



## FINDING OF NO SIGNIFICANT IMPACT

### PROPOSED UPGRADE AND OPERATION OF THE CEBAF AND FEL ACCELERATORS AND CONSTRUCTION AND USE OF BUILDINGS ASSOCIATED WITH THE 2005 TEN-YEAR SITE PLAN AT THE THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY NEWPORT NEWS, VIRGINIA

**AGENCY:** U.S. DEPARTMENT OF ENERGY

**ACTION:** FINDING OF NO SIGNIFICANT IMPACT

**SUMMARY:** The U.S. Department of Energy (DOE) has completed an Environmental Assessment (DOE/EA-1534) for proposed improvements at the Thomas Jefferson National Accelerator Facility (Jefferson Lab), Newport News, Virginia. Based on the results of the impacts analysis reported in the EA, DOE has determined that the proposed action is not a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, preparation of an environmental impact statement is not necessary, and DOE is issuing this Finding of No Significant Impact (FONSI).

**PUBLIC AVAILABILITY OF EA AND FONSI:** The EA and FONSI may be reviewed at and copies of the documents obtained from:

U.S. Department of Energy  
Public Reading Room Building 12  
Thomas Jefferson National Accelerator Facility  
12000 Jefferson Avenue  
Newport News, VA 23606  
Phone: (757) 269-7140

**FURTHER INFORMATION ON THE NEPA PROCESS:** For further information on the NEPA process, contact:

Mr. Gary Hartman  
NEPA Compliance Officer  
U.S. Department of Energy  
P.O. Box 2001  
Oak Ridge, Tennessee 37831  
Phone: (865) 576-0273

**BACKGROUND:** DOE evaluated the potential environmental impacts from proposed construction of various site improvements and the proposed upgrade and operation of the CEBAF (Continuous Electron Beam Accelerator Facility) and FEL (Free-Electron Laser) accelerators at Jefferson Lab. Jefferson Science Associates LLC (JSA), under contract to DOE, is the management and operating contractor for this facility.

With this proposal, DOE intends to: (1) increase the present beam energy range of the CEBAF accelerator from a maximum energy of 8.0 GeV (Giga [billion] electron-volts) to 16.0 GeV and build expansions to the North and South Access Buildings and Service Building 98; (2) construct a second Central Helium Liquefier (CHL) facility that would be connected to the current CHL; (3) construct and use a new experimental area, the Hall D complex, along with its counting house and associated service buildings; (4) upgrade the FEL facility from the current 50 kW (kilowatt) maximum to provide 190 kW light beam power; (5) excavate/construct two retention ponds; (6) construct one Technical Support Building; (7) construct a radioactive waste storage structure and several general use site storage structures; (8) expand the site utilities that serve the Accelerator Site (the fenced in area that encompasses both CEBAF and the FEL and their experimental areas) including the construction of a 10 megawatt (MW) generator pad; (9) and the addition of a North Connector Road extension and parking lot. All of the projects and activities discussed within this EA are included in the Laboratory's 2005 Ten-Year Site Plan.

**ALTERNATIVES:** In this EA, DOE evaluates the impacts of the no-action alternative where Jefferson Lab would continue to operate as it does today and the proposed action alternative. Alternatives considered and dismissed from further evaluation were the use of other locations on site and the leasing of additional off-site space. These alternatives were found not to be viable alternatives because of poor proximity to existing structures and utilities, more undisturbed land would be affected, or reductions in efficiency, such as greater distances to transport utilities and services, and longer times to travel to access needed supplies, than those identified for the proposed action.

## **ENVIRONMENTAL IMPACTS:**

### *No Action Alternative*

If no action is taken on this proposal, Jefferson Lab would continue to operate as it does today; however, because of the interest in the science performed at Jefferson Lab, the current site buildings will not have sufficient space to accommodate the growing staff and user community. If no action is taken, DOE would continue operating CEBAF within a beam energy range up to 8.0 GeV and the FEL at its current light beam power maximum, and Jefferson Lab would continue to function as effectively as possible by using existing buildings and structures. Without the CEBAF and FEL upgrades, the functionality of the Lab diminishes because the research reach is limited and will not be forefront. Inefficiencies due to using non-optimal work and storage spaces would continue for other identified projects as well. The environmental impacts from taking no action would be the same as those under current operations and identified in previous EAs (EA-0257, January 1987; EA-1204, October 1997; and EA-1384, June 2002).

