U.S. Department of Energy

Finding of No Significant Impact

Center for Energy Studies

at

Arkansas Technical University

Russellville, Arkansas

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-0565, to support the DOE decision to provide a grant of $838,100 to be used for support of the proposed Center for Energy Studies at Arkansas Technical University (ATU) in Russellville, Arkansas. Based upon the analysis in the EA, 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 and DOE is issuing this Finding of No Significant Impact (FONSI).

PROPOSED ACTION:

Senate report 101-83 accompanying the Energy and Water Appropriations Act, 1990, indicated that $850,000 (later reduced to $838,100) had been included in DOE's fiscal year 1990 appropriation for support of the Center for Energy Studies on the campus of Arkansas Technical University (ATU). The Center would consolidate existing and planned functions in energy education and applied energy research, including nuclear science engineering and a special degree program in physical science for power plant operators for Arkansas Nuclear One. The grant

would partially fund the design and conventional construction of a 4,500 ft.^{2} administrative/classroom building and a 2,500 ft.^{2} reactor facility to house a TRIGA Mark I research reactor previously used at Michigan State University. The reactor facility would contain a reactor control room, two radiation counting laboratories, shop and utility rooms, and a 25' x 10' diameter below-grade pool surrounded by three feet of concrete reinforcement. Site work would consist of conventional excavation and standard reinforced concrete and masonry construction activities, which are anticipated to have no impact on areas beyond the Center site. Structural engineering of the building would be specified by standard University procedures established in accordance with the Uniform Building Code and the State Building Code. All elements would be designed to Zone 1 seismic conditions, the Life Safety Code, and the National Fire Protection Code.

The TRIGA Mark I research reactor ATU intends to install will operate under the auspices of the Arkansas Department of Health and the Nuclear Regulatory Commission (NRC) after conclusion of the NRC's licensing and NEPA processes. Safe operation of the reactor for the proposed steady power levels of 250 kW (kilowatt thermal) and pulse powers of 300 MW (megawatt thermal) was established by Michigan State University, where it was operated from 1967 until 1989, when it was decommissioned and dismantled after the retirement of the principal researcher. GA Technologies, Inc., which originally manufactured the reactor, recently installed an upgraded control system and refurbished control rod drives.

Fuel elements (approximately 100 39-gram enriched U^{238} TRIGA fuel pins) would be obtained from DOE under the University Research Reactor Assistance Program after NRC review and approval. Disposal of fuel elements by DOE would be undertaken as a part of decommissioning,

and is anticipated to involve accumulations of less that 750 MW-days of burn-up over 40 years, based upon projections from the operation schedules of similar research reactors.

ALTERNATIVES:

Two alternatives were considered: (1) the proposed action, to provide the Congressionally-appropriated grant; and (2) no action. Under the no-action alternative, the funding would not occur. This would leave ATU with less than half of the funding required for construction of the two buildings. At this time, ATU does not have a means of mitigating the loss of the DOE grant for the project. It is likely that ATU would reduce the scope of the project commensurate with the remaining available funds, and build just the reactor building on the proposed site. If the reactor was not utilized at ATU, it would be available for use by another university. The proposed site for the Center for Energy Studies is a prime location at ATU and would be put to other use in the near term.

ENVIRONMENTAL IMPACTS:

The potential environmental consequences of the proposed action were analyzed for all phases of activity, including (1) construction of the Center; (2) operation of the Center, including the TRIGA Mark I research reactor; and (3) decommissioning of the reactor building.

Construction:

The proposed construction site is a vacant, grass-covered area of the ATU campus. No environmentally sensitive areas exist in the vicinity that could be affected by construction activities. There are no wetland areas and no Federal or state-designated natural areas. The location is well drained and lies above the floodplain. Consultation with the State Historic

Preservation Office and the Fish and Wildlife Service indicates that the proposed project would have no effect on historic properties or threatened and endangered species.

