Comments on "Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SEIS) for the Production of Tritium in a Commercial Light Water Reactor"

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Dear Mr. Chambellan:

These comments are in response to the Department of Energy's "Notice of Intent To Prepare a Supplemental Environmental Impact Statement (SEIS) for the Production of Tritium in a Commercial Light Water Reactor," published in the Federal Register on September 28, 2011. The SEIS to be prepared by DOE's National Nuclear Security Administration (NNSA) will update the "Commercial Light Water Reactor EIS" prepared in 1999. The matter addressed in the notice concerns expanded tritium production for nuclear weapons in the Tennessee Valley Authority's Watts Bar Nuclear Bomb Reactor (WBNBR) as well as weapons tritium production in the Sequoyah 1 and 2 reactors. We request that these comments be made part of the public record in this matter and that the points we raise be responded to individually in the draft Supplemental EIS due in 2012.

The notice presents these alternatives of irradiation of Tritium-Producing Burnable Absorber Rods (TPBARs), which are not inclusive of all actions that must be considered and are not reflective of all environmental impacts that must be considered:

1. No Action Alternative: Produce tritium at currently approved TVA facilities (Watts Bar Unit 1 and Sequoyah Units 1 and 2) at appropriate levels to keep permeation levels within currently approved NRC license and regulatory limits.

2. Alternative 1: Utilize TVA's Watts Bar site only to a maximum level of 2,500 TPBARs every reactor fuel cycle (18 months).

3. Alternative 2: Utilize TVA's Sequoyah site only to a maximum level of 2,500 TPBARs every 18 months.

4. Alternative 3: Utilize both the Watts Bar and Sequoyah sites to a maximum total level of 2,500 TPBARS every 18 months. The level of production per site would be determined by TVA. This alternative would provide the ability to supply stockpile requirements at either site Independently, or using both sites with each supplying a portion of the supply.

If decisions in the tritium program results in the Sequoyah reactors to be converted to military use, those commercial-military Sequoyah Nuclear Bomb Reactors (SNBRs) will mean that production of weapons tritium is being proliferated, thus demonstrating to the world that production of nuclear bomb materials in more civilian reactors is acceptable behavior. This will undermine U.S. nuclear non-proliferation policies and efforts.

These comments come from groups and individuals who are well informed about nuclear power, nuclear weapons and nuclear non-proliferation issues and reflect the informed views of a diverse sector of the public. Production of weapons tritium in the military-commercial reactors owned by TVA is of concern to us for a host of reasons, some of which are reflected in the comments below.

Comment 1: Reassess need for maintaining tritium in deployed and reserve nuclear weapons

While the SEIS notice states that production of tritium is "required to support the current Nuclear Posture Review tritium supply requirements," the draft SEIS must take fully into account the impact of the recently ratified New Strategic Arms Reduction Treaty (New START). That treaty allows around 1,550 deployed nuclear weapons, far below the number of deployed weapons when the earlier "Commercial Light Water Reactor EIS" was prepared. The trend is for that number to be further reduced in the near term, with the legally mandated requirement to reach zero nuclear weapons and the SEIS must take this into account.

The SEIS must demonstrate how the Nuclear Posture Review constitutes a legal requirement for tritium production and the SEIS must also discuss impacts to tritium production if the Nuclear Posture Review recommends charging fewer weapons with tritium, including no filling of tritium reservoirs for stockpiled weapons. The SEIS must likewise discuss the quantity of tritium rods needed in the maintenance of far fewer weapons than assumed in the Federal Register notice.

Under the treaty, the U.S. may keep several thousand weapons in "reserve" in spite of no justification to maintain such weapons on stand-by. While the tritium reservoirs for those weapons may be stored apart from the weapons themselves, there is absolutely no need to produce, process and store tritium for those weapons. The SEIS must discuss not processing tritium for those weapons, which will greatly reduce production and processing "needs."

<u>Thus, a new "no action" alternative must be included in the draft SEIS – a halt to production of weapons tritium in commercial nuclear reactors.</u> This option could consider a phased reduction below current levels in the number of Tritium-Producing Burnable Absorber Rods (TPBARs) irradiated in the TVA reactors, until no rods were irradiated.

Comment 2: A new nonproliferation impact assessment is needed

In parallel with the EIS in 1999, the Department of Energy prepared a document entitled *The Nonproliferation Implications of Alternative Tritium Production Technologies Under Consideration* (July 1998). This document attempted to present a façade of legality on the production of tritium, a nuclear weapons material, in commercial reactors. At the time, there was concern that production of tritium, a non-fissile gas used to boost the explosive power of all U.S. nuclear weapons, in commercial reactors would cross the imaginary line between commercial and military nuclear applications and send a disturbing message to the world that production of nuclear weapons materials in commercial facilities is acceptable.

