File Copy

U.S. Department of Energy (DOE)

Finding of No Significant Impact

Induction Linac System Experiments in Building 51B

at

Lawrence Berkeley National Laboratory, Berkeley, California

AGENCY: U.S. Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The U.S. Department of Energy (DOE) has prepared an Environmental Assessment (EA), (DOE/EA-1087) evaluating the proposed action to modify existing Building 51B at Lawrence Berkeley National Laboratory (LBNL) to install and conduct experiments on a new Induction Linear Accelerator System. LBNL is located in Berkeley, California and operated by the University of California (UC). The project consists of placing a pre-fabricated building inside Building 51B to house a new 10 MeV heavy ion linear accelerator. A control room and other support areas would be provided within and directly adjacent to Building 51B. The accelerator system would be used to conduct tests, at reduced scale and cost, many features of a heavy-ion accelerator driver for the Department of Energy's inertial fusion energy program.

Based upon information and analyses in the EA, the 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. Therefore, an Environmental Impact Statement is not required.

DESCRIPTION OF THE PROPOSED ACTION:

The proposed action is to modify existing Building 51B at LBNL to accommodate a new 10 MeV heavy ion linear accelerator, experimental extensions, and adjacent support areas. The accelerator system that would be installed would be used to perform experiments that would advance the understanding of high current, heavy ion accelerator physics. The physics issues that would be addressed in the experiments include beam combining, longitudinal beam bunch control, final focus, and other technical issues. Fabrication and maintenance of accelerator components would take place in existing LBNL electrical and mechanical shops. To operate the proposed ILSE project, a total of 6 personnel would occupy Building 51B. A maximum of 3 would be new employees. The staff in the support shops would not be increased above previous levels during peak occupancy.

ALTERNATIVES:

Five alternatives to the proposed action were considered: (1) no action, (2) LBNL Building 71 alternative, (3) LBNL Building 58 alternative, (4) LBNL Building 64 alternative, and (5) an off-site location: Richmond Field Station.

(1) Under the no action alternative, the proposed ILSE project would not be implemented and proposed modifications to Building 51B would not be undertaken. The no action alternative would have no effect on the environment above existing conditions. This alternative, however, would not allow DOE to test, at reduced scale and cost, features of a heavy-ion accelerator driver for inertial fusion energy.

(2) The LBNL Building 71 alternative consists of converting a portion of Building 71 from its current use as a Center for High Beam Physics, and constructing a building addition to provide adequate space for the ILSE project. This would necessitate cutting into the adjacent hillside to make room for the addition, and constructing a retaining wall. This alternative would result in slightly greater short-term impacts to air quality, traffic and parking, and noise during construction of the building addition and would have potential impacts relating to geology, soils, and seismicity because of its location adjacent to a hillside. In addition, the Building 71 alternative would incur additional environmental impacts and a higher cost than the proposed action because the building is currently occupied by other programs that would have to be relocated. The environmental effects associated with facility operations would be similar to the proposed action.

(3) The LBNL Building 58 alternative consists of converting a portion of Building 58 from its current use by the Heavy Ion Fusion Program and the Superconducting Magnet Group and constructing a building addition east of the existing building to provide adequate space to house the ILSE project. The addition would measure approximately 48 ft. by 240 ft. and would require extensive soil excavation and construction of retaining walls. The potential environmental impacts of the Building 58 alternative are similar to the Building 71 alternative because of the necessity to relocate existing programs and construct a building addition. An advantage of placing ILSE in Building 58 would be that the electrical and mechanical shops would be in the same building as the accelerator, and therefore the transport of fabricated accelerator parts between buildings would not occur. As a result, on-site traffic and air emissions from transport vehicles would be slightly less than under the proposed action. However, these benefits would be more than offset by the environmental effects associated with the additional construction that would be required.

