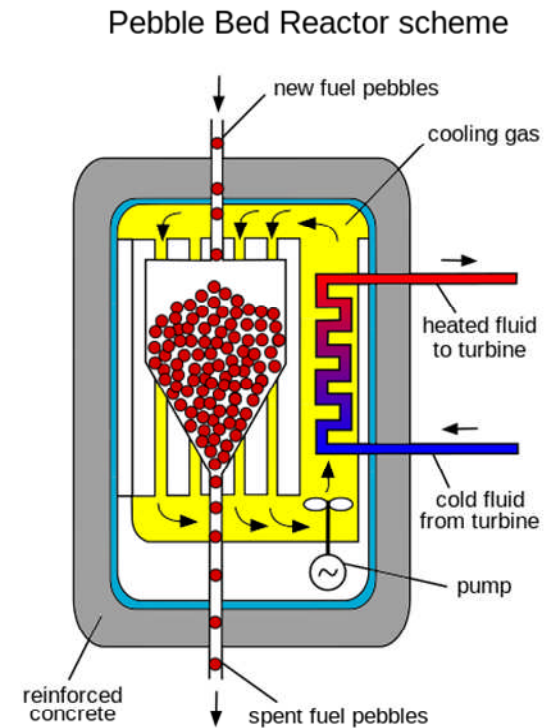


Savannah River Site Watch

## **Proposal to ship AVR and THTR commercial spent fuel to the U.S. Department of Energy's Savannah River Site (SRS)**

- Overview of AVR and THTR spent fuel
- Recent history of public communication
- Savannah River Site overview – not a geologic repository
- US spent fuel storage situation
- H-Canyon reprocessing plant at SRS
- Waste tanks at SRS – a huge problem
- By law, Germany must pursue domestic storage and not export the problem

The Savannah River Site in the U.S. is no dump for graphite spent fuel from the AVR and THTR power reactors (both connected to the electrical grid). This is a German problem and according to German law must be dealt with in Germany.

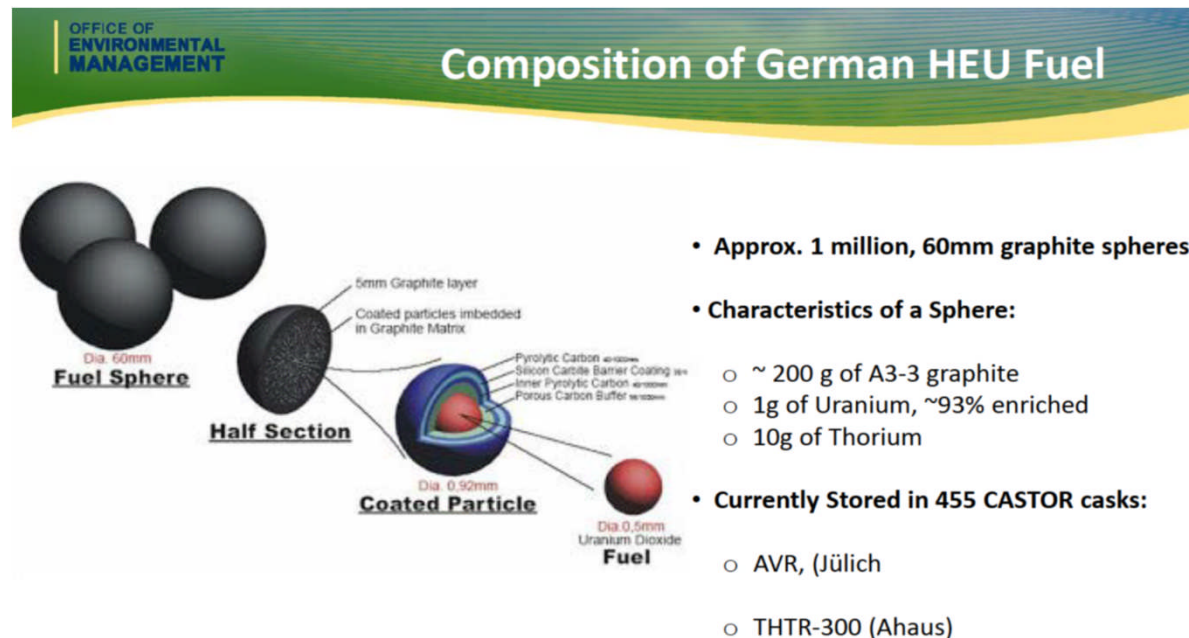


AVR storage at FZJ = 152 CASTOR casks & THTR storage at Ahaus = 305 casks;  
there is no such storage of commercial light-water reactor (LWR) or graphite spent  
fuel at SRS



**900,000 graphite spent fuel balls: 300,000 at Juelich and 600,000 at Ahaus; some originally contained 1 gram HEU/sphere of U.S.-origin uranium;**

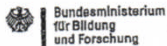
**FZJ: “In its current form, the nuclear fuel in the spent AVR fuel elements is not weapons-grade.”** (in “Frequently Asked Questions on the AVR Fuel Elements”)



First US-German contact on the matter appears to have been in December 2011, when Germany saw a possibility to export the problematic AVR and THTR waste – but did the US DOE make the suggestion initially?