Operations:

No chemical storage, use, or generation of non-radioactive hazardous waste is proposed for the operation of the Center laboratories, or shop and utility rooms. The proposed action does not require the construction or expansion of waste disposal, recovery, or treatment facilities. ATU expects to operate the reactor for approximately 20% of a work-year (1920 hours), or about 384 hours per year. Routine operation of the TRIGA Mark I research reactor would result in minute radiation exposures to operations personnel and visitors to the reactor building. Calculations of such exposures are documented in the Safety Analysis Report prepared by ATU to support the application for an NRC license for the reactor facility. Due to its very short half life (7.11 seconds), nitrogen-16 would contribute less than 0.25% to the estimated occupational dose. The radionuclide of concern to workers in the restricted area (reactor room) is argon-41. The average dose from argon-41 is estimated to be 0.43 mrem/hour. This estimate is consistent with gamma dose measurements taken around the TRIGA Mark I reactor during 250 kW steady-state operations at MSU, which ranged from 0.2 to 1.0 mrem/hour. The estimated combined occupational annual dose from argon-41 and nitrogen-16 (166 mrem, assuming operation at full power for 384 hours per year) is well within the NRC licensing standard of 5000 mrem/year for individuals in the restricted area.

Conservatively high calculations estimate that the concentration of the radionuclide of concern (argon-41) in the outside air from reactor operation would be less than 1.2×10^{-9} Ci/m^3, well within the proposed EPA hazardous air emission limit for NRC-licensed facilities (1.7×10^{-9} Ci/m^3, 40

CFR Part 61, Appendix E). This conservatively calculated argon-41 concentration is based on reactor operation at 50% of the work year; the actual expected level of operation would be less than 20% of the work-year.

Liquid waste releases typical of similar facilities are less that 0.01 curies per year and should be substantially less for this facility. Representative samples of liquid wastes would be collected and analyzed by standard techniques before any release of potentially contaminated waters to the sanitary sewer system. When the concentration of radioactive materials in the liquid waste is less that the guideline values in 10 CFR 20.303, the liquid can be discharged directly to the sewer.

The total volume of solid radioactive waste (gloves, paper, containers, samples) is projected to be 1 to 2 cubic meters per year. This volume also includes approximately 0.1 m^3 of contaminated ion-exchange resin used to remove activation products (primarily intermediate and long half-life) from the reactor coolant system. Dose rates at the surface of the resin typically would be 10-20 mrem/hr.

The most severe credible accident is postulated to be the release of fission products to the environment due to clad rupture during fuel handling. This is calculated to result in a potential maximum total whole body dose of 0.61 mrem to a reactor room occupant from a 10 minute exposure during evacuation. This is well within the NRC requirements (10 CFR Part 20) of 1250 mrem/quarter occupational dose limit. Thyroid exposure of 5.16 rem was calculated based upon isotope inhalation for 10 minutes (compared with the NRC standard of 30 rem/yr). The maximum exposure to an individual in the unrestricted area from a stack release of fission products from such a fuel clad accident would result in a calculated whole body dose of 0.07 mrem/hr (compared

with the NRC standard of 50 mrem/yr), and a thyroid dose of 9.9 mrem/hr (compared with the NRC standard of 1500 mrem/yr).

Decommissioning:

Studies such a Nuclear Regulatory Commission study on decommissioning (NUREG CR-1756) contain detailed information for the radionuclide inventories expected in reactor materials and concrete shielding after operation of a typical research reactor facility. Major isotopes of concern identified are Cobalt-60, Zinc-65, and Carbon-14. ATU would be responsible for the decommissioning and dismantling of the reactor, and has established a decommissioning fund in keeping with State Board of Higher Education requirements. The amount of the fund is based on the estimated volume of waste, primarily of reactor structural components located inside the pool. By enlarging the pool diameter, ATU expects to eliminate the need to remove concrete from around the pool. ATU expects to ship the low level radioactive waste to a disposal site in Nebraska (approximately 600 miles). Based on data from the MSU reactor decommissioning, ATU estimates that less that 1000 ft^3 of radioactive waste, or one truckload (40 ft. long van) would require disposal at the time of decommissioning.

DETERMINATION:

Based on the analysis in the EA, the DOE has determined that the proposed DOE decision to provide partial funding of the Center for Energy Studies at Arkansas Technical University does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969. Therefore, an Environmental Impact Statement on the proposed action is not required.

PUBLIC AVAILABILITY: Copies of this EA (DOE/EA-0565) are available from:

Mr. Bohdan J. Bodnaruk
Programs and Facilities Management Division
U.S. Department of Energy
Chicago Field Office
9800 South Cass Avenue
Argonne, Illinois 60439
(708) 252-2823

For further information regarding the DOE NEPA process, contact:

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

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Paul L. Ziemer, Ph.D.
Assistant Secretary
Environment, Safety and Health