Since 1998, the concern about proliferation of nuclear weapons and nuclear technologies is as great as ever. Having a confused and dangerous national policy which allows production of tritium in commercial reactors must be reassessed. In a new assessment the proliferation implications of the proposal before us must be much more rigorous, must be prepared, unlike the 1998 assessment, by identified individuals, and the document must be provided to the public and the public must be allowed to comment. That a new policy allowing production of tritium in commercial reactors was accepted in 1999 does not mean that such a policy is wise in today's world. A "no dual use" policy has proven sound and this policy needs to be considered in light of a policy shift involving production of weapons tritium in military-civilian reactors.

In a November 1998 DOE inspector general's report on tritium production - *Summary Report on Inspection of Issues Associated with the Department of Energy's Tritium Source Selection Process* **–** it was stated that a senior official in the Office of Nonproliferation and National Security involved in preparation of the nonproliferation assessment stated that **"**she concurred with the final report, and agreed with the conclusion that producing tritium in a Commercial Light Water Reactor involves "manageable" nonproliferation risks." The IG's report goes on to state "there was a concern that an official in the Office of Nonproliferation and National Security was not given the opportunity to provide input on whether producing tritium in a CLWR posed "manageable" nonproliferation risks." To this day it is unknown if the risks are "manageable," thus necessitating an in-depth review of the proliferation implications.

Such an assessment must also consider the risk of proliferation of TPBAR technology and associated processing equipment and methodologies.

Comment 3: Environmental and health impacts and causes of tritium leakage from the rods must be fully discussed

The irradiation of tritium rods has resulted in the unacceptable release of large amounts of tritium into cooling water and eventually into the environment at Watts Bar 1. DOE has finally acknowledged the leakage rate of tritium from the TPBARs and states in the Federal Register notice that "the permeation of tritium through the TPBAR cladding into the reactor coolant systems of potential tritium production reactors was estimated to be less than or equal to one tritium curie/TPBAR/year" and that the "NNSA has determined that tritium permeation through TPBAR cladding is approximately three to four times higher than this estimate." The notice further states that "To conservatively bound the potential environmental impacts, the SEIS will assess the impacts associated with tritium production in CLWRs based on a permeation rate of approximately five tritium curies/TPBAR/year."

While acknowledging the high leak rates, the draft SEIS must discuss not only this leakage but also TPBAR cladding damage and failure during irradiation, which could result in large amounts of tritium being discharged into cooling water. This tritium will eventually find its way into the atmosphere, the Tennessee River or ground water. Release of thousands of curies of tritium into the environment around both Watts Bar and Sequoyah is unacceptable and fails to meet guiding environmental policies that strive to reduce release of contaminants into the environment. Expansion of tritium production will thus guarantee that tritium releases increase, in non-compliance with policies such as ALARA.

There is no overriding law or principle that says that the environment and applicable environmental laws and regulations must take the back seat to military programs. The draft SEIS must thus present an

argument as to why the military's "need" for tritium has stronger legal rights than reducing tritium release at commercial reactors and citizens' rights to live in an environment free from such high rates of tritium release.

Given on-going concern with tritium releases by Watts Bar and Sequoyah that can be attributed to their on-going commercial operation, the impact of increased releases for nuclear weapons production must be considered as part of overall tritium impacts and not discussed in a way which only deals with weapons tritium leaks and discharge.

Dispersal pathways into the environment, associated doses to the public and impact of the possibility of strengthening EPA tritium release standards must be discussed. (EPA standards are below standards in at least two states and below the levels allowed in the European Union).

Is it in part technical problems with the TPBARs that have resulted in large amounts of tritium escaping the rods and entering reactor cooling water at the Watts Bar Nuclear Bomb Reactor (WBNBR). DOE's attempts to address this problem appear to have failed. DOE has shipped irradiated TPBARs to DOE's Pacific Northwest National Laboratory (PNNL) in Washington State for examination and possible redesign but it appears that redesign to prevent or reduce leaks has not been successful and DOE is accepting rods that are leaking tritium in amounts not anticipated. The draft SEIS must present what has happened related to design of the TPBARs and the scope of the work by DOE and PNNL to address the on-going leakage problems and if future redesign of the TPBARs will be considered by PNNL or any other lab.