Freedom of Information Act (FOIA) yielded this  
27 Feb. 2012 letter

02/27/2012 14:05 202-298-4386 ECON SCIENCE DEP PAGE 01/04



Bundesministerium  
für Bildung  
und Forschung

POSTLEISTUNG für internationale Postleistungen für Einzelpersonen, 53170 Bonn

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Under Secretary for Nuclear Security  
NA-1  
U.S. Department of Energy  
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USA

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State Secretary at the Federal Ministry of Education  
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DATUM Bonn, February 27, 2012

Copy to

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1000 Independence Avenue, SW  
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Ms Anne Harrington  
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Dr. William F. Brinkman  
Director of the Office of Science  
U.S. Department of Energy  
SC-1/Forrestal Building  
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Washington, DC 20585

Translation

Dear Mr D'Agostino,

A number of research reactors and pilot and experimental facilities were built and operated in previous years under the German Federal Government's research and development projects for the peaceful use of nuclear energy. The Federal Ministry of Education and Research (BMBWF) is responsible for the decommissioning and dismantling of those facilities. One example is the AVR experimental reactor at Research Centre Jülich (FZJ), a formerly graphite-moderated pebble bed reactor which is currently

02/27/2012 14:05 202-298-4386 ECON SCIENCE DEP PAGE 02/04

being dismantled. In this project, the BMBWF is representing the Federal Government as the majority partner within FZJ.

In this context, officials from German reactors met with Ms Anne Harrington (NNSA) and Mr David Huizanga (DOE-EM) in Washington, D.C. on December 6, 2011 to discuss the possible return of graphite-based nuclear fuels of U.S. origin.

The Government of the Federal Republic of Germany supports the reactor operators' approach. We therefore welcome that the U.S. Department of Energy offered to consider the option of acceptance of nuclear fuel that originally contained approximately 900kg of highly enriched uranium from the U.S.

Should it be possible to reach a decision before the forthcoming nuclear security summit in Seoul, this would certainly benefit the debate at the meeting.

Thank you for your support. We will be pleased to answer any questions you may have.

Sincerely yours,

signed: Dr. Georg Schütte

# FZJ has paid \$10 million to SRS to develop a proliferation-prone reprocessing technology; part of effort to privatize work of DOE labs

May 29, 2014 DOE-SR Update: **German Spheres Notice of Intent (NOI) - Update on German Research Reactor Pebble Bed Fuel**

In our last stakeholder update, we mentioned our potential work with Germany and promised to keep you updated on this topic.

Today, the Department signed a Notice of Intent to prepare an environmental assessment (EA) to analyze the potential environmental impacts from a proposed project to accept used nuclear fuel from the Federal Republic of Germany at DOE's Savannah River Site (SRS) for processing and disposition. A public scoping meeting will be held on June 24, 2014, at the North Augusta Community Center.

DOE proposes to accept, process, and disposition used nuclear fuel from Germany containing approximately 900 kilograms (kg) of highly-enriched uranium (HEU) from the United States. The used nuclear fuel is composed of kernels containing thorium and U.S.-origin HEU embedded in thousands of small graphite spheres. DOE would install a capability in H-Canyon at SRS, which would chemically remove the graphite from the fuel kernels via a graphite digestion technology being developed by the Savannah River National Laboratory. The EA will analyze potential environmental impacts of transporting the fuel to SRS, storage and processing at SRS, and alternatives for disposition of the HEU that would be separated from the fuel kernels.

While no decision has been made to accept this fuel, the planned cooperation would support the United States' efforts to reduce and eventually eliminate HEU from civil commerce. By removing U.S.-origin HEU from Germany and returning it to the United States for safe disposition, DOE could render it unusable in a nuclear weapon or an improvised nuclear material dispersal device.

Under the signed Statement of Intent, DOE, the Federal Ministry of Education and Research of the Federal Republic of Germany and the Ministry for Innovation, Science and Research of the State of North Rhine-Westphalia (on behalf of the North Rhine-Westphalian State Government) would jointly work on activities to further support the scale-up of the graphite digestion technology while DOE prepares the environmental assessment of the proposed project. All work to support DOE's evaluation, including technology development, will be funded by the German government.

In December 2012, **Savannah River National Laboratory (SRNL) signed a \$1.5 million "Work for Others Agreement" with the German entity currently managing the subject fuel**, initiating the early development of the graphite digestion technology. SRNL has developed a method to digest the graphite while leaving the fuel kernels intact. The SRNL method does not generate graphite fines, typically seen with mechanical graphite removal methods. The technology has proven to be repeatable with 95 percent volume reduction. Research teams at SRNL and the Juelich Laboratory (FZJ) in Germany have independently confirmed results of SRNL's graphite dissolution chemistry on un-irradiated fuel and some sample size irradiated fuel. **Continuation of this work is furthered by the recently signed \$8.5 million Work for Others Agreement.**

US DOE is conducting an “environmental assessment,” announced on June 4, 2014 in the Federal Register; one public meeting was held on June 24 & draft document expected by the end of 2014, with 45-day comment period – document will be deficient and will not be an overall policy document

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**DEPARTMENT OF ENERGY**

**Environmental Assessment for the Acceptance and Disposition of Used Nuclear Fuel Containing U.S.-Origin Highly Enriched Uranium From the Federal Republic of Germany**

**AGENCY:** Department of Energy.

**ACTION:** Notice of intent; public meeting.

**SUMMARY:** The U.S. Department of Energy (DOE) announces its intent to prepare an environmental assessment (EA), (DOE/EA-1977) pursuant to the National Environmental Policy Act (NEPA) to analyze the potential environmental impacts from a proposed project to accept used nuclear fuel from the Federal Republic of Germany at DOE's Savannah River Site (SRS) for processing and disposition. This used nuclear fuel is composed of kernels containing thorium and U.S.-origin highly enriched uranium (HEU) embedded in small graphite spheres that were irradiated in nuclear reactors used for research and development purposes. DOE invites public comments on the scope of the EA and will conduct a public meeting.

**DATES:** DOE invites Federal agencies, state and local governments, Native American tribes, industry, other organizations, and members of the general public to submit comments on DOE's proposed scope of the EA. The public scoping period extends from the date of publication of this notice in the **Federal Register** through July 21, 2014. DOE will consider all comments received or postmarked by that date. Comments submitted after that date will be considered to the extent practicable.

