

FINDING OF NO SIGNIFICANT IMPACT

AGENCY: U.S. Department of Energy

COOPERATING AGENCY: Tennessee Valley Authority

ACTION: Finding of No Significant Impact

SUMMARY: An environmental assessment (EA) has been prepared to assess potential environmental impacts associated with a U.S. Department of Energy (DOE) Proposed Action to conduct a lead test assembly (LTA) program to confirm the viability of using a commercial light water reactor (CLWR) to produce tritium. The Proposed Action described in the EA supports DOE's Record of Decision for the *Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (TSR PEIS). The EA tiers from the TSR PEIS and covers only those activities necessary to conduct tests involving irradiation of tritium-producing burnable absorber rods (TPBARs) in a CLWR and post-irradiation examination (PIE) of the TPBARs. The Proposed Action would involve preparation and analysis activities at DOE facilities and irradiation of the TPBARs at a commercial nuclear power reactor. Based on the analysis in the EA and considering concerns expressed by the Yakima Indian Nation, and comments received from the states of Tennessee and Washington, DOE has determined that the Proposed Action is not a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (NEPA). Therefore the preparation of an environmental impact statement is not required.

ADDRESSES AND FURTHER INFORMATION:

Single copies of the EA and further information concerning the proposed action are available from

Debbie Trader, Director
Science and Technology Programs
U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352
(509) 372-4015

For further information regarding the DOE NEPA Process, contact:

Carol Borgstrom, Director
Office of NEPA Policy and Assistance (EH-42),
U.S. Department of Energy,
1000 Independence Avenue, S.W.,
Washington, D.C. 20585
(202) 586-4600, or (800) 472-2756.

PURPOSE AND NEED: The U.S. Department of Energy (DOE) needs to confirm the viability of using a commercial light water reactor (CLWR) as a potential source for maintaining the nation's supply of

tritium. The Proposed Action discussed in this environmental assessment is a limited scale confirmatory test that would provide DOE with information needed to assess that option.

BACKGROUND: DOE's *Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (TSR PEIS), described the need for a new source of tritium for defense purposes as summarized in the following.

Since nuclear weapons were developed in 1945, a nuclear deterrent has been a cornerstone of the nation's defense policy and national security. Tritium is used to enhance the yield of current nuclear weapons and allows for the production of smaller or more powerful devices. The United States has based its strategic nuclear systems on designs that use tritium and therefore requires a reliable source of this material in order to maintain the nuclear weapons stockpile as required by law.

Tritium has a relatively short radioactive half-life of 12.3 years. Because of this relatively rapid radioactive decay, tritium must be replenished periodically in nuclear weapons to ensure that they will function as designed. Over the past 40 years, DOE has built and operated 14 reactors to produce tritium and other nuclear materials for weapons purposes. Today, none of these reactors is operational, and no tritium has been produced since 1988.

Until a new source of tritium is operational, DOE will continue to meet tritium requirements by recycling tritium from existing weapons as they are retired from the weapons stockpile. However, because tritium decays relatively rapidly, recycling can only meet tritium demands for a limited time. Current predictions of future stockpile scenarios indicate that recycled tritium will adequately support the nation's nuclear stockpile until approximately 2005. (At the time the TSR PEIS was published, a previous assessment of the need for new tritium had placed that date at 2011; the current target date of 2005 is based on a more recent analysis). The tritium supply and recycling facilities as proposed in the TSR PEIS would provide the capability to produce tritium safely and reliably in order to meet the nation's defense requirements well into the 21st century while also complying with environmental, safety, and health standards.

In the TSR PEIS, DOE proposed several alternatives to provide a new source of tritium for the nuclear weapons program (DOE 1995a). The TSR PEIS evaluated alternatives for the siting, construction, and operation of tritium supply technology and recycling facilities at each of five candidate sites: the Idaho National Engineering and Environmental Laboratory (INEEL) in Idaho, the Nevada Test Site (NTS) in Nevada, the Oak Ridge Reservation (ORR) in Tennessee, the Pantex Plant in Texas, and the Savannah River Site (SRS) in South Carolina.