In an October 2010 General Accounting Office report entitled *National Nuclear Security Administration Needs to Ensure Continued Availability of Tritium for the Weapons Stockpile* (GAO-11-100), the GAO recognized technical and environmental problems with leakage of TPBARs and concluded that the "GAO recommends that NNSA develop a plan to manage tritium releases from reactors, analyze alternatives to its current tritium production strategy, ensure its contracting complies with appropriate contracting procedures, and ensure its future budget requests account for the program's large unexpended balances. NNSA generally agreed with our recommendations."

The GAO also noted that plans to increase TPBAR numbers in TVA Reactors "have not been coordinated with the Nuclear Regulatory Commission (NRC), which ultimately must approve any changes to the operation of the TVA reactors." Thus, new licensing requirements may be required to be met.

PNNL has also produced new TPBARs, that are assembled by WesDyne at the Westinghouse uranium fuel fabrication facility in Columbia, South Carolina. Such assembly has resulted in the de facto conversion of the Westinghouse fuel plant into a nuclear bomb facility and the draft SEIS must thus discuss security and process aspects of WesDyne's fabrication of the TPBARs at the Westinghouse facility and the security and non-proliferation aspects of transport of the assembled TPBARs to the TVA reactors.

Comment 4: Final Safety Analysis Reports and Accident Dose Analysis for Watts Bar and Sequoyah must be redone

According to a June 6, 2011 letter from TVA to the NRC on Watts Bar 2, TVA conducted a new analysis related to postulated accident and radiation dose. TVA states in the letter that "the tritium source term is based on the failure of two (2) TPBARs."

The TVA considered seven postulated accidents in calculating the dose in the new FSAR (and which must be considered in the draft SEIS):

1. Loss of AC Power to the Plant Auxiliaries
2. Waste Gas Decay Tank Rupture
3. Loss of Coolant Accident (LOCA)
4. Steam Line Break
5. Steam Generator Tube Rupture
6. Fuel Handling Accident
7. Rod Ejection Accident

The draft SEIS must also include a new analysis of these and other postulated accidents involving the proposed number of TPBARs in the Watts Bar and Sequoyah reactors and address the dose consequences of multiple TPBAR failure under accident as well as normal operating conditions. The impact of steam line breaks, including steam releases from a failure of a steam generator, must be analyzed. Additionally other leaks from the Reactor Coolant System, with normal TPBAR leakage and with failure of TPBARs, must be analyzed.

Additionally, it is possible that the license for Sequoyah must be amended to allow use of TPBARs. A DOE Inspector general report - *Evaluation of NRC's Oversight of Tritium Production at Commercial Nuclear Power Plants* (OIG-11-A-19 September 21, 2011, http://www.nrc.gov/reading-rm/doc-collections/insp-gen/2011/oig-11-a-19.pdf) states "Since TPBARs have not been installed in either Sequoyah Unit 1 or 2, the provisions authorizing the loading of TPBARs in license amendment numbers 278, 269, 289, and 279 have not been implemented in Sequoyah's technical specifications."

Having to change "technical specifications" and given how much time has passed since the license amendment and that the reactor operation is being scrutinized in light of lessons learned from the Fukushima accident, it may well be required that a new license amendment process be initiated by TVA if the plan to irradiate TPBARs in the reactors proceeds. Such new and/or updated requirements must be addressed in the draft SEIS.

That OIG report also noted that the "NRC's communication with stakeholders regarding tritium production could be improved." Given the NRC's regulatory and oversight role in production of weapons tritium in commercial reactors, the NRC must be a party to the preparation for the draft SEIS.

Comment 5: Use and/or testing of plutonium fuel (MOX) in Sequoyah reactor(s) while irradiating tritium rods must be analyzed

Also, as the Sequoyah reactors are being considered for use of mixed oxide fuel (MOX) made from weapons-grade plutonium – which has never been used on a commercial scale anywhere in the world and which has not been tested for more than two 18-month irradiation cycles in a PWR – the impact of MOX handling and use on TPBAR irradiation, and vice versa, must be considered.

In order for TVA to use weapons-grade MOX fuel for the normal three 18-month irradiation cycles, an NRC-licensed test involving MOX "lead test assemblies" will have to be conducted for three cycles in one of the Sequoyah reactors. That weapons-grade MOX test fuel will have to be made at the MOX plant at the Savannah River Site, if the facility ever obtains an operating license (which is being challenged by

public interest groups) and if the facility can start and operate. No other facility in the world is licensed to make MOX from weapons-grade plutonium, necessitating that initial operation of the MOX plant will have to be for manufacture of MOX for testing in both PWRs (Sequoyah) and BWRs (Browns Ferry). As those tests will take many years, the interaction of MOX testing and TPBAR irradiation must be discussed. After approximately 8 years of MOX irradiation testing and post irradiation examination, TVA will have to make a decision if it will seek a license amendment for batch use (up to of 40% MOX in the core). Interactions of batch MOX use and TPBAR irradiation must be discussed in the draft SEIS.

