SHUTDOWN OF THE FAST FLUX TEST FACILITY

HANFORD SITE, RICHLAND, WASHINGTON

U.S. DEPARTMENT OF ENERGY

FINDING OF NO SIGNIFICANT IMPACT

MAY 1995

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: The U.S. Department of Energy (DOE) has prepared an Environmental Assessment (EA), DOE/EA-0993, to assess environmental impacts associated with the shutdown of the Fast Flux Test Facility (FFTF), and activities to support this work. The FFTF is a liquid-metal cooled research reactor located in the 400 Area of DOE's Hanford Site near the City of Richland, Washington. Alternatives considered in the review process included: the No Action alternative; the preferred alternative to permanently shut down the FFTF by removing fuel, draining and de-energizing the systems, removing the stored radioactive and hazardous materials, and performing other actions to place the facility in a radiologically and industrially safe shutdown state; and alternatives addressing the disposition of irradiated fuel, bulk sodium (storage and disposition), and residual sodium.

Based on the analysis in the EA, and considering preapproval comments from the Yakama Indian Nation, 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), 42 U.S.C. 4321, et seq. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required.

ADDRESSES AND FURTHER INFORMATION

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

Mr. James E. Mecca, Director
Transition Program Division
U.S. Department of Energy
Richland Operations Office
P. O. Box 550
Richland, Washington 99352
(509) 376-7471

For further information regarding the DOE NEPA process, contact:

Ms. Carol M. Borgstrom, Director
Office of NEPA Oversight
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-4600 or (800) 472-2756

PURPOSE AND NEED: DOE needs to place the FFTF in a radiologically and industrially safe shutdown condition, suitable for a long-term surveillance and maintenance phase prior to final decontamination and decommissioning (D&D).

The need for the proposed action arises from a determination made by DOE that no combination of missions for the FFTF has a reasonable probability of financial viability over the next 10 years. Disposition of the associated radioactive and hazardous materials is necessary to place the facility in a safe shutdown condition with reduced risk to plant workers, the public, and the environment.

BACKGROUND: FFTF operations ceased in April, 1992. In December, 1993, DOE determined that no combination of missions for the FFTF has a reasonable probability of financial viability over the next 10 years. Therefore, shutdown of the facility was ordered with a goal to accomplish the shutdown effort in approximately 5 years. The sodium systems have been maintained in a molten state to retain the capability for sodium offload. Approximately 980,000 liters (260,000 gallons) of bulk sodium coolant are contained within various systems throughout the FFTF. Sodium-potassium eutectic alloy (NaK) also is present (approximately 2,300 liters [600 gallons]), and is used for cooling of auxiliary systems and components.

The FFTF's reactor core, In-Vessel Storage, Interim Decay Storage (IDS), and Fuel Storage Facility (FSF) contain 371 fueled components. One additional fueled component is stored in the Test Assembly Conditioning Station, in an inert atmosphere. The fuel is predominantly mixed plutonium-uranium oxides, which are encapsulated in stainless steel. The fuel has decayed, and a substantial reduction in associated fission products and noble gases has occurred. Additionally, there are 250 nonfuel irradiated core component hardware and research test articles.

PROPOSED ACTION: The proposed action would permanently shut down the FFTF by removing fuel, draining and de-energizing the systems, removing the stored radioactive and hazardous materials, and performing other actions to place the facility in a radiologically and industrially safe shutdown state. Appropriate surveillance and maintenance would be performed to prevent unacceptable risks to persons or the environment until final D&D of the facility is completed. To safely accomplish this shutdown, several actions would be required.

The reactor core will be defueled to the IDS and the FSF by use of standard FFTF refueling equipment and operating procedures. The fuel will be replaced with irradiated nonfuel core components (e.g., reflectors and control rods); thirteen new nonfuel core components; and three new Simulated Core Assemblies that otherwise would have been excessed.

The irradiated fuel assemblies and pin containers will be washed to remove residual sodium and placed into an Interim Storage Cask (ISC), which will be transferred to storage at the Interim Storage Area (ISA).

Due to low- to moderate-radioactivity levels, eleven fueled components would require additional safeguards and security measures. Therefore, the proposed action would consider intermixing one of these fueled components with five or six highly-radioactive fueled components in a single ISC. This concept, along with cask arrangement within the ISA, would provide sufficient safeguards and security protection. Alternatively, these low- to moderately-radioactive fueled components (or a combination thereof) may be stored in ISCs within the Hanford Site's Plutonium Finishing Plant (PFP) protected area. In this case, thirty-two unirradiated fuel assemblies presently stored in IDS would be transferred for storage at the Hanford Site's PFP.