(4) The LBNL Building 64 alternative consists of constructing an approximately 13,000 gross square foot building addition on a paved area currently used for storage. Some surface grading,

retaining walls, and minor modifications to the adjacent roadway would be required. The potential environmental impacts are similar to the Building 71 alternative because the space is inadequate to accommodate the proposed activities and therefore additional construction would be required to expand the building.

(5) The alternative offsite location is at the University of California-owned Richmond Field Station (RFS) located approximately 7 miles northwest of the LBNL site. This alternative would require construction of a new building to house the ILSE accelerator and would have greater environmental effects than the proposed action. The RFS is located within or near sensitive zones for historical and cultural resources, within the 100-year coastal flood zone, and near wetlands. Implementation of this alternative might result in negative effects to these resources. Implementation of this alternative also would add additional daily commute trips to the local street and freeway system, marginally contributing to existing traffic congestion and resulting in additional air pollutant emissions.

ENVIRONMENTAL IMPACTS:

The proposed action would have negligible or no impacts on hydrology and water quality, geology, land use, visual quality, and sensitive biological and cultural resources. Potential impacts in the areas of noise, traffic, air quality, human health, waste generation, and utilities and services are summarized below.

Impacts from Renovation

Renovation activities are expected to generate increased noise levels and short-term vehicle exhaust and airborne particulates. The increased noise levels and air contaminants are not expected to pose a threat to human health because of the low levels that would be generated, the short duration of construction, and the measures that would be taken as a normal part of construction to ensure workers and the environment are protected. Short-term transportation effects would include trips by construction workers to and from the site. The effects to traffic and parking would be minor and of short duration.

Precautions would be taken to ensure that an air release of the lead-based paint present on the building's structural steel would not occur during building modification, in accordance with the LBNL Lead Compliance Program and BAAQMD requirements. About 150 cubic yards of construction waste would be generated. Recycling or disposal of the waste would be the responsibility of the construction contractor. The concrete flooring that would be removed from Building 51B as part of the excavation of a recessed foundation for the accelerator injection

subsystem, would be surveyed for radiological activity; if no radiation is detected, the concrete would be recycled or disposed of as non-hazardous waste at an approved landfill. The small quantities of hazardous wastes that would be generated during renovation activities (such as paint and solvents) would be recycled or disposed of in compliance with LBNL standard procedures for handling and disposing hazardous wastes. Only a very limited amount of grading and excavation would be required, with little or no soil remaining for disposal. Samples would be collected of any soil to be disposed of and analyzed for contaminants to determine whether or not it would be classified as hazardous waste. If so, the soil would be handled and disposed of in accordance with LBNL policies and regulations for disposal of hazardous waste.

Existing provisions of utilities, services, and energy at LBNL are expected to be adequate for renovation activities.

Impacts from Operations

Air Quality. Project operations would have minimal air emissions. Inert gases, including helium, nitrogen, and argon would be used in small quantities and released to the atmosphere. Sulfur hexafluoride (SF_6) would be used as an accelerator insulating gas that may need to be replaced if it is unintentionally mixed with air during project operations (SF_6 is classified as an irritant by the Uniform Fire Code, Article 80). In such an event, the SF_6/air mixture would be vented to the atmosphere through a stack on the roof of Building 51B. The maximum amount released would be less than 90 kg/hr. (.1 ton/hr.), and would not require a permit from the Bay Area Air Quality Management District. Air emissions from solvents that would be used in the electrical and mechanical shops would increase but would remain within LBNL's existing BAAQMD permit limit for precursor organic compound solvents for the buildings that would support the project.

Human Health. The project would have minimal impact on public health. Health hazards to workers include electrical hazards, compressed gas hazards, oxygen-deficiency hazards, ionizing and non-ionizing radiation hazards, and potential hazards associated with the use of hazardous materials.

Electrical Hazards. ILSE electrical systems consist of pulsed high voltage and DC and AC high-voltage power supplies. These high voltage sources would be completely enclosed and interlocked. Energy storage systems would be equipped with bleeder resistors that discharge the capacitors when the voltage source is removed. Safe work practices would be enforced.