(It should be noted, in spite of erroneous claims by AREVA and others in the plutonium industry, that weapons-grade MOX has never even been tested in any BWR worldwide. If a weapons-grade MOX test is conducted in Browns Ferry it will be the first time for testing or MOX use in any BWR worldwide.)

Comment 6: Impacts of increased tritium rod storage in spent fuel pools, especially in light of the Fukushima accident, must be considered

Given the plan to increase both the number of tritium rods to be irradiated and the number of reactors, storage of spent fuel and highly radioactive TPBARs in the spent fuel storage pools may well be more challenging. The pools may have to deal with higher amounts of heat and larger amounts of radioactive products. In light of the NRC's Fukushima Task Force report and subsequent staff "lesson-learned" recommendations, it is imperative that a new analysis of spent fuel pool performance in day-to-day and accident situations be analyzed.

Given increased quantities of TPBARs in the pools and as the spent fuel pools take on a military mission in storing irradiated TPBARs containing weapons tritium, a new analysis of sabotage must be conducted.

Because of the 18-month irradiation cycle of the tritium rods – vs three 18-month cycles for uranium fuel in the PWR reactors under consideration – the handling and loading of irradiated fuel and TPBARs will change. This impact on the spent fuel management regime must be considered.

Comment 7: Fukushima lessons learned and ice condenser reactors with "egg shell containment" – Watts Bar and Sequoyah

Just as the GE Mark I design at Fukushima and TVA's Browns Ferry reactors relies on a poorly designed pressure-suppression system, the Watts Bar and Sequoyah reactors rely on the ice condenser pressure-suppression system to deal with a severe accident involving reactor breach. The Watts Bar and Sequoyah reactors with thinner containments pose problems not faced by PWRs with robust containment domes.

The Fukushima accident underscores the risk of reactors with thin containment and faulty pressure-suppression systems. The draft SEIS must review the recommendations of the NRC's Fukushima task force and subsequent staff recommendations in analyzing the possible consequences of severe accidents at the ice condenser reactors. Impact of such accidents on varying numbers of TPBARs – up to 2,500 per fueling cycle – must be analyzed. An accident with damage, rupture or total destruction of a majority of the TPBARs must be analyzed, including a severe accident taking place near the end of an 18-month irradiation cycle.

The NRC Task Force report noted that in the U.S. many Severe Accident Management Guidelines (SAMGs) and other ad-hoc severe accident features, because they involve beyond-the-design-basis

accidents, are not reviewed, monitored, or enforced by the NRC. The staff thought this was a bad idea, and the Fukushima accidents revealed many problems of this nature. The ice condenser reactors have been allowed to continue operations because, in part, the operator has instituted some voluntary ad hoc systems and procedures. For example, emergency power during station blackouts (SBOs) for the hydrogen igniters in containment involve some actions that are covered by procedures and equipment that are not reviewed or approved by the NRC.

[See Recommendation 8 of the Task Force (in report on page 49, http://pbadupws.nrc.gov/docs/ML1118/ML111861807.pdf) states: *The Task Force recommends strengthening and integrating onsite emergency response capabilities such as EOPs, SAMGs, and EDMGs.]*

The draft SEIS must include an assessment if the vulnerabilities of ice condensers - including hydrogen igniters and other systems - to severe accidents would be addressed by any procedures or equipment that go beyond the licensing basis and technical specifications.

Related to the hydrogen igniter performance, the NRC's resolution (Unresolved Safety Issue 189) depends largely on voluntary commitments by the plant to supply backup power for the igniters, but the NRC does not monitor or review the plant's approach. The tritium mission augmentation at the ice condenser reactors presents another reason for the NRC to take a more formal approach (which is the Task Force's point in general) concerning the reactors and Task Force recommendations. The draft SEIS must discuss what the NRC and TVA will do in response to this issue.

