1984 WL 107049 (F.R.)

NOTICES

DEPARTMENT OF ENERGY

L Reactor Operation; Savannah River Plant, Aiken, South Carolina; Record of Decision

Friday, July 13, 1984

*28660 This Record of Decision has been prepared on the proposed operation of the L Reactor at the Savannah River Plant, Aiken, South Carolina, pursuant to the Regulations of the Council on Environmental Quality (CEQ) (40 CFR Part 1505) and the implementing procedures of the U.S. Department of Energy (45 FR 20694).

Decision

The U.S. Department of Energy (DOE) has decided to restart the L Reactor at its Savannah River Plant (SRP) near Aiken, South Carolina, to produce plutonium for the Nation's defense programs.

Prior to restart of the reactor, DOE will construct a 1,000-acre cooling lake by impounding a portion of Steel Creek which, when coupled with modifications to the reactor's power level, will ensure that the thermal effluent from the reactor complies with a national Pollutant Discharge Elimination System (NPDES) permit to be issued by the State of South Carolina. The NPDES permit will require the maintenance of a temperature of 90 F or less in approximately 50 percent of the lake. Construction of the embankment for the 1,000-acre lake will commence after receipt of a dredge and fill permit from the Corps of Engineers (COE) pursuant to Section 404 of the Clean Water Act.

In conjunction with the decision to restart L Reactor, DOE has also decided to: (1) Utilize the existing confinement system to limit the release of radio- nuclides in the event of a highly unlikely accident; (20 discharge contaminated disassembly-basin purge water into the L Area seepage basin to minimize exposure to onsite workers and the offsite population; and (3) use a batch discharge to the Steel Creek system to remove sludge from the 186 Basin cooling-water reservoir, thereby eliminating potential habitat for the Asiatic clam and its potential impact on the heat exchangers. These decisions present minimal risks to the public and are similar to the practices currently employed for the other operating reactors at SRP. In addition, DOE will pursue the authorization, funding, and implementation of the Groundwater Protection Plan for the SRP, May 1984, submitted to Congress on June 13, 1984, pursuant to Pub. L. 98-181. All groundwater mitigation proposals will be subject to the NEPA review process.

DOE has also committed to taking further mitigation actions dependent upon the following ongoing studies and consultations. Significant archeological and historical artifacts that might be affected by cooling-lake construction and operation will be protected or recovered based on consultation with the South Carolina State Historic Preservation Officer and the Advisory Council on Historic Preservation. Based on the results of consultations with the U.S. Fish and Wildlife Service (FWS), DOE will implement further mitigation measures necessary for the protection of the endangered American alligator and wood stork. DOE will also cooperate with the U.S. Department of Interior (DOI) in using the Habitat Evaluation Procedure (HEP) for the Steel Creek system to assess the value of habitat which will be gained or lost due to L Reactor operation and the need for further habitat mitigation measures. As part of DOE's ongoing program to reduce radiological releases from SRP, the Department will also continue its efforts to study and evaluate the feasibility of implementing detritiation of the reactor's moderator.

Background

The SRP is a major DOE installation for the production of defense nuclear materials that began operation in the early 1950's. The SRP occupies approximately 800-square kilometers (300-square miles) adjacent to the Savannah River south of Aiken, South Carolina.
L Reactor, one of five heavy-water moderated and cooled production reactors at SRP, began operation in 1954 and was placed in standby status in 1968 because of a decline in the need for defense nuclear materials. In 1980, due to an increasing demand for defense nuclear materials to upgrade and modernize the Nation's nuclear weapons stockpile, DOE undertook a number of initiatives to meet the increased material demand as defined in the fiscal year 1981-1983 Nuclear Weapons Stockpile Memorandum (NWSM) and reaffirmed in subsequent NWSM. In fiscal year 1981, DOE began to restore and upgrade L Reactor to the equivalent condition of the three currently operating reactors (C, K, and P Reactors) at SRP. The restoration and upgrade of L Reactor, which has been completed, included the installation of effluent controls and environmental protection and safety improvements.
Prior to the placement of L Reactor in standby status in 1968, the L Reactor withdrew water from the Savannah River for secondary cooling and discharged the thermal effluent directly to Steel Creek. Since 1968, the Steel Creek system, including the Steel Creek delta and portions of the Savannah River swamp that were thermally affected by previous reactor operation, has undergone 15 years of successional recovery.