**ADDRESSES:** Please direct written comments on the scope of the German HEU Fuel EA to Mr. Andrew Grainger, NEPA Compliance Officer, U.S. Department of Energy, P.O. Box B, Aiken, South Carolina 29802. Comments on the scope of the German HEU Fuel EA may also be submitted by email to [drew.grainger@srs.gov](mailto:drew.grainger@srs.gov). DOE will give equal weight to written comments and oral comments received at the public scoping meeting. Requests to be placed on the German HEU Fuel EA mailing list should be directed to Mr. Grainger at the postal or email addresses above.

**FOR FURTHER INFORMATION CONTACT:** To request further information on SRS used nuclear fuel disposition activities or background information on the proposed project, please contact Mr. Grainger as listed above.

For general information concerning DOE's NEPA process, contact Ms. Carol Borgstrom, Director, Office of NEPA Policy and Compliance (GC-54), U.S. Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585; (202) 586-4600, or leave a message toll-free, at (800) 472-2756; fax (202) 586-7031; or send an email to [askNEPA@hq.doe.gov](mailto:askNEPA@hq.doe.gov). This Notice of Intent (NOI) and other information related to DOE's NEPA program are available on the DOE NEPA Web site at <http://nepa.energy.gov>.

**SUPPLEMENTARY INFORMATION:**

**Background**

DOE intends to prepare an EA in accordance with Council on Environmental Quality and DOE NEPA implementing regulations at 40 CFR Parts 1500-1508 and 10 CFR Part 1021, respectively. The EA will analyze the potential environmental impacts of a proposal to accept, process, and disposition used nuclear fuel from Germany containing approximately 900 kilograms (kg) of HEU from the United States. The used nuclear fuel is composed of kernels containing thorium and U.S.-origin HEU embedded in thousands of small graphite spheres. The United States provided the HEU to Germany between 1965 and 1988. The fuel was irradiated at the Arbeitsgemeinschaft Versuchsreaktor (AVR) reactor, which operated from 1967 to 1988, and the Thorium High Temperature Reactor (THTR)-300, which operated from 1983 to 1989. These reactors operated as part of Germany's program to research and develop pebble bed reactor technology. AVR reactor fuel is stored at Jülich, Germany, and the THTR-300 reactor fuel is stored at Ahaus, Germany.



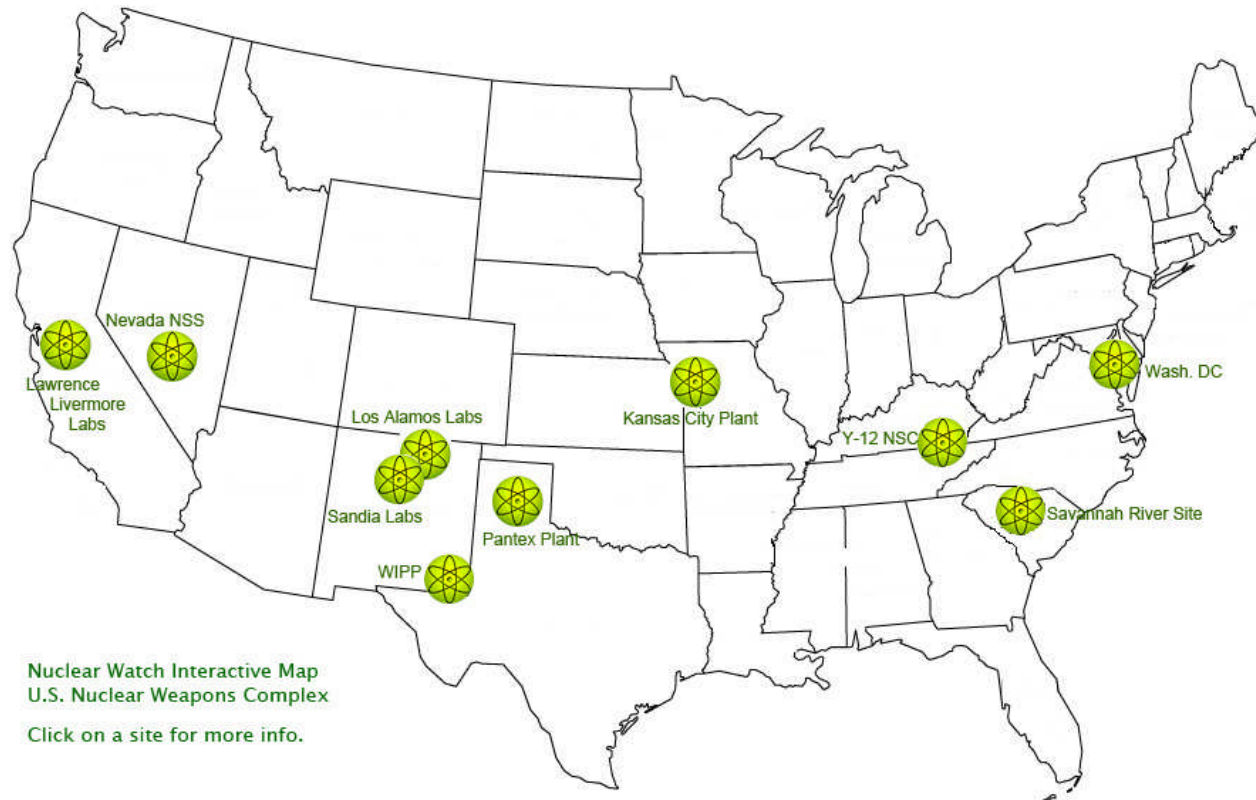
What is the US Department of Energy's Savannah River Site (SRS)?