[See *Resolution of Generic Safety Issues: Issue 189: Susceptibility of Ice Condenser And Mark III Containments to Early Failure From Hydrogen Combustion During a Severe Accident (Rev. 1) (NUREG-0933, Main Report with Supplements 1–33)* - http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0933/sec3/189r1.html . Issues discussed here must be fully analyzed and addressed in the draft SEIS]

Comment 8: Dangers of transporting highly radioactive TPBARs must be discussed

Irradiation and storage of more tritium rods at the TVA reactors will mean more loading into transport casks and more shipments of the highly radioactive rods on the roads between the reactors and the Savannah River Site. Beyond leakage of tritium and the possibility of a reactor accident involving the TPBARs, transport also presents risks of radiation exposure and release of radioactive materials into the environment.

A new analysis of the rod handling, packaging and transport risks must be performed. Accident scenarios must be analyzed and routine exposure by workers must be assessed. The result of attacks, theft in transit and sabotage must be reviewed.

Comment 9: Impact at the Savannah River Site of TPBAR processing must be discussed

Dr. Everet Beckner, former Deputy Administrator of Defense Programs in the NNSA, said in congressional testimony in 2009 that the “NNSA has adequate quantities of tritium for years to come” and thus recommended putting the Tritium Extraction facility at the Savannah River Site on cold standby.

The Defense Nuclear Facilities Safety Board, in a May 2011 staff issue report (cover letter to DNFSB from Thomas P. D'Agostino, Administrator, National Nuclear Security Administration dated August 19, 2011) entitled *Review of Safety Basis, Tritium Facilities, Savannah River Site*, the DNFSB found that "results of a recent review by the Board's staff indicate that the National Nuclear Security Administration's (NNSA) Savannah River Site Office (SRSO) has approved downgrading safety controls based on changes in the analytical methodology and safety philosophy. These changes have weakened the safety posture of the tritium facilities. The revised safety basis may not adequately identify the set of safety-related controls necessary to protect both the public and workers because of its use of non-conservative parameters and heavy reliance on the Emergency Preparedness (EP) program."

Given this DNFSB report, the safety posture of SRS tritium facilities and possible impact of accidents to SRS sites worker and the off-site public in the processing of TPBARs and storage and processing of tritium into reservoirs must be analyzed. Possible problems with both the processing of TPBARs in the Tritium Extraction Facility and H Area New Manufacturing (HANM) Facility loading and unloading of gas in reservoirs and with the gas transfer and storage system must be analyzed.

The Nuclear Matters Handbook (http://www.acq.osd.mil/ncbdp/nm/nm_book_5_11/index.htm) of the Department of Defense's Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)) describes the Savannah River site as the location of the "national repository" for tritium and DOE has recently concentrated tritium facilities at SRS. As part of the Tritium Responsive Infrastructure Modifications program at SRS, ground was broken in October 2011 for two new tritium facilities at SRS – the Process Support Building and the Tritium Engineering Building. (See DOE news release of November 3, 2011: http://www.srs.gov/general/news/releases/nr11_srs-nnsa-trit-grndbrk.pdf) The role of all facilities in the tritium infrastructure at SRS must be discussed in the draft SEIS and include potential environmental impacts due to tritium leaks or accidents at each facility and the relationship of activities in those facilities to irradiation of TPBARs in TVA commercial-military reactors.

Comment 10: Final disposition of tritium rods must be discussed

After processing at the Savannah River Site, the TPBARs must be managed as nuclear waste. The disposition of these used rods must be discussed in the draft SEIS. The various waste streams associated with the TPBARs themselves and the processing of them, including contaminated equipment, must be discussed.

Contaminated equipment in the handling of the rods at the TVA reactor sites must also be included in the analysis of waste streams.

Comment 11: Use of Helium-3 decay product and industrial uses must be discussed

It has been speculated that the reason that DOE is planning to step up production of tritium is that DOE wants to be able to have access to a larger stockpile of helium-3, which is a tritium decay product which has industrial uses. Industry may also have interest in this new DOE mission. The draft SEIS must discuss any plans related to expanded tritium production in TVA reactors which may be associated with industrial uses of H-3. Likewise, the role of SRS tritium processing and handling facilities in relation to H-3 handling for industrial or business use must be discussed.

A fact sheet entitled "SRS Tritium Facilities" by Savannah River Nuclear Solutions (SRNS), the private contractor which manages much of the Savannah River Site for DOE, confirms industrial use of tritium as related to SRS tritium processing activities: "*Helium-3 Recovery* – Tritium radioactively decays to helium-3, which has become a precious commodity. One reason for the tremendous growth in demand for helium-3 is its use in neutron detection equipment that is being installed all over the world to protect our nation and its allies from terrorism. We recover, purify, and bottle this valuable byproduct of tritium. SRS is the sole producer of helium-3 gas in the United States." (http://www.srs.gov/general/news/factsheets/tritium_esrs.pdf

The SRNS fact sheet is presented as being part of a new unfunded DOE-contractor scheme – *Enterprise SRS* - to bring new missions to SRS, implying that industrial use of helium-3 is regarded by DOE and special interests as part of the future of the tritium program at SRS.