The TSR PEIS included an analysis of the use of a light water reactor (LWR) as well as the use of an accelerator for production of tritium. As part of the LWR alternative, DOE considered the purchase of an operating or partially completed commercial power reactor, or purchasing irradiation services from an existing CLWR. A combination of the CLWR and accelerator alternatives (one option to serve as the primary tritium source with the other serving as the backup source) was selected in the TSR PEIS Record of Decision (60 FR 63877-63891). A decision is expected by the end of 1998 to determine which option will be the primary source for tritium and which will serve as the backup source.

This EA tiers from the TSR PEIS and covers only those activities that would be necessary to conduct tests involving irradiation of tritium-producing burnable absorber rods (TPBARs) in a CLWR and post-irradiation examination (PIE) of the TPBARs. Aspects of the actual tritium production program or operations at the CLWR used to irradiate the TPBARs are, or would be, addressed by separate NEPA documentation. The commercial reactor proposed to perform the irradiation in this EA may or may not be the reactor selected for actual tritium production in the future. If the CLWR alternative is selected to be a primary or backup tritium source, the selection of the specific reactor(s) eventually used for the production mission would be addressed by a separate site-specific NEPA analysis.

PROPOSED ACTION: The Proposed Action would confirm the results of developmental testing conducted previously at DOE facilities and provide DOE with information regarding the actual performance of the TPBARs in a CLWR. It would also demonstrate that tritium production could be carried out within the normal operating and regulatory constraints associated with a commercial nuclear power facility, without affecting the plant's safety systems, production capacity, or normal operations. These activities would provide added confidence to the utilities and the NRC, which regulates commercial power reactors, that tritium production in a CLWR could meet national security needs in a technically straightforward, safe and cost effective manner.

Activities associated with the Proposed Action include replacing four conventional PWR burnable absorber assemblies with assemblies containing the TPBARs (referred to as TPBAR-LTAs) during the next refueling outage at the Watts Bar Nuclear plant (WBN), Unit 1 in southeastern Tennessee. The TPBARs would be shipped from the Hanford Site near Richland, Washington to the Westinghouse fuel fabrication facility in Columbia, South Carolina, for assembly into TPBAR-LTAs. The TPBAR-LTAs would be inserted into four new fuel assemblies at Westinghouse. The fuel assemblies with the TPBAR-LTAs (hereafter referred to as "integrated assemblies") would then be shipped to WBN with the rest of the new fuel and stored until the next refueling outage, when they would be inserted into the reactor. A typical fuel reload would contain more than 1000 burnable absorber rods, of which 32 would be replaced by the TPBARs in the proposed test.

The TPBAR-LTAs would be irradiated for one complete operating cycle (approximately 18 months), following which they would be removed from the integrated assemblies and stored in the spent fuel pool. The fuel assemblies would be placed back in the reactor as part of the refueling process. The TPBAR-LTAs would be shipped to the Pacific Northwest National Laboratory (PNNL) at Hanford for post-irradiation examination (PIE). Because the fuel assemblies from the integrated assemblies could be returned to the reactor core during refueling, no shipment or disposal of spent nuclear fuel would be required as part of the Proposed Action.

As part of the PIE activities at Hanford, the TPBARs would be removed from the remaining hardware. The TPBARs would then be subjected to non-destructive evaluation (NDE), including a visual inspection and gamma radiography. The TPBARs would also be punctured to collect and analyze any gases that accumulate during irradiation, and the penetrations would be sealed before the TPBARs are stored or processed further.