Compressed Gas Hazards.. Compressed gases that would be used in the operation of the accelerator would include compressed air, helium, nitrogen, and argon. In addition, a pressurized SF_6 and/or Co_2 gas system would be installed which would consist of a generator tank, gas recovery system, and sixteen storage tanks. These tanks would be equipped with pressure relief valves. Pressure systems would be designed, installed, and operated by qualified personnel who have been trained in, and are knowledgeable of, American Society of Mechanical Engineers (ASME) and LBNL Health and Safety requirements.

Oxygen-Deficient Atmosphere. CO_2 and/or SF_6 would be used in quantities sufficient to pose an oxygen deficiency hazard in the event of a leak or rupture. To protect workers against this hazard, oxygen-deficiency sensors and alarms would be installed as appropriate in areas where a gas leak may decrease the atmospheric oxygen level to less than 19.5% of the total amount of air.

Ionizing Radiation. Normal operation of the accelerator would not produce ionizing radiation. However, ionizing radiation in the form of low-level x-rays could be created if high-voltage breakdown were to occur due to the focusing systems inside the beamline. Because of the shielding created by the wall thickness of the beam line, and the outside core materials and housing, the amount of x-ray that would escape from the beam line would be well below the 5 mrem/hr at 30 cm limit set by the ACGIH TLVs. As a safety precaution, as new sections of ILSE are completed and tested, each section would be monitored by the EH&S Division. If deemed necessary, thin sheets of lead would be added to reduce radiation levels to ensure that x-ray levels are below the TLV. All personnel working with the ILSE apparatus would be issued appropriate personnel dosimetry devices. Passive area radiation monitors would be installed to aid conformance with the As Low As Reasonably Achievable (ALARA) principle and for workplace monitoring. Visitor access would be controlled in accordance with LBNL policy.

Non-Ionizing Radiation. Equipment is not expected to generate high electrical or magnetic fields outside the beamline. To verify the absence of these potential hazards, selected would be surveyed for electrical and magnetic fields during beam operation to ensure that levels are below the ACGIH Threshold Limit Values (TLV).

Hazardous Materials Use. Hazardous materials that would be used include distillate oil, solvents, and other materials typically used in electrical and mechanical shops, such as paint, sealant, resins, and epoxy. In addition, acetylene, which is a flammable gas, and oxygen would be used. A maximum of four 200-ft^3 and two 100-ft^3 cylinders of each gas would be stored at any one time. Containers of hazardous materials (e.g., distillate oil) would be stored in 30- or 55-gallon drums

with properly designed secondary containment to prevent accidental releases into storm drains or the sanitary sewer.

The oil that would be used in the injector vessel would consist of a light- to non-halogenated non-PCB containing mid-distillate hydraulic oil. The principal risk associated with use of the oil would be a spill as a result of a hose rupture. In such an event, a maximum of 40 gallons of oil would spill into the pressure vessel, which would constitute secondary containment. The oil would be removed and disposed of as hazardous waste.

The insulating oil that would be used in each of the 76 capacitors would also be a non-halogenated and non-PCB containing oil. The total amount of oil in each capacitor is one liter maximum. In the event of a spill, the oil would be released into the bottom of the vacuum vessel, which would constitute secondary containment. The oil would be removed and disposed of as hazardous waste. In addition, the automatic grounding relays that ground the capacitors would be mounted in a 55-gallon drum filled with Diala insulating oil. This drum would have secondary containment. There will also be two tanks containing Diala insulating oil, that will contain voltage dividers for the matching section. These tanks will contain 75 gallons of oil each. These tanks also will have secondary containment. In the event of a spill, the oil would be removed and disposed of as hazardous waste.