### *Proposed Action*

**Socioeconomics:** There will be a temporary increase in on-site labor during the construction of the proposed action. This action will span over a period of 6 to 8 years. Labor for proposed modifications and operational changes would be drawn from the pool of JSA and subcontractor staff at Jefferson Lab. Therefore, only minimal impacts to the local population, services, and economy would be expected. With regard to environmental justice, there would be no disproportionate adverse impacts on minority and economically disadvantaged populations in

the Newport News area because, in general, there are no significant important adverse impacts expected from any aspects of the proposed action.

**Cultural Resources:** The Project Review Supervisor at the Commonwealth of Virginia Department of Historic Resources has advised DOE that no adverse impacts to archaeological and historic resources would be expected from the proposed action.

**Geology:** The site geology was thoroughly reviewed in 1995 to support the change to the groundwater monitoring permit status from a construction project to an operating facility. As excavation is limited, the proposed construction activities should not affect site geology or soils.

**Land Use:** The local Oyster Point area was developed to serve industrial and business needs, and both City and industrial developments continue throughout the area. The proposed action will take place on land already occupied by Jefferson Lab or previously identified for use by the Lab. Therefore no land use impacts will occur.

**Transportation and Traffic:** Public and site roads will have increased use during construction activities. The need for additional parking and material transport during construction and in the course of ongoing facility operations as a result of this action will not impact the environment more than is occurring at present. Thus, no significant impacts will occur.

**Noise:** Local construction noise would exceed ambient noise levels and may be heard for some distance within the project area. Normal building and equipment functioning typically produces noise on the Jefferson Lab site. Given the site's urban vicinity, noise from operations would not be unique. While noise from operating equipment and traffic would regularly be perceptible in nearby areas, no adverse effects on human hearing would occur.

**Floodplain/Wetlands:** The DOE site is not within a 100-year floodplain, so no floodplain areas will be affected by this action. From previous studies and reviews by the U.S. Army Corps of Engineers, the only identified wetland area on-site will not be disturbed by this action; therefore, impacts to wetland areas are not anticipated.

**Endangered Species:** In accordance with Section 7, Endangered Species Act requirements, DOE informally consulted with the U.S. Fish and Wildlife Service and the Commonwealth of Virginia Department of Game and Inland Fisheries, Department of Agriculture and Consumer Services, and Bureau of Plant Protection. All agencies reported that no adverse impacts to protected species and/or habitat would be expected from the proposed action.

**Groundwater Dewatering:** Temporary construction dewatering at excavations will likely be necessary, but as this type of activity will be short term, only minimal impacts from this activity will occur. Completion of this action will not have an impact on the flow quantity of the groundwater dewatering operation at the experimental halls.

**Water Quality:** Erosion and sedimentation to on-site storm water channels and storm drainage systems, including at local roadways, could result from land disturbances during on-site construction activities and would continue until stabilization is complete.

Generally, radiological effects from upgraded CEBAF operations, including at the three existing experimental halls (Hall A, Hall B, and Hall C) and at the new Hall D, will continue to have the potential for minor impacts to ground and surface waters. Impacts to ground and surface water



from upgraded FEL operations will be negligible. The effects on surface waters include negligible impacts from the controlled discharges of activated waters to the local sanitary sewer system.

**Air Quality:** The operation of construction equipment and vehicles on-site would produce air emissions localized near the site of operation common to construction sites. Contribution from the proposed action to off-site concentrations of regulated non-radiological air pollutants, such as dust particulates, would be minimal. The operation of CEBAF above 8.0 GeV will result in minimal effects on the air quality on the accelerator site, within the CEBAF accelerator tunnel and experimental halls, and negligible effects at the new Hall D complex. This will also apply outside the Accelerator Site and at the site boundary. There are no anticipated air emission concerns from the long-term maintenance and operation of the other identified projects.

**Waste Generation:** There will be a temporary increase in waste generation due to construction activities. During operations, only minor increases in the quantities of sanitary and radioactive wastes generated from this proposed action are expected.