The TPBARs may also be examined by neutron radiography at the Argonne National Laboratory-West (ANL-W) near Idaho Falls, Idaho. Upon completion of the neutron radiography, the TPBARs would be returned to PNNL for destructive examination. For this evaluation, laboratory wastes that result from the destructive examinations, intact spent TPBARs, and residual equipment and materials that remain from

cleaning out the facilities are assumed to be dispositioned as waste at the Hanford Site. The small quantities of radioactive waste that may be generated at other locations would be disposed with similar wastes from those facilities.

ALTERNATIVES CONSIDERED: The EA discussed several alternatives to the proposed action as well as the No Action Alternative.

No Action: Under a no-action alternative, DOE would not conduct the LTA program or post-irradiation examinations. The final selection of either a CLWR or an accelerator as the nation's primary tritium source would be made without the benefit of the results of this proposed project. The no-action alternative is not consistent with the Department's purpose and need and therefore was not considered reasonable. However, evaluation of the No Action alternative is required by NEPA as a baseline against which to assess the impacts of the Proposed Action and alternatives.

Irradiation at Other Reactor/Analysis at Other DOE Laboratory: DOE considered the use of another commercial reactor to conduct the LTA program, as well as the use of other DOE laboratory facilities for examining the TPBARs. WBN was proposed for these tests because its refueling schedule provided optimum timing for obtaining the performance data needed by DOE, and because it was the only reactor of compatible design that was not encumbered by vendor restrictions on use of its fuel or other components for defense-related research. All other U.S. PWRs of this design obtain their fuel from foreign vendors that impose contractual restrictions on use of their products for defense-related purposes. Use of any facility other than WBN would have required DOE to replace all of the reactor's fuel, resulting in possible delay of the tests as well as substantially increased cost. Therefore, DOE considered options other than use of WBN to be unreasonable for the proposed tests. A future, separate evaluation process would identify one or more facilities for the actual tritium production mission. Reactors owned by DOE (such as the Fast Flux Test Facility [FFTF] at Hanford or the Advanced Test Reactor at the INEEL) or reactors operated by universities were not considered reasonable alternatives because they do not meet the purpose of, and need for, the Proposed Action, which is to demonstrate the viability of producing tritium in a CLWR.

Other DOE laboratories could perform the post-irradiation activities if the technology were transferred to those laboratories, and if the laboratories possessed hot cells large enough to contain the full length of the TPBAR-LTAs. This alternative was not considered reasonable because Hanford has the technology for post-irradiation examination of the TPBARs. Further, Hanford has hot cells suited for this purpose and has conducted similar types of examinations in the past. Use of alternate facilities would introduce technical uncertainties and impact both the schedule and cost for the proposed tests; therefore, this alternative was not evaluated in detail.

Analysis at Private Facility: DOE also considered the use of a private hot cell facility to conduct the analysis on the irradiated TPBARs. However, hot cells with the ability to handle the quantities of radioactive materials involved and to accommodate the full-length assemblies are generally not available outside the DOE complex. The exception would be a commercial nuclear fuel fabrication facility which is owned by a foreign corporation. However, the security measures required to perform the work in a foreign-owned facility would be difficult to implement. For these reasons, use of non-DOE facilities was not considered reasonable and is not evaluated further.

ENVIRONMENTAL IMPACTS: The environmental consequences of the proposed action would be well within existing state and federal standards, and are not expected to result in any appreciable risks to

members of the public, workers, or the environment. The major impacts are summarized in the following section; other types of consequences were determined to be negligible and are not discussed in detail.

Air Quality - Radionuclide emissions to the atmosphere could occur during destructive examination of the TPBARs at Hanford. An upper bound estimate of the air emissions would result in a dose to an offsite member of the public that is less than 3% of the EPA and Washington State standards. The risk of latent cancer fatality (LCF) from those emissions would be less than 1 in 5 million for the maximally exposed individual, and less than 1 in 1400 for the offsite population within 50 miles (80 km) of the site. The risks from radionuclide air emissions would not increase at other locations participating in the proposed activities. In addition, emissions of regulated nonradiological materials to air are not expected to increase above current levels and would remain within applicable regulatory standards.