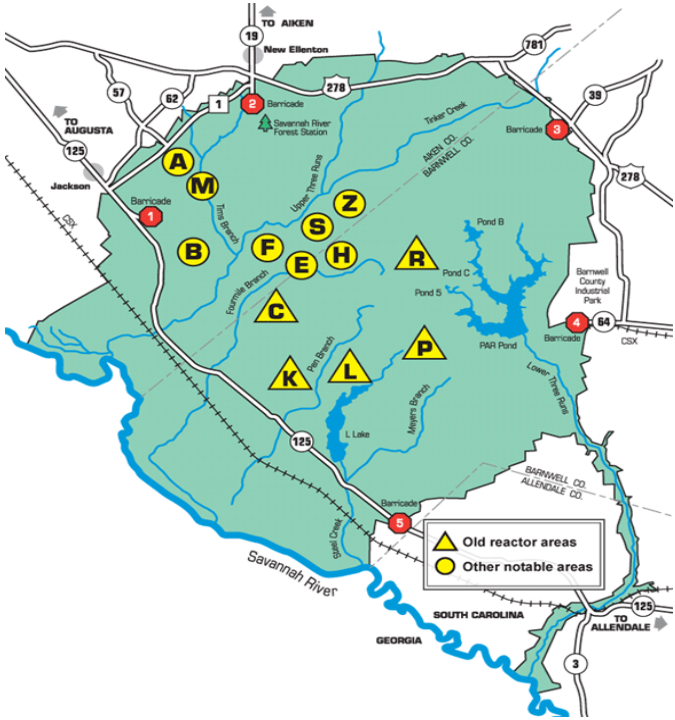
SRS is a nuclear weapons site - created in the early 1950s by expelling 5000 people from an 810-square kilometer area in South Carolina, in order to produce nuclear weapons materials: plutonium and tritium gas



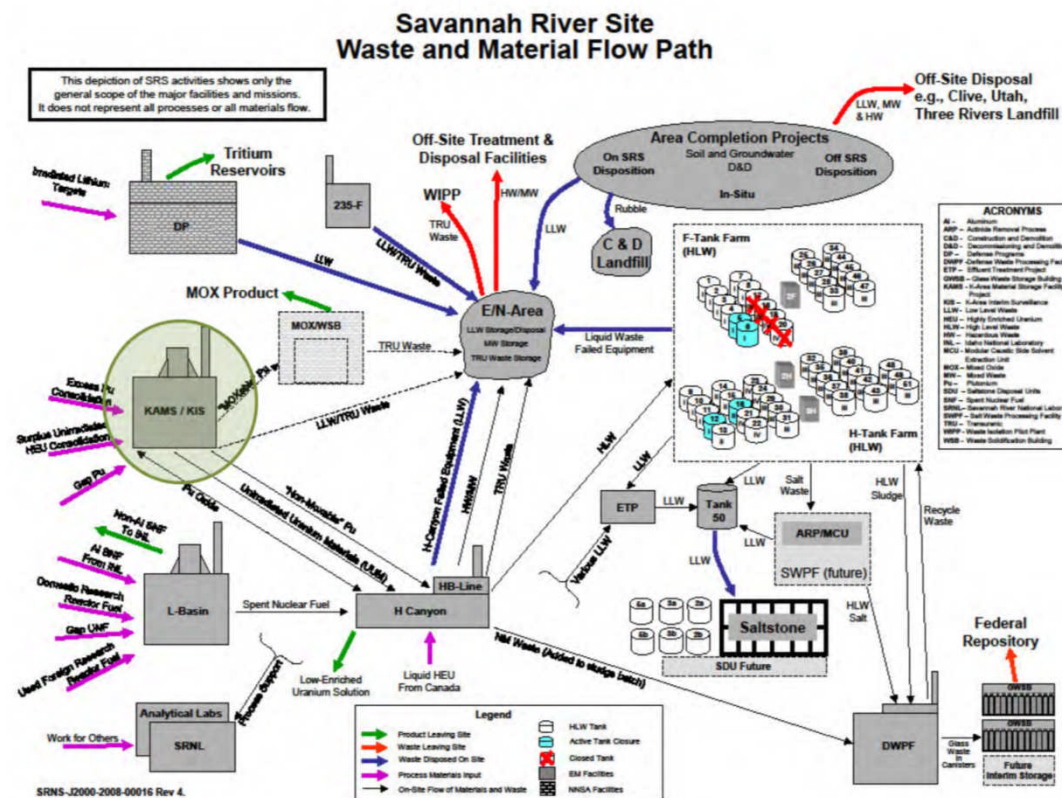
SRS is a key part of the US Department of Energy's nuclear weapons complex; employs about 10,000 people but only about 800 work for DOE (which is primarily a department of nuclear weapons & Cold War waste "cleanup")