Description of Alternatives [FN1]

FN1 CEO regulations require that the Department "[R]igorously explore and objectively evaluate all reasonable alternatives* * *." 1502.14(a).)
As described in the Final Environmental Impact Statement (FEIS), L Reactor Operation, Savannah River Plant, Aiken, South Carolina, DOE/EIS-0108, May 1984, the proposed action is to resume operation of the L Reactor as soon as practicable. Alternatives considered by DOE in reaching its decision consisted of alternatives for the production of plutonium and alternatives for mitigating the environmental consequences of restarting the L Reactor.

Production Alternatives

In accordance with the CEQ National Environmental Policy Act (NEPA) regulations (40 CFR 1502.14), DOE has examined a range of production alternatives. The alternatives considered included those that have production capabilities similar to that of L Reactor and those that have only partial production capabilities compared with that of L Reactor. Alternatives having similar production capabilities included: (1) Restart of R Reactor at the SRP; (2) restart of one of the K Reactors at the Hanford Reservation in Richland, Washington; and (3) the recovery of plutonium from spent fuel produced by commercial power reactors. Alternatives having partial production capabilities compared to that of L Reactor included: (1) increasing the power of N Reactor at the Hanford Reservation or increasing the power of the operating reactors at the SRP; (2) reducing the plutonium-240 content of the produced plutonium to allow a more rapid conversion of fuel-grade plutonium into weapon-grade material through blending; and (3) adopting (sooner than had been scheduled) the use of the Mark-15 fuel lattice for use in the SRP reactors. In addition, DOE also considered various combinations of the partial production alternatives, a delay in the restart of L Reactor in combination with the implementation of two partial production options--the accelerated use of the Mark-15 lattice in the SRP reactors and the reducion of the plutonium-240 content of plutonium ***28661*** produced in the N Reactor--and the "no action" alternative.

Mitigation Alternatives Considered

Mitigation alternatives considered for the restart of L Reactor included those in the categories of cooling water, disassembly-basin purge water disposal, cooling-water reservoir sludge disposal, and safety systems.

Cooling Water

Thirty-three alternative cooling-water systems and seven other alternatives were considered to the cooling-water category. The 33 cooling-water systems considered included: 7 once-through cooling lakes, 4 recirculating cooling lakes, 9 once-through cooling towers, 9 recirculating cooling towers, and 4 direct discharge alternatives. The seven other alternatives included: thermal cogerneration, low-head hydropower, modified reactor operation, fisheries management programs, restocking, protection of similar wetlands, and support of fisheries reseach.
DOE's preferred mitigation alternative is the 1,000-acre colling lake. The environmentally preferred mitigation alternative is a recirculating 2.8° C (5° F) approach temperature cooling tower with treatment of the blowdown.

Disassembly--Basin Purge Water Disposal

The disassembly-basin water becomes contaminated with tritium and other radionuclides from process water adhering to the fuel and target assemblies removed from the reactor. The disassembly-basin water is processed to clarify the water and remove radionuclides other than tritium. Basin water is periodically purged to reduce tritium concentrations for protection of the workers. Alternatives considered for disassembly-basin purge water consisted of discharge to the L Reactor area seepage basin, direct discharge to the Steel Creek system, evaporation, and detritiation of the reactor moderator.
DOE's preferred mitigation alternative is to discharge the disassembly-basin water into the L Area seepage basin. The environmentally preferred alternative is the use of an evaporator. The environmentally preferred mitigation alterative would be detritiation of the reactor moderator if such technology can be developed and demonstrated.

186 Basin Sludge Removal

Some of the suspended solids contained in the water from the Savannah River settles in the bottom of the 186 Basin. This sediment has been found to be a suitable habitat for the asiatic clam. The clam can enter the reactor heat exchangers and, over time, foul the reactor's secondary cooling system. To eliminate this risk, the sludge is periodically removed from the basin.
Alternatives considered for cooling-water reservoir sludge disposal included: batch disposal to the Steel Creek system, land application, borrow pit application, and continuous sediment suspension.
DOE's preferred mitigation alternative is batch disposal into the Steel Creek system. The environmentally preferred mitigation alternative would be either land application or disposal in a borrow pit.

Safety Systems

Safety-system alternatives considered included: existing confinement system, remote storage system, low-temperature absorption system, tall stack, internal containment system, and external containment system.
DOE's preferred alternative is to utilize the existing confinement system. The environmentally preferred mitigation alternative would be the low-termperature absorption system if developed and demonstrated. Among technologies reasonably available, the tall stack is the environmentally preferred alternative.

Basis for Decision [FN2]

FN2 CEQ regulations require that DOE specify "* * * the alternative or alternatives which were considered to be environmentally preferable * * *". (§ 1505.2(b).)
In compliance with NEPA and the Energy and Water Development Appropriations Act, 1984, DOE has analyzed the environmental impacts of a range of production alternatives, as well as the impacts associated with the restart of L Reactor, under numerous mitigation alternatives as discussed in the final EIS. Comments on the draft statement were considered in preparing the final EIS, and the final EIS contains DOE's response to those comments. Comments on the final EIS were considered in the preparation of this Record of Decision.