Water Quality - Routine emissions of radioactive or hazardous materials to groundwater or surface waters are not anticipated for any activity in the proposed action other than irradiation of the TPBARs at WBN. Small quantities of tritium that may be released from the TPBARs during irradiation would not increase the risk associated with WBN by comparison to the facility's normal operations.

Waste Management - Destructive examination of TPBARs at Hanford would generate less than 25m³ of solid low level radioactive waste (LLW), and less than 0.5 m³ of LLW at other facilities. Decontamination of the facility and disposal of equipment used for PIE could generate an additional 200 m³ of LLW at an undetermined time in the future; however, the facilities and equipment would likely be retained and used for other research in addition to the proposed action. The proposed action would also result in the generation of small quantities of mixed waste and hazardous materials (e.g., solvents). All radioactive and hazardous materials would be managed and reused, recycled, or disposed of in accordance with applicable federal and state regulations. The volumes of waste generated by the proposed action are not anticipated to impact overall waste management activities at any of the participating facilities. Because of the relatively short-lived radionuclides that would be generated by the proposed actions, no long-term effects on groundwater are expected.

Transportation - The radiological consequences of incident-free transportation to members of the public were estimated as less than 3.4 person-rem, resulting in LCF risks of less than 1 in 500 to the entire population along the transportation routes. The radiological consequences for transport crews amounted to 0.9 person-rem, resulting in a collective LCF risk of 1 in 2500. The collective radiological risks from transportation accidents amounted to 1 in 3000 for members of the public. The nonradiological risks for transportation fatalities were about 1 in 25,000 from vehicle emissions and less than 1 in 1500 from traffic accidents.

Facility Accidents - A variety of accidents were evaluated for activities in the proposed action, ranging from low consequence, higher probability events to high consequence incredible events. The doses from accidental radiological releases at facilities participating in the proposed action amounted to less than 14 rem for an onsite non-involved worker and 1.6 rem for a member of the public. The maximum LCF risk for the accidents evaluated was 1 in 10,000 for an onsite individual and 1 in 100,000 for a member of the public. All of the hypothetical events fell within accepted safety guidelines for DOE facilities.

Health and Safety - The collective dose to workers during the proposed actions was estimated to be less than 3 person-rem, resulting in a LCF risk of about 1 in 800. Non-radiological industrial hazards are expected to result in at most one recordable event (injury or illness) over the course of the proposed action.

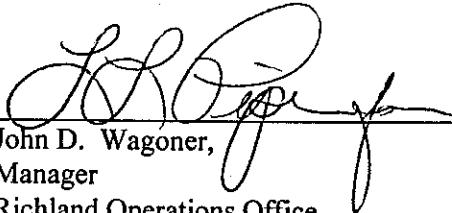
Other Environmental Impacts - The consequences of the proposed action are expected to be negligible for other types of impacts, including those on land use, socioeconomics, cultural resources, aesthetic or scenic resources, geologic resources, ecological resources, noise, or site services. A Biological Resource Review supports these expectations.

Cumulative Impacts - The proposed action is not expected to contribute substantially to the overall cumulative impacts from past or anticipated operations at WBN, ANL-W and HFEF, or on the Hanford Site.

Environmental Justice - Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that Federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs and activities on minority and low-income populations. Because no adverse effects are anticipated as a result of the proposed actions, there would be no opportunity for disproportionately high and adverse consequences to minority, or low-income populations.

DETERMINATION: Based on the analysis in the EA, and after considering the preapproval review comments of the State of Tennessee, the State of Washington and concerns of the Yakama Indian Nation, I conclude that the proposed action, modified to include the administrative control measures recommended by the panel, does not constitute a major federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an EIS for the proposed action is not required.

Issued at Richland, Washington, this 20 day of July 1997.


John D. Wagoner,
Manager
Richland Operations Office