A workshop in 2010 by the American Association for the Advancement of Science (http://www.aaas.org/news/releases/2010/0423helium3.shtml) explored "how to meet demand for helium-3 in medicine, industry, and security" and explored alternatives to use of helium-3 for various applications. The results of this workshop must be considered in the draft SEIS and alternative sources of helium-3, such as from Canada and Russia, must be analyzed, along with a review of more efficient H-3 use and improved recycling techniques.

Thus, the draft SEIS must fully discuss if the goal of part of the expanded tritium production expansion activities by DOE and TVA is related to plans for industrial, business or research uses for helium-3.

Comment 12: DOE must pay and TVA must collect fees for TPBAR irradiation and impact of fee management must be discussed

In a TVA inspector general's document entitled *TVA Tritium Program Under DOE/TVA Interagency Agreement DE-A102-00DP00315* (May 16, 2011 - 2010-13013, https://lists.tva.gov/cgibin/dada/mail.cgi/archive/vc1211905/20110615143834/),the IG found that the TVA had not recovered fees due to TVA for TPBAR irradiation services:

"We reviewed TVA cost recovery for tritium production under Interagency Agreement DE-A102-00DP00315 with the Department of Energy (DOE). The audit covered the period from January 2000 through December 2009 with some scope restrictions due to incomplete accounting data. We were unable to determine if tritium production costs were accurately identified and invoiced or if any negative impacts on plant operation from tritium production were reimbursed by DOE due to inadequate documentation. Specifically, Nuclear Power Group (NPG) management: (1) had incomplete accounting data, (2) negotiated rates that did not accurately reflect NPG's anticipated costs, (3) did not address $9 million in under-recovered overhead identified in the previous Office of the Inspector General audit on the tritium agreement, (4) did not invoice standby payments and overhead in compliance with agreement terms, (5) did not identify all additional operating costs caused by tritium production, (6) did not have support for $22.9 million in expenses and an unknown amount of revenues, and (7) misclassified revenue. Possible consequences of the audit findings include noncompliance with the Economy Act, noncompliance with the TVA Act resulting in rate-payer subsidy of tritium production, and unreliable NPG financial/performance data." (summary; full document not posted on TVA website)

The draft SEIS must analyze fee payment by DOE to TVA and if this is actually being paid and if the fees for current and future irradiation services are adequate to cover the direct and indirect costs to TVA.

In conclusion, a new "no action" alternative that includes a halt to tritium production in TVA reactors must be included in the SEIS. Expansion of tritium production in Watts Bar and into the Sequoyah reactor will result in release into the environment of more radioactive tritium, increased costs to the tax payer and perpetuate a program that poses nuclear proliferation risks and which fuels the risk of use of nuclear weapons.

Thank you for considering these comments and for addressing them in the draft SEIS. Unless otherwise noted, please send a CD of the draft SEIS to the sign-ons below.

Sincerely,

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Attachment:

http://www.globalsecuritynewswire.org/gsn/nw_20111028_5918.php

Some Nuclear Experts Question Ramp-up in U.S. Tritium Production

Friday, Oct. 28, 2011

By Elaine M. Grossman

Global Security Newswire

WASHINGTON -- The U.S. nuclear complex is expanding production of an exotic gas widely seen as essential for keeping nuclear weapons functioning, but some progressive issue experts cast doubt on just how much new fabrication is required (see *GSN*, Aug. 25).

(Oct. 28) - *The Tritium Extraction Facility at the Savannah River Site in South Carolina. A number of analysts have questioned a planned increase in U.S.*

capabilities to produce tritium, a material considered key in the function of nuclear weapons (Savannah River Nuclear Solutions photo).

The Energy Department's semiautonomous National Nuclear Security Administration plans over the next few years to more than triple capacity to produce tritium at the commercial Watts Bar reactor in eastern Tennessee, according to the agency's fiscal 2012 "Stockpile Stewardship and Management Plan."

This budget year alone, the agency is seeking a $27.3 million boost for its "tritium readiness" effort, in which production will increase from 240 to 544 rods per cycle at a cost of $77.5 million, the NNSA fiscal 2012 funding request to Congress states. Since production began at the Tennessee Valley Authority reactor in 2004, 10 tritium-irradiation cycles -- each taking about 18 months -- have been completed.