Production Alternatives

Under the Atomic Energy Act of 1954, DOE is responsible for developing and maintaining the capability to produce all defense nuclear materials required for the U.S. nuclear weapons program. The requirements for increased defense nuclear materials and the production initiatives necessary to provide the additional production capacity have been affirmed and reaffirmed in the NWSM approved annually by each President since 1980. In the most recent NWSM, President Reagan specifically directed that ". . . DOE shall . . . restart the L Reactor at the Savannah River Plant, Aiken, South Carolina, as soon as possible."
The NWSM derives from the requirements of the Atomic Energy Act of 1954 (91), which authorizes DOE to produce defense nuclear materials, but only with the annual express consent and direction of the President. Accordingly, compliance with the NWSM is one of DOE's most important statutory missions. Any delay in the restart of L Reactor will directly result in lost nuclear materials production for the time period involved, which lessens DOE's ability to fulfill this mission. As discussed in the final EIS, the restart of one of the standby reactors other than L Reactor would necessarily entail a lengthy delay inproduction because of the time needed for upgrading those reactors. Also, this would incure significant costs. Since the environmental impacts associated with the restart of the other reactors are not significantly different from those anticipated with L Reactor and since restart of these reactors involves additional costs and inherent schedule delays, DOE does not adopt the other reactor alternatives. Also, in view of the statutory prohibition against recovery of plutonium form commercial spent fuel, DOE must reject that alternative [Atomic Energy Act of 1954, as amended, 42 U.S.C. 2007(e)].
None of the partial production options or combinations of these options can provide the needed defense nuclear materials requirements, nor can they fully compensate for the loss of this material that would be produced by L Reactor. Consequently, DOE, in order to best accomplish its mission, does not adopt the partial production options despite their environmental superiority.
Finally, DOE has weighed the environmental benefits of further delay against the security costs of any delay beyond that anticipated from the preferred alternative and has concluded that to further delay the restart of L Reactor results in greater costs than benefits. Therefore, DOE does not adopt the delay alternative and the "no action" alternative.

Mitigation Alternatives

Cooling Water

Of the 33 alternative cooling-water systems and 7 other alternatives, 5 cooling-water systems were selected as the most favorable alternatives for each category to facilitate a comparative ***28662*** evaluation. These five systems are: a 1,000-acre once-through cooling lake, a 1,300-acre recirculating cooling lake, a once-through cooling tower with a 2.8 C (5 F) approach temperature, a recirculating cooling tower with a 2.8 C (5 F)

approach temperature and treatment of blowdown, and direct discharge to Steel Creek. Of these five alternatives, the recirculating cooling tower was judged to be the most environmentally preferable because it comes closest to maintaining the existing environment of the Steel Creek corridor.

The estimates in the final EIS for construction of the dam for the 1,000-acre once-through cooling lake were based on the assumption that the geology of the dam site was similar to that under the Par Pond dam since detailed geological data of the site on Steel Creek were not yet available. Following development of the final EIS, preliminary analyses of data being obtained to characterize the geological conditions under the dam for the 1,000-acre lake indicate the need for grouting and densification. Current estimates for this additional work indicate that the schedule will be impacted by from 6-9 months and that the costs will increase by $5-$10 million above the estimate provided in the final EIS. These changes were fully considered in reaching this Record of Decision.

The viability of many of the 33 options and 7 other alternatives mentioned above was contingent upon an independent action by the President, the Congress, or the State of South Carolina to allow the thermal discharge from L Reactor to occur. Those options that cannot meet current standards have not been adopted because there are options which do comply with existing laws and are environmentally preferable to those options.

The environmentally preferred alternative, the recirculating cooling tower with a 2.8 C (5 F) approach temperature and treatment of blowdown, is estimated to have capital costs of approximately $75 million, which is considerably higher than the $30-$35 million [FN3] for the preferred alternative. The impacts to the environment averted by this option do not justify the higher costs and the lost production associated with this option. This is especially true in view of the ability of the preferred alternative to meet the State's water quality regulations and minimize lost production due to delayed startup associated with this option. The production loss resulting from the longer construction time needed for the cooling tower compared to the 1,000-acre lake reduces DOE's ability to meet NWSM requirements. It is also noted that the preferred alternative is amenable to backfitting with additional cooling apparatus if it becomes necessary in the future to reduce the production loss associated with the reduced reactor power levels. While the additional cooling might add approximately $10 million to the overall cost of the 1,000-acre cooling lake, the cost would still be significantly less than that of a recirculating cooling tower.