**Pollution Prevention (P2):** General P2 considerations, that include waste minimization, energy efficiency, and environmentally preferable purchasing (EPP), will be taken into account during the design and construction of the proposed buildings. Building and accelerator operations will incorporate P2 considerations into the design and operations to the extent possible.

**Resource Usage:** Generally, the increase in the demand for power and water to support upgraded accelerator operations will have the potential for moderate impacts to local utility resources. The need for additional supplies of power and water and cryogenics for cooling will be substantial but are well supported by off-site systems.

**Health and Safety Impacts:** The expected level of impact regarding safety and health concerns for each of the identified activities has been evaluated for this proposed action.

*Construction Impacts:* The hazards and potential safety and health impacts during construction will be typical for this type of activity, such as those involved with working on elevated surfaces and performing work around electrical systems.

*Radiological Impacts:* Occupational radiation exposure at Jefferson Lab would continue to occur during maintenance activities on activated components. The level of induced radioactivity in the components is directly proportional to the amount of electron beam power lost in the components. CEBAF operation at energies up to 16.0 GeV would not increase potential beam power loss from the potential for beam power loss at operations present (i.e., 1 MW in either Hall A or Hall C). Consequently, changes in beam energy, as proposed, are not expected to increase occupational radiation exposure.

The chief source of radiation exposure for members of the general public is "skyshine" radiation. An analysis of skyshine production mechanisms for electron beam energy of 16.0 GeV has shown that the increased number of neutrons directed toward the roof from beam loss at the target region will be offset by the reduction of beam loss from the target region to the High Power Beam Dump areas in each experiment hall. As a result, the general public exposure should remain constant for an increase in energy from 8.0 GeV to 16.0 GeV.

The public may be exposed to small quantities of radioactivity induced in air in the CEBAF enclosure as a result of nominal ventilation during routine operations. The production of ozone, oxides of nitrogen, and radioactive gases by CEBAF operation, including the experiment halls, the primary gas generation areas, has been shown to be directly proportional to the amount of beam power loss. Because beam power loss in the experiment halls is expected to remain similar to that occurring at current operating energies, the amount of ozone, nitrogen oxides, and radioactive gases will remain at approximately the same level under the proposed action.

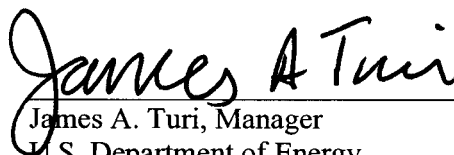
The safety and health impacts to workers and the public due to radiological activity resulting from Hall D operation are very low, as this is a low hazard machine and will involve using the same type of controls and support equipment currently in use at Jefferson Lab.

*Non-Radiological Impacts:* Non-radiological hazards associated with the proposed action include electrical, chemical, and non-ionizing radiation (lasers), which could injure and, in extreme cases, can be potentially fatal to occupational workers. Engineering controls, such as those to be used to reduce the chances of the FEL's outdoor laser light beam from making contact with high objects, as well as administrative procedures specified in the Jefferson Lab Environment, Health & Safety Manual, are used by the Lab to minimize the potential for accidents involving electricity, chemicals, and lasers.

**Cumulative Impacts:** Cumulative environment, health, and safety impacts are those which result from the incremental contribution from each effect discussed above along with impacts expected from other past, ongoing, or planned actions within the same geographic area. Both on-site and off-site major construction activities will have minimal temporary and long term site related impacts. There will be no cumulative impacts involving radioactivity from the combination of operating the upgraded CEBAF and FEL accelerators simultaneously. Although there would be cumulative impacts when taking into account the construction, operation, and use of the new buildings and the operation of the upgraded CEBAF and FEL accelerators when combined with other non-DOE impacts beyond the site boundaries, none of these activities would have major impacts on the environment or occupational and public health and safety.

**DETERMINATION:** Based on the findings of this EA, DOE has determined that the proposed Upgrade and Operation of the CEBAF and FEL Accelerators and Construction and Use of Buildings Associated with the 2005 Ten-Year Site Plan at the Thomas Jefferson National Accelerator Facility does not constitute a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act. Therefore, preparation of an environmental impact statement is not required.

Issued at Newport News, Virginia, this 30 day of January 2007.




---

James A. Turi, Manager  
U.S. Department of Energy  
Thomas Jefferson Site Office  
Newport News, Virginia