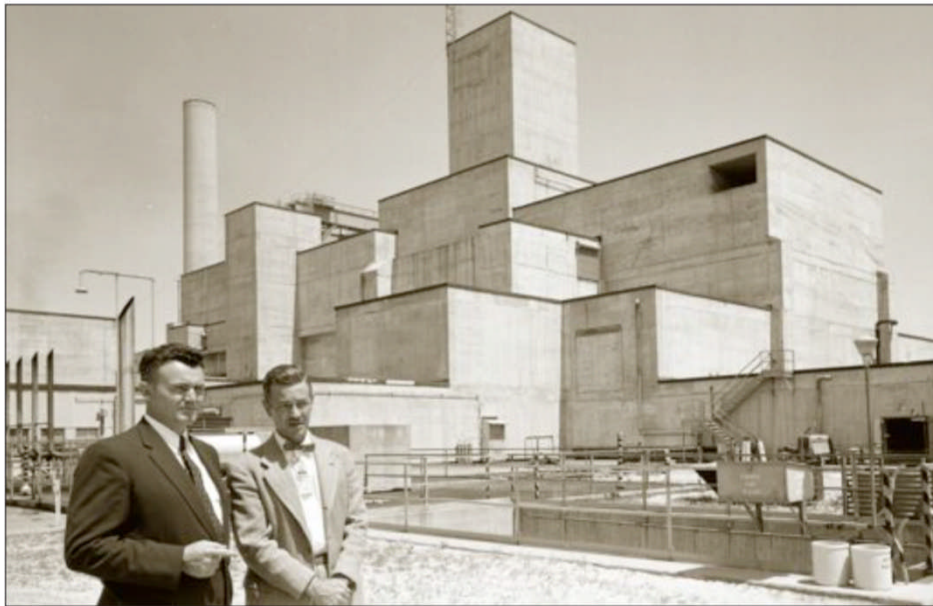
SRS is located in South Carolina, in the sandy soils of the Atlantic Coastal Plain and is unsuited for waste storage or disposal



Though plutonium production stopped in the mid-1980s, the site continues to process nuclear materials, with the main focus on nuclear waste management (“cleanup of Cold War waste”)



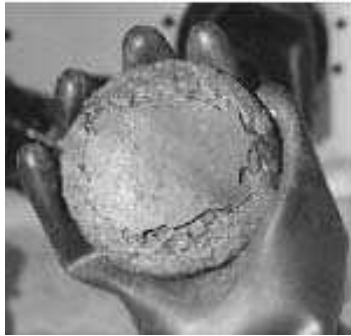
SRS operated five nuclear reactors and produced 36 MT of weapon-grade plutonium for U.S. nuclear weapons; reactors had no containment domes and hot water was dumped directly into streams; the last reactor was operated briefly in 1989 and is now used for storage of 13MT of plutonium; 2 have been undergone “in situ decommissioning” (filed with concret & left in place)



SRS had two reprocessing plants; the “H-Canyon” is still operating and employs about 800 people, with a budget of about \$150 million/year – DOE and contractors are seeking work for the facility as it’s a money maker & that’s the motivation for seeking German waste: \$\$\$

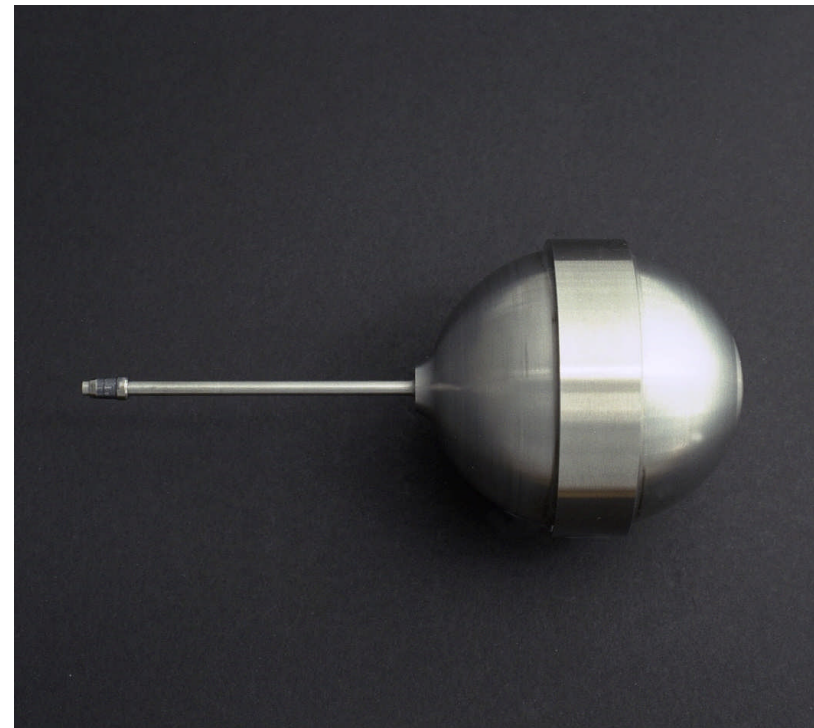


SRS provided raw plutonium “buttons” that were fabricated into nuclear weapons components at other sites





SRS produced radioactive tritium gas, used in all US weapons, for over 30 years & now processes all US tritium (made from irradiating rods in a commercial nuclear reactor) – tritium makes SRS a key nuclear weapons site



The K-Reactor building is now used to store 13 MT of weapon-grade plutonium; less than 3 MT are under IAEA safeguards



Plutonium “3013 can” in which oxide and bits of metal are packaged,  
and then placed in larger “9975” storage/shipping container



“The thirty-seven million gallons of highly radioactive and toxic waste, stored in aging and degrading tanks at SRS, is the single largest environmental threat in South Carolina.” – South Carolina Department of Health & Environmental Control, about the 51 leaking waste tanks on the site; 6 tanks have been “emptied” and filled with concrete to be left forever as a monument to the insanity of the Cold War