FN3 Current Estimate.

The other recirculating cooling-tower alternatives present lower costs ($39-$60 million) than the 2.8 C (5 F) approach temperature cooling tower with treatment of blowdown, but at the price of increased environmental impacts. All of these alternatives would require stream reclassifications from the State. The $39 million cooling tower carries the largest production loss of any of the cooling-tower alternatives. This lost production is caused both by the longer construction time (27 months) and the operational loss due to the tower's inefficiency and the additional need to reduce control power levels in the summer to meet the 90 F requirement of the State of South Carolina. This latter permanent loss would be in excess of 15 percent. For the other recirculating alternatives, costs would be significantly higher than for the preferred alternative, and these costs coupled with the production loss due to longer construction times are not justified when balanced against the environmental impacts averted.

The once-through cooling-tower alternatives present costs higher ($50-$55 million) than the preferred option. In view of the abrupt flow and temperature changes which do not occur under the preferred alternative, the higher costs, and the need for stream reclassifications from the State for the once-through cooling towers, they do not balance favorably against the preferred alternative and are, therefore, not adopted.

All of the permittable cooling-lake alternatives present significant environmental impacts. Even though these impacts will be different and, in some instances, probably less harmful that those anticipated from the lake identified as the preferred alternative (though not significantly so), all will entail significantly higher ($73-$173 million) costs and greater loss of production than the preferred alternative. As such, there is an inadequate balance

between timing and costs on the one hand and impacts averted on the other to select one of these alternatives.

Disposal of Disassembly--Basin Purge Water

For the periodic disposal of disassembly-basin purge water, DOE has decided to use the L Reactor seepage basin and to continue its ongoing research and development program on the feasibility of implementing moderator detritition.
The environmental impacts of the use of the seepage basin are minimal and do not present a health risk to onsite or offsite populations. Although the use of an evaporator would result in lower offsite radiological doses, the significantly higher costs of an evaporator are not justified when balanced against the environmental impacts associated with the use of the seepage basin, and, therefore, DOE has not adopted that alternative.

186 Basin Sludge Removal

DOE has also decided to dispose of the L Reactor cooling-water reservoir sludge by batch discharge to the Steel Creek system as allowed by an NPDES permit that requires the performance of a 1-year study. Based on the minimum environmental effects and costs of batch discharge, the costs of the alternatives do not tip the balance in their favor, especially in view of their lack of significant environmental superiority. Further, since DOE will be monitoring this process in conjunction with the State of South Carolina, any subsequent information that creates a need for alteration of this process can be effected in the future.

Safety Systems

DOE has also decided to use the existing L Reactor confinement system for mitigation of low probabililty radiological releases. Of the safety-system alternatives considered, only the existing confiniment system, the remote storage system, and the tall stack were considered to be technically feasible. The expected low risk from reactor operation and the high costs of the technically available alternatives do not support adoption of the alternatives as a protedtion against highly unlikely occurrences.

Additional Monioring and Mitigation Studies

1,000-Acre Cooling Lake

DOE will fund long-term studies to assure a balanced biological community in the lake and the development and implementation of mitigation and monitoring plans for impacts associated ***28663*** with the operation of the 1,000-acre cooling lake.

Wildlife and Endangered Species

DOE has received findings of "no jeopardy" from the FWS regarding the American alligator and wood stork. DOE will implement mitigative measures for these species based on the results of the consultations with the FWS. The National Marine Fisheries Service has determined that SRP's operations, including the restart of L Reactor would not jeopardize the continued existence of the shortnose sturgeon in the Savannah River. Further, DOE will cooperate with DOI in the use of the HEP to determine further habitat mitigation measures that might be needed.

Groundwater

DOE will pursue the authorization, funding and implementation of the Groundwater Protection Plan for the Savannah River Plant, May 1984, submitted to Congress on June

13, 1984, pursuant to Pub. L. 98-181. All groundwater mitigation proposals will be subject to the NEPA review process.

Conclusion

DOE has weighed the need for the restart of L Reactor against its potential environmental impacts and, after its consideration of the benefits, impacts, and costs of the reasonably available production and mitigation alternatives, has decided to proceed with the restart of L Reactor as soon as practicable after the construction of a 1,000-acre cooling lake. To ensure that the environmental impacts from the restart of L Reactor are minimized, DOE has committed to a number of further measures to monitor, study, and mitigate impacts, as described in the final EIS.
Dated: July 5, 1984.

Donald Paul Hodel,

Secretary of Energy.

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