The readiness program also includes the process of extracting tritium from the irradiated rods at the Energy Department's Savannah River Site, located on South Carolina's western border with Georgia, and of maintaining military reserves of the gas.

By 2020, the agency intends to boost production to 1,700 rods each cycle, according to Terry Johnson, a TVA spokesman. The Obama administration seeks to spend $270.5 million on tritium readiness between fiscal 2013 and 2016, producing no fewer than 240 rods per cycle as a minimum "sustaining rate" during that period.

This will "ensure a capability is available in the event that future resources are allocated to ramp up production to support the requirements" of a future U.S. nuclear stockpile, the funding plan states. The blueprint also calls for extracting tritium at a clip of no less than one batch of rods per year.

Thanks to post-Cold War reductions in the size of the nuclear stockpile, the Energy Department now needs less new tritium than initially projected in May 1999, according a recent federal notice.

However, tritium production has gone a bit slower than anticipated because more of the gas than expected has leached from rods at Watts Bar into reactor coolant water. That has left slightly less tritium available to extract from each rod, Johnson said.

The nuclear agency is thus exploring options for further increasing its production capacity, the notice states.

However, not everyone sees new production as a must. Some experts are questioning why a standard practice of recycling tritium from deactivated nuclear warheads is not offering sufficient reserve stocks of the gas, particularly given anticipated arms control reductions and further weapon retirements from the strategic hedge force.

If the United States can deactivate warheads at an average rate of at least 5 percent every year, "there would be no need to produce additional tritium," said Charles Ferguson, president of the

Federation of American Scientists. That would offset the roughly 5 percent rate of annual decay in tritium in the remaining warheads, he said.

On occasions when warheads are shifted out of the operationally deployed stockpile or ready-reserve force, tritium gas is typically removed, purified and reused in weapons that are still active, the career physicist and a number of other experts said.

The nation removes tritium from inactive stockpile warheads "as soon as logistically practical, and the tritium is returned to the national repository" at Savannah River, according to the Defense Department's 2011 "Nuclear Matters Handbook." The government has not elaborated on the rate at which this is done or exactly how much reserve supply is available today.

A mix of tritium -- a radioactive isotope of hydrogen -- and deuterium is maintained in a small reservoir in each U.S. nuclear weapon to boost the warhead's explosive power. Just a few grams of the gas, injected into the hollow pit of a warhead's primary stage, initiate a chain reaction and trigger a much more powerful secondary stage.

To make a nuclear weapon detonate, "this is where the rubber hits the road," said Hans Kristensen, who directs the FAS Nuclear Information Project. "If you can get the primary to go off with enough yield, then the secondary will go off."

Conversely, if a warhead's tritium-dispenser bottle has been removed or if the gas has significantly deteriorated, the secondary stage could fail to ignite and the explosive power of the weapon would be considerably diminished, experts explain.

U.S. nuclear weapons policy calls on the Energy Department to maintain fresh tritium in the deployed arsenal of atomic warheads carried by ICBMs, submarine-launched missiles and bomber aircraft.

Continuing a policy from previous administrations, the Obama White House is also keeping roughly 2,290 warheads in an active hedge reserve force that receives regular maintenance and is kept stocked with tritium, according to Nuclear Matters. This stockpile hedge force constitutes more than one fully assembled backup warhead for each strategic warhead deployed at bomber aircraft bases, on ICBMs or on submarine-launched ballistic missiles.

The State Department last week announced that the nation now has 1,790 operationally deployed warheads, as the United States gradually reduces to a limit of 1,550 fielded weapons under the U.S.-Russian New START agreement (see *GSN*, Oct. 26).

One key distinction between a warhead in the active force -- either deployed or hedge -- and one that has been deactivated is that the tritium reservoir in the active warhead is routinely replaced every few years to ensure that the weapon's radioactive gas does not expire.

The hedge warheads are maintained in active reserve status in case "an unforeseen catastrophic failure of a class of delivery vehicles, warhead-type or family" is discovered or there is "an

unexpected reversal of the geopolitical situation that would require an increase in the number of weapons available for use," according to the Pentagon handbook.

Kristensen sees this as overkill and a waste of resources.

"I think it's totally unnecessary to retain active weapons in the hedge," he said in an interview this week. "Short of a Martian attack, there's nothing that would require us to suddenly upload 2,000 warheads onto the force. It's not going to happen."