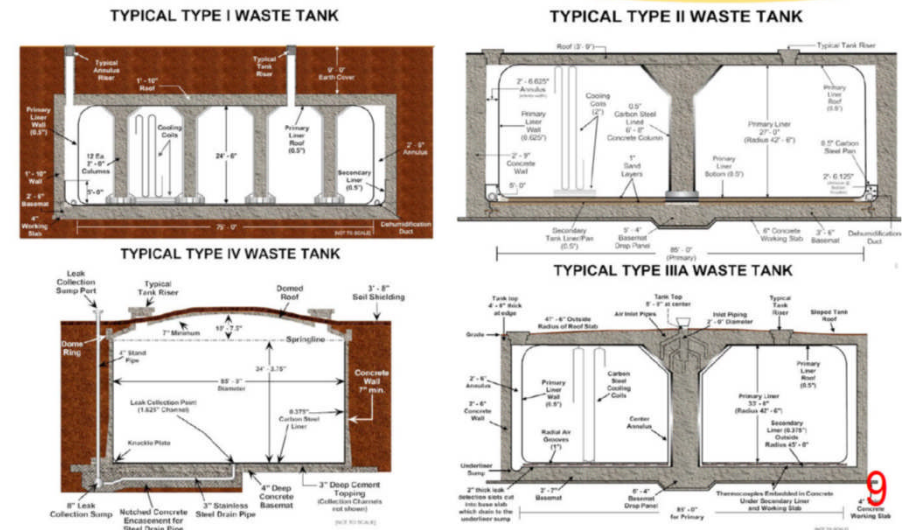


Highly radioactive liquid waste from the reprocessing facilities went into “tank farms,” with little plan for how it would be managed – highly radioactive graphite waste from Germany would be dumped into the tanks – would tank chemistry be negatively impacted?

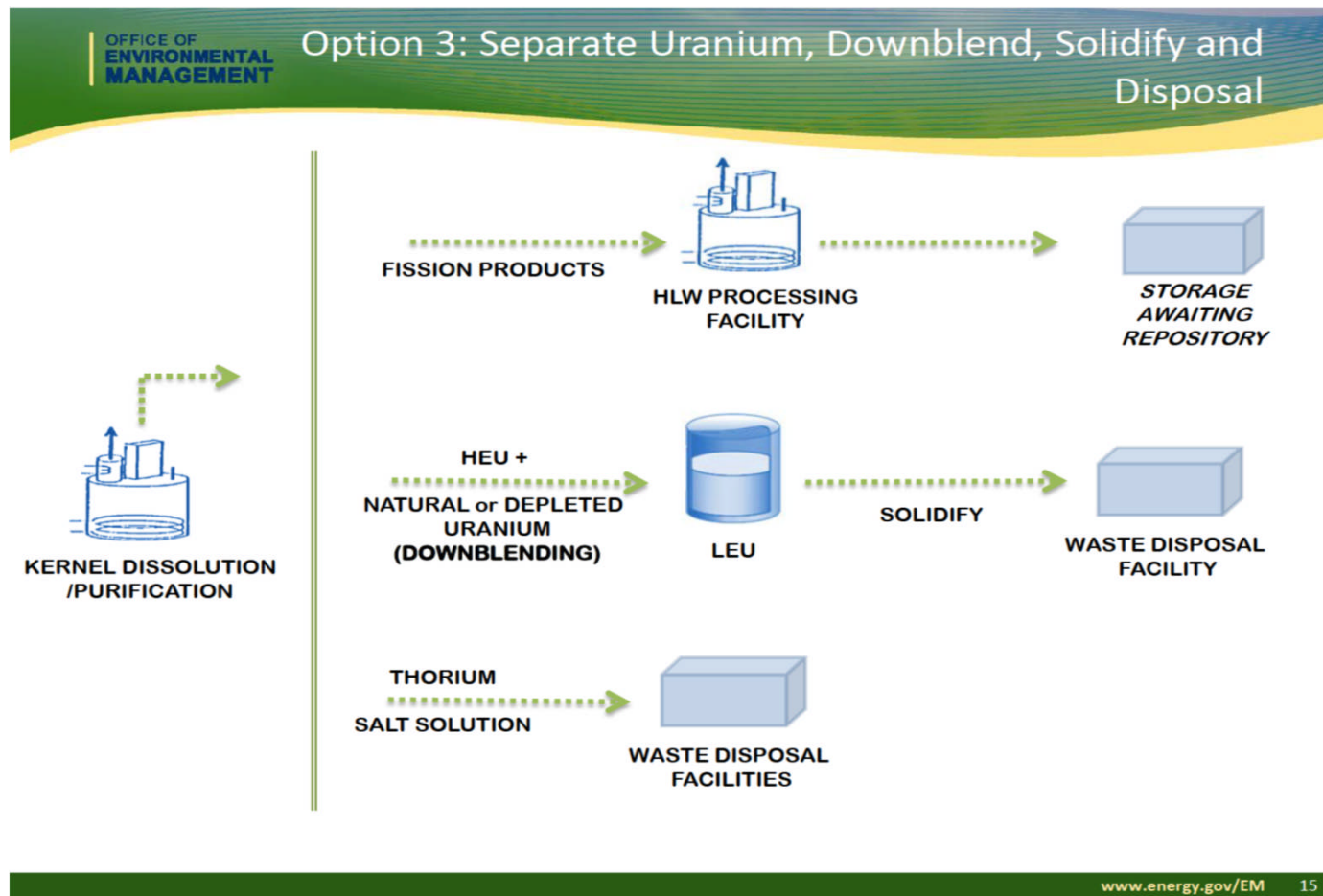
OFFICE OF ENVIRONMENTAL MANAGEMENT  
**H-Tank Farm Layout**