As discussed above, pressurized gases that would be used during operation consist of CO_2 and/or SF_6 as an insulating gas in the generator tank. In the unlikely event of an accidental total release of SF_6 or CO_2, the gas would be vented through a stack to the atmosphere. The exposure concentration would be 340 parts per million at 100 meters which is 3 times lower than the TLV for SF_6 and CO_2.

Hazardous Wastes. An estimated 120 lb. of solid and 300 gallons of liquid hazardous wastes, such as solvents, paints, Diala oil, sealants, resins, and epoxy, would be generated annually in the shops that would support the project. These quantities represent .003 percent of LBNL's total amount generated in 1994. These increases in waste generation would not require additional waste storage space in LBNL's Hazardous Waste Handling Facility nor substantially affect current levels of waste transport or disposal. Wastes would be handled, sorted, and disposed using approved procedures by qualified LBNL personnel in accordance with DOE orders and Federal and State regulations. ILSE activities would not generate radioactive or biomedical wastes.

After completion of the proposed ILSE project (anticipated to last about 10 years), the accelerator and support equipment would be dismantled and either shipped to other DOE accelerator facilities for reuse or disposed of as solid waste. None of the components would be radioactive.

Traffic, Parking, and Noise. The 6 employees who would occupy Building 51B represent only one fourth the number of people who occupied this building during its previous occupancy. The number of people who would occupy the supporting shops would be no more than the number that occupied the buildings during their peak period of occupancy. Daily trips at LBNL would remain below the goals set forth in the agreement with the City of Berkeley, and level of service (LOS) along access roads would not change. Adequate parking would be available to maintain the ratio of employees per parking space established in LBNL's Long Range Development Plan.

Operation of the proposed project would produce little noise, the major sources of which would be heating/cooling equipment and alternator that are in current use. It is not anticipated that there would be an increase in the ambient noise level at on-site LBNL receptors and at the nearest Berkeley residential neighborhood.

Utilities, Services, and Energy. Proposed project operations are expected to result in a minor incremental increase in the use of water, gas, electricity, and the production of wastewater above existing levels. Available levels of service are expected to be more than adequate for the proposed project. Other services, including communications, emergency notification, fire, and police are also expected to be adequate to support the proposed project.

Environmental Justice. As discussed above, the proposed project would have minimal impact on public health and the environment. Based upon a preliminary assessment of the economic and demographic make-up of the communities that surround LBNL, it appears that there are not disproportionately high and adverse human health or environmental effects from LBNL activities on minority and low-income populations.

Cumulative Effects. Potential cumulative effects are anticipated for regional air quality and waste generation. The San Francisco Bay area does not meet emission standards (nonattainment status) for carbon monoxide, ozone precursors, and particulate matter less than 10 microns in size (PM_{10}). Construction and operation of the proposed project would provide a minor contribution to these emissions in the region.

The proposed project would increase the quantity of various types of hazardous wastes that are being generated at LBNL by .003 percent. California lacks adequate disposal capacity to handle current or projected quantities of hazardous wastes generated within the State. Therefore, LBNL and other California generators continue to rely on licensed hazardous waste treatment and disposal facilities located outside California.

DETERMINATION

Based on the information and analysis in the EA, DOE has determined that the proposal to construct and operate the Induction Linac System Experiments project 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, a Finding of No Significant Impact is made and an Environmental Impact Statement is not required.

PUBLIC AVAILABILITY

Copies of this EA (DOE/EA-1087) are available from:

Carl Schwab
U.S. Department of Energy
Berkeley Site Office
Lawrence Berkeley National Laboratory
1 Cyclotron Road, Mail Stop 50B-3238
Berkeley, CA 94720
(510) 486-4298

For further information regarding the DOE NEPA process, contact:

Anthony J. Adduci
DOE/OAK NEPA Compliance Officer
U.S. Department of Energy
1301 Clay St.
Oakland, CA 94612
(510) 637-1807

Issued in Oakland, CA. this 8th day of September, 1995.

for James M. Turner, Ph.D.
Manager
Oakland Operations Office