Finding a technical defect that puts a portion of U.S. warheads out of commission is perhaps more plausible than a resurgent-threat scenario in justifying the retention of a hedge force, Kristensen said. However, if such a flaw was discovered, it could likely be handled quietly over time without a need for massive warhead swap-outs from the active reserve stockpile, he argued.

"Would it really require us to have active weapons that we'd have to upload immediately?" he said, calling for a "reality check" on how big of a backup nuclear force is truly needed. "The rest of the force would still be good. We'd have enough [other] warheads left to bomb Russia back to the Stone Age."

In fact, the Pentagon anticipates reducing the size of the active stockpile hedge force in coming years as warhead maintainers develop more replacement components that could help aging weapons remain functional (see *GSN*, Aug. 18).

It is unclear, however, if long-term plans for reductions in the active hedge force have translated into a lower requirement for the amount of tritium that must be produced in the years to come.

"The United States is in an era of fiscal constraint with an unprecedented debt and a substantial annual deficit," Ferguson said. "Political leaders need to take a very serious examination of additional costs for maintaining a rather large reserve stockpile of warheads."

More than a decade ago, he joined Princeton physicist Frank von Hippel in a 1999 letter published by *Physics Today* estimating that given the amount of tritium available, its rate of decay and the standard use of recycling, a U.S. nuclear arsenal numbering 4,500 warheads could be sustained without new tritium production through 2025.

The pair noted that the Energy Department at the time had established a requirement to maintain a five-year reserve supply of tritium.

Assuming that the backup tritium-supply policy has not changed and the nation continues to keep its roughly 5,000-warhead arsenal maintained with fresh tritium, "then the year would be 2022" in which new gas would have to be produced, von Hippel said this week in an e-mail response to questions. "But probably DOE still has more than a five-year reserve [available] and is getting nervous that it will be approaching that level in a few years."

Additional tritium has been produced since the two scientists calculated their 1999 estimates, which should result in an even deeper cushion of reserve gas, Ferguson noted.

Von Hippel said a national production schedule for tritium should account more realistically for how hedge-force warheads are actually managed.

In the unlikely case that an emergent threat dictated a more urgent need for new tritium, "it might take a few years to produce enough for 2,000 additional [deployed] warheads," but the United States would almost certainly have at least that much warning time that more tritium is needed, he said. "[Or,] if a problem developed with some deployed warheads that required them to be replaced by reserve warheads, the tritium could be swapped."

Linton Brooks, who served as the first NNSA administrator during the Bush administration, played down debate over the issue. He noted that hedge force weapons do not have to be kept at an immediately usable state of readiness because upload schedules for operationally deploying those warheads would be largely driven by weapon delivery systems.

"Uploading the entire force would take months for submarines (driven by patrol schedules, since we would not want to reduce the number of survivable missiles) and years for the ICBM force (driven by handling equipment)," he said in a Thursday e-mail message.

Further nuclear-weapon reductions through arms control agreements or unilateral deactivations could allow Washington to produce tritium even later down the road, von Hippel told *Global Security Newswire*.

Were Washington to cut the active stockpile in half from the current 5,000 or so warheads to a level of 2,500, "we would buy ourselves 12 years of no tritium requirements and still have a reserve for 800 warheads," he said.

Given "a significant amount of tritium on hand" today -- freed up by post-Cold War warhead retirements -- Brooks said he "would advocate matching production capability with probable upload schedules, since producing excess tritium has little value."

Others raised additional tolls that tritium production might take.

"I don't think people realize that this material is being produced in a commercial reactor and it does have environmental and health implications near the production sites," said Tom Clements, the southeastern nuclear campaign coordinator for Friends of the Earth.

He said that heightened levels of tritium are present in groundwater near the tritium-handling facilities, and that the long-term consequences are not well understood even if the chemical levels fall within of government-approved limits.

"If there is no good reason to maintain the warheads, we need not pay any financial or environmental costs," von Hippel said.

Clements also took issue with the Energy Department's use of Watts Bar to produce tritium for ultimate use in U.S. warheads.

"I definitely don't think commercial reactors should be used to produce nuclear weapons material because it sends the wrong nonproliferation message to the entire world," he said. "It clearly crosses the imaginary line between the military and commercial nuclear fuel cycles. And the United States should be doing everything possible to keep them distinctly separated."

Clements said there has been some discussion of making some of the Watts Bar tritium available to industry for commercial purposes, but he said specific uses and timing remained unclear.

However, "the biggest concern is that the United States is keeping reserve weapons under the New START treaty fully capable of being deployed in a short period of time," he said. "And I think that undermines the goal of eventual, complete disarmament of nuclear weapons."