OFFICE OF ENVIRONMENTAL MANAGEMENT  
**H Tank Farm Tank Types**



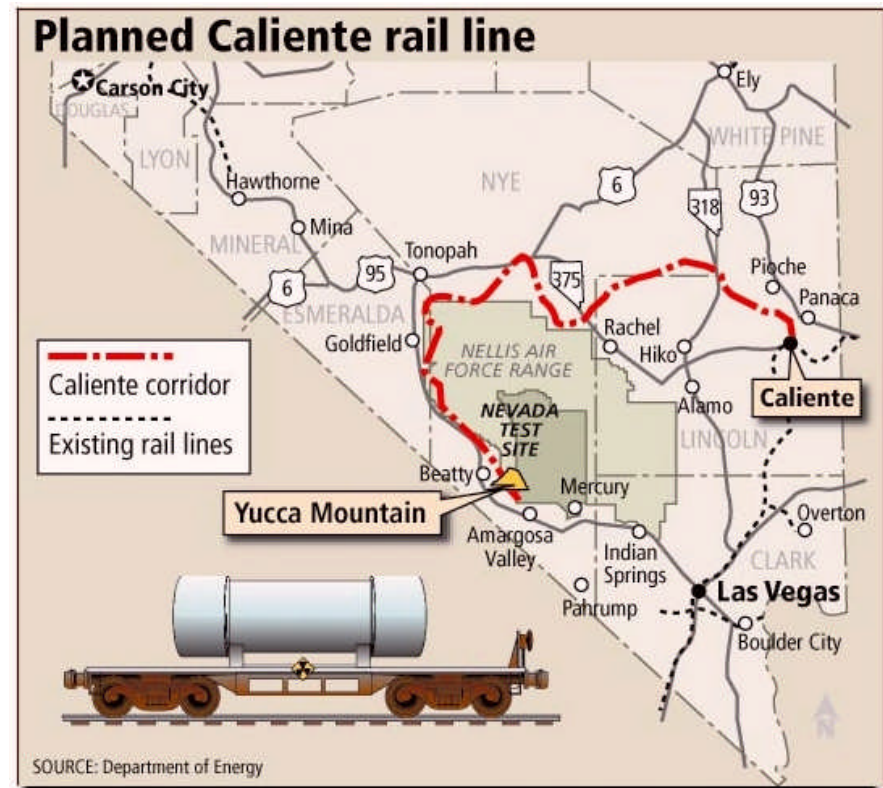
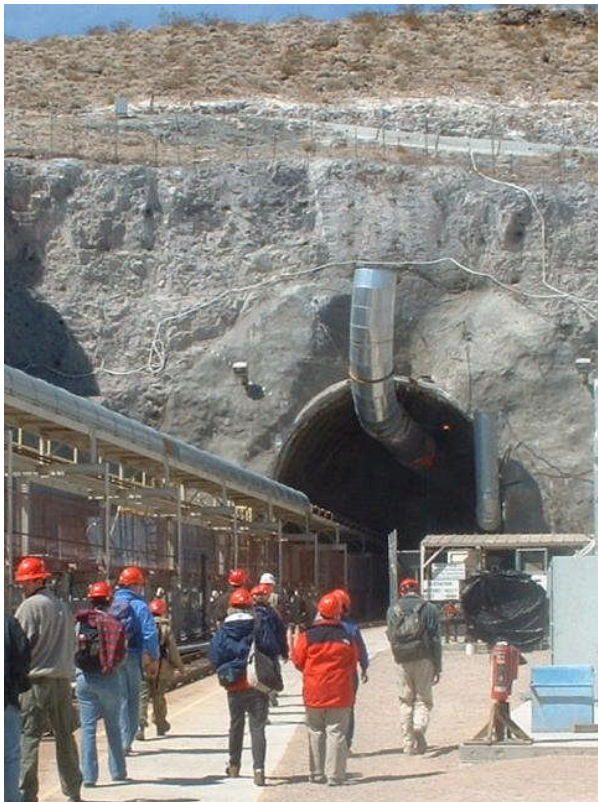
More high-level waste into the tanks for “storage awaiting repository” is clearly not the best management practice and constitutes “dumping”



Tanks are being emptied and large casks are being filled with vitrified waste – about 3800 have been filled (out of about 8500); current rate is about 100/year; German waste may cause the need for an additional 100-200 canisters so would slow down the urgent emptying of the tanks and have no destination (i.e. repository)

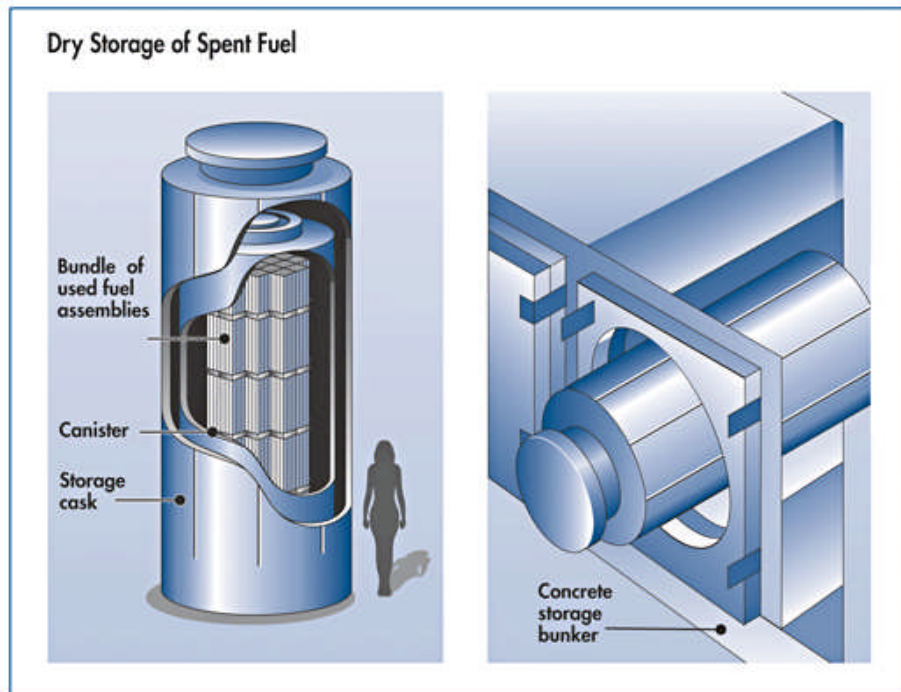


Yucca Mountain in Nevada was selected as the geologic repository for commercial spent fuel and DOE high-level waste but pursuit of it has been terminated & there is no plan to find a new repository