Two fuel assemblies that experienced a breach in the fuel cladding during irradiation, several fuel assemblies that are known gas leakers, and seven sodium-bonded metal fuel assemblies plus sodium-bonded pins would require slightly different disposition. The failed pin(s) would be encapsulated, placed in pin containers with the remaining pins, washed, and loaded into an ISC for storage in the ISA. Additionally, several fuel assemblies are known gas leakers; these assemblies would be processed last to minimize the consequences of potential contamination release and resultant deposition in the sodium-removal equipment, which would make equipment maintenance more difficult. The sodium-bonded materials could be washed and stored with the bulk of the FFTF irradiated fuel in the ISA, or pending the outcome of the programmatic environmental impact statement for spent nuclear fuel, could be washed and transported to the Idaho National Engineering Laboratory for storage.

The metallic sodium would be maintained in a molten state until the fuel assemblies were removed from their respective storage location (i.e., the FFTF reactor vessel, IDS, or the FSF), and the sodium was transferred to appropriate storage. Minor plant modifications, and construction of a new sodium storage facility closely coupled to the FFTF complex, would be necessary to support sodium drain operations. The sodium would be drained into tanks located in the sodium storage facility, to the maximum practical extent, by pressure transfer.

The inventory of the bulk metallic sodium (and NaK if present) would undergo appropriate excess evaluations to determine if alternative sponsors and/or uses were available. Current planning is that the sodium will be converted to sodium hydroxide for use at Hanford by the Tank Waste Remediation System (TWRS) Pretreatment Program. In the event the sodium hydroxide use at TWRS is not viable, the sodium would be converted to an acceptable stable form for disposal as waste.

Following the drainage of the sodium and NaK systems, approximately 15,000 liters (4,000 gallons) of residual sodium would remain in the main portions of the FFTF's piping and equipment. Additional indeterminate quantities would remain in other portions of the plant systems, especially in complex, small-diameter piping systems. Included in the proposed action would be accommodation of these residuals to a stabilized condition such that long-term monitoring and surveillance of the FFTF could be conducted in a safe and environmentally sound manner. The current concept for accommodating residuals would be to maintain an inert gas atmosphere to prevent any chemical reactions during long-term surveillance and maintenance.

General plant support for the FFTF during the first 4 years of the transition to shutdown would be comparable to that required for maintaining the plant in its current safe configuration because prior to draining the sodium, approximately 90 percent of the plant systems are required to support hot sodium circulation. As systems become no longer necessary to support plant deactivation activities, the need for general maintenance and plant support would be reduced.

The management of various waste streams, resulting from the FFTF's shutdown activities, is considered. The solid and liquid effluents from the shutdown activities that contain radioactive and/or hazardous materials would be appropriately packaged. Primary consideration would be given to transportation of the wastes to (and use of) existing Hanford Site treatment, storage, and/or disposal (TSD) facilities. Offsite TSD facilities also would be considered, as appropriate. All activities would be conducted in full compliance with applicable regulations.

ALTERNATIVES CONSIDERED: The EA discussed a variety of alternatives as well as the No Action Alternative.

No-Action Alternative. This alternative would result in the FFTF remaining in a hot standby state, continuing under existing conditions. That is, ongoing monitoring and minimal maintenance for hot standby. No fuel would be moved. This alternative would result in continued expenditure of funding (approximately $35,000,000 per year) for maintaining systems in a safe and operable configuration. This alternative would be inconsistent with the DOE's need to shutdown the FFTF.

Alternatives. Alternatives for various elements associated with FFTF shutdown were considered. Those elements include irradiated fuel storage, unirradiated fuel storage, bulk sodium storage, bulk sodium disposition, and accommodation of sodium residuals. In general, alternatives would not support the FFTF shutdown schedule, resulting in additional exposure and costs.

ENVIRONMENTAL IMPACTS: Routine conduct of the proposed activity would not result in any significant increase in FFTF emissions. Before beginning the proposed activity, appropriate procedures and administrative controls would be in place to maintain exposure to workers and other onsite personnel to within requirements established by DOE Orders and as low as reasonably achievable principles. The exposure received by onsite personnel is not expected to be greater than doses currently received from routine Hanford Site operations. Potential radiological doses to the public from routine operations would be extremely small and are not expected to result in any health effects. The risks to workers from chemical exposures, noxious vapors, burns, and other common industrial hazards are expected to be low, and would be minimized by training and the use of appropriate personal protective equipment. The FFTF ventilation system would keep emissions within applicable regulatory requirements for gaseous and particulate discharges.