Nuclear industry is moving ahead with dry cask storage at almost all reactor sites; these are not well-protected from rocket attack



SRS receives and stores research reactor spent fuel; has about 20 MT stored in a pool of one of the old reactors; program to receive spent fuel containing US-origin HEU is to end in 2019: German research reactor spent fuel is at SRS



*UNF Receipt Forecast*

**Estimated Number of Assemblies**

Assemblies			Fiscal Year								Grand Total		
Type	Location	Reactor	2011	2012	2013	2014	2015	2016	2017	2018		2019	
DRR	Maryland	NIST		168		126			126			420	
	Massachusetts	MIT	8	8	8	8	8	8	8	8	8	72	
	Missouri		16	16	24	16	24	16	24	16	24	176	
	Tennessee	HFIR	10		15	15	15	14	14	12	12	107	
<b>DRR Total</b>			<b>34</b>	<b>192</b>	<b>47</b>	<b>165</b>	<b>47</b>	<b>38</b>	<b>172</b>	<b>36</b>	<b>44</b>	<b>775</b>	
FRR	Australia	OPAL					140		140			280	
	Canada	PTR		9								9	
		SLOWPOKE		1									1
	Germany	BER-2			33			66		33			132
		FRG-1			25								25
	Israel	IRR-1								51		51	
	Jamaica	SLOWPOKE			1							1	
	Japan	DCA						4					4
		JMTR				120	120	120	120	120	120	90	810
		JMTRC				16	16						32
		JRR							80	80	80	40	280
		KUR									60		60
	Peru	RP-10					29						29
	Portugal	RPI								14			14
S. Africa	SAFARI		49									49	
<b>FRR Total</b>			<b>59</b>	<b>58</b>	<b>137</b>	<b>165</b>	<b>330</b>	<b>200</b>	<b>438</b>	<b>260</b>	<b>130</b>	<b>1777</b>	
New Scope	Canada	NRU / NRX			120	180	180	180	180	170		1010	
		SLOWPOKE			2							2	
	France	Osiris			102			237		211		550	
S. Africa	SAFARI		408	362								770	
<b>New Scope Total</b>			<b>512</b>	<b>482</b>	<b>180</b>	<b>417</b>	<b>180</b>	<b>391</b>	<b>170</b>			<b>2332</b>	
<b>Grand Total</b>			<b>93</b>	<b>762</b>	<b>666</b>	<b>510</b>	<b>794</b>	<b>418</b>	<b>1001</b>	<b>466</b>	<b>174</b>	<b>4884</b>	

MOX plant to use surplus weapons plutonium - under construction at SRS but faces long delays & DOE may terminate the program; construction cost was originally under \$1 billion but now officially \$7.7 billion but govt officials \$10 billion; overall program \$30+ billion





SRS is “nuclear ground zero” – two Westinghouse AP100 reactors are under construction at the Vogtle site directly across the river (in state of Georgia) – Georgia has four operating reactors



And...150 km to the northeast, two more AP1000s are under construction at the VC Summer site (40 km north of Columbia, South Carolina) – South Carolina has 7 operating reactors



Conclusions: SRS is not a nuclear dump for Germany –

AVR, THTR waste will be handled to poor standards and cause more environmental problems at SRS --

- The public and local newspapers are strongly against efforts to turn SRS into a long-term nuclear waste storage site. Receiving spent fuel is unprecedented and will negatively impact cleanup of existing waste.
- Under US law, high-level nuclear waste, including spent nuclear fuel, must be disposed of in a geologic repository. SRS is not such a disposal site and all high-level waste at the site is required to go to a repository. No repository exists in the US and plans to develop such a repository are stalled.
- DOE admits that reprocessing of the highly radioactive graphite spent fuel, a type never handled by SRS, will yield waste to go into “storage awaiting repository,” which means poor storage practices and permanent storage in the tanks.

## Conclusions continued....

- While there may be some US-origin highly enriched uranium in the graphite spent fuel, much of it contains no such material. Underscoring that the spent fuel poses no proliferation threat, both Germany the U.S. had long-accepted domestic disposal of it until 2011.
- SRS is developing a new reprocessing technique to remove uranium from the graphite fuel and herein lies the real proliferation risk. That new technique is being paid for by Germany. DOE has refused to prepare an essential “proliferation impact assessment” analyzing the risks of the new reprocessing method.
- The H-Canyon reprocessing plant at SRS is a defense facility and is not under safeguards by the International Atomic Energy Agency (IAEA) and there would be no independent documentation of the handling of the spent fuel or any separated uranium (or associated waste).



## Conclusions continued

DOE is not regulated by the U.S. Nuclear Regulatory Commission, meaning no public oversight of the proposal and no NRC regulation of reprocessing or CASTOR shipments.

The import of commercial spent fuel from any country into the US is unprecedented. SRS has historically received research reactor spent fuel, including from Germany, but that program is soon to end. Attempts to redefine the AVR and THTR reactors as research reactors has no basis in fact or law and will fail.

•  
Germany and the US should formally halt ill-conceived plans to export a domestic spent fuel problem to the U.S. Germany must deal with its own nuclear waste

# Fragen? Questions?

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South Carolina ist kein Entsorgungsplatz für deutschen Atommüll

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