The proposed action would result in the generation of minor amounts of hazardous materials (e.g., solvents, glycols, PCBs, asbestos). These materials will be removed or stabilized, and would be managed and reused, recycled, or disposed of in accordance with applicable federal and state regulations.

The 400 Area, and the project location specifically, is a developed, highly disturbed area, and is currently under a vegetation management program which eradicates vegetation. No sensitive or critical plant or animal habitat would be affected. There are no animal species of special concern which are known to use the area exclusively.

The proposed action would not release any particulate matter, thermal releases, or gaseous discharges in significant amounts. Noise levels would not be expected to rise for the duration of the project with the majority of the impact during the early construction phase.

Socioeconomic Impacts

Existing Hanford workers will perform the FFTF shutdown construction and operation activities. Staffing levels will be reduced as the shutdown activities progress. Personnel will decrease from the current level of approximately 400 to approximately 10 full time employees for long term surveillance and maintenance. This reduction represents about 2.5% of the 1994 Hanford Site workforce. Social and economic impacts cannot be quantified at this time because of the ongoing reductions in the Hanford work force and uncertainty about future Hanford budgets.

Cumulative Impacts

The proposed action is not expected to contribute substantially to the overall cumulative impacts from operations on the Hanford Site. Standard Operating Procedures will provide sufficient personnel protection such that exposure to radiological and chemical materials will be kept below DOE and contractor guidelines. Routine shutdown operations are not expected to significantly increase the amount of radioactivity released from total Hanford operations. In 1993, the maximally exposed offsite individual was exposed to 3.7×10^{-3} millirem (effective dose equivalent) from total air emissions, well below allowable limits set by state and federal regulations. The wastes generated from the activities would not add substantially to waste generation rates at the Hanford Site and would be stored or disposed in existing facilities. As stated above, the cumulative effects of the reduction in staff at the FFTF cannot be quantified at this time because of the ongoing reductions in the Hanford work force.

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. This proposed action would occur within the Hanford Site boundaries. As discussed in the EA, no health effects are expected. With the exception of the socioeconomic impacts which are unknown, it is not expected that there would be any disproportionate adverse effects to low-income or minority populations in the surrounding community.

Impacts From Postulated Accidents

In addition to environmental impacts that were postulated from routine operations, the EA discussed a range of reasonably foreseeable accident scenarios that could lead to

environmental impacts. Scenarios were related to fuel offload and sodium drain, storage, and reaction. These events include both high consequence and low probability and low consequence and high probability scenarios for the onsite (100 meters, 0.062 miles) worker and the MEI offsite (i.e., approximately 7 kilometers or 4.5 miles).

The Maximum Reasonably Foreseeable Accident is postulated to be a large leak (due to a metal defect of a storage tank) in the sodium storage facility. The entire inventory of the tank was assumed to discharge onto the steel floor of the secondary containment and to burn, releasing a sodium hydroxide aerosol plume. The calculated onsite dose consequence is 2.5×10^{-4} rem. The calculated offsite dose consequence is 3.9×10^{-4} rem. No latent fatalities due to radiation from this incredible accident would be expected.

Of greater impact are the toxicological consequences of the sodium hydroxide plume from the postulated fire associated with the Maximum Reasonably Foreseeable Accident. The calculated onsite (100 meters [330 feet]) sodium hydroxide concentration is approximately 166 milligrams per cubic meter. The sodium hydroxide concentration at the site boundary (approximately 7 kilometers [5 miles]) was calculated to be approximately 0.05 milligrams per cubic meter. Based on the extremely low probability of occurrence, even if the consequences of such an event are as severe as calculated for the onsite worker, the extremely low probability of occurrence and administrative training and controls make the risks of a sodium fire from the proposed action small. The calculated offsite toxicological consequences of approximately 0.05 milligrams sodium hydroxide per cubic meter fall well below the applicable guidelines for offsite exposure.

DETERMINATION: Based on the analysis in the EA, and after considering the preapproval review comments of the Yakama Indian Nation, I conclude that the proposed shutdown of the Fast Flux Test Facility at the Hanford Site 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 1st day of May, 1995.

John D. Wagoner
Manager
Richland Operations Office