Environmental Assessment and FONSI for the Construction and Operation of a Office Building at the Stanford Linear Accelerator Center August, 1995

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1.0 INTRODUCTION

This document is an Environmental Assessment (EA) for a proposed project to modify existing Building 51B at Lawrence Berkeley National Laboratory (LBNL) to install and conduct experiments on a new Induction Linear Accelerator System. This EA addresses the potential environmental impacts from modifications to Building 51B necessary to allow installation and operation of the accelerator and support systems, and from conduct of Induction Linac System Experiments (ILSE).

2.0 PURPOSE AND NEED

The purpose of the proposed project is to provide an accelerator facility that would be used to test, at reduced scale and cost, many features of a heavy-ion accelerator driver for the Department of EnergyÕs (DOE) inertial fusion energy (IFE) program. The proposed project is needed to enable DOE to achieve its mission of building a demonstration IFE power plant by the year 2025, as outlined in the National Energy Strategy.

3.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The proposed action is to modify existing Building 51B at LBNL to accommodate a new 10 MeV heavy ion linear accelerator, experimental extensions, a control room, and adjacent support areas. Building 51B is the External Particle Beam (EPB) Hall which was used to house experiments that used beams supplied by the Bevatron (Building 51) prior to the Bevatron shut-down in 1993. The accelerator system that would be installed as part of this proposed project would be used to perform experiments that would advance the understanding of high current, heavy ion accelerator physics so that many of the basic technical questions concerning the suitability of using the heavy ion induction accelerator as a driver for IFE can be resolved. The physics issues that would be addressed in the experiments include beam combining, longitudinal beam bunch control, final focus, and other technical issues.

The proposed project would be constructed in two phases. The first phase, Elise, which has been approved for funding, would operate at a maximum beam energy level of 7 MeV; the beam injector would consist of an existing injector that has already been fabricated. The injector would produce one beam. The types of experiments that would be conducted would be a subset of the experiments described in Section 3.1.4 for the proposed ILSE project. The second phase, ILSE, which has not yet received funding, would operate at a maximum beam energy level of 15 MeV. The beam injector would be newly fabricated and would produce four beams. The types of experiments that would be conducted are described in Section 3.1.4. This EA addresses both project phases.

3.1 Proposed Action

3.1.1 Background of Location

The proposed location for the proposed ILSE project is within existing Building 51B at LBNL (Figure 1). This 30,000 square foot building was built in 1967 as an addition to the Bevatron building to house shielded experiments that used beams supplied by the Bevatron. Building 51B was designed with open sides and a series of roof vents. Consequently, the existing building provides minimal weather protection.

Figure 1

3.1.2 Building Modifications

Modifications to Building 51B to accommodate the proposed ILSE project would include the following. A 6,400 gross square-foot pre-fabricated steel-frame building would be placed inside Building 51B to house the accelerator system and to protect the equipment from rain, wind, dust, and corrosion and also to provide some degree of thermal control (Figure 2). The accelerator system would include an injector and ion source, a beam transport subsystem, accelerator cells, and drive networks, as well as various support systems such as a vacuum system, alignment system, a control system, and diagnostics that would be distributed along the length of the beam line. To ensure that the injector can hold high voltage across the insulator, the entire injector assembly would be enclosed in a steel tank filled with a pressurized insulating gas, either sulfur hexafluoride (SF6) or carbon dioxide (CO2) or a mixture of the two.

Beneath the accelerator would be a new 4-inch thick concrete surface slab to eliminate surface perturbations and to raise the accelerator above the roadway grade to reduce rain water intrusion. A shallow pit lined with concrete would be constructed for the injector subsystem so that the overall beamline height could be kept to a minimum. Next to the accelerator would be a row of power supply and conditioning racks. A second row of racks would house electronics, power supplies, diagnostics, and controls for alignment, vacuum, and heat-rejection subsystems. Figure 3 shows a cross-section view of the proposed building, including the accelerator area and racks, and Figure 4 shows the overall ILSE configuration.

Existing utilities in Building 51B would be relocated to service project requirements, including electric power, water, lighting, fire protection (a fire sprinkler system connected to the LBNL fire alarm system), and heating, ventilation and air conditioning. A self-contained closed-loop cooling system with a 50-kW capacity would be installed adjacent to Building 51B on a 10 ft. by 10 ft. concrete pad. The cooling medium used in the cooling system would be either air or chilled water. An existing 24-inch round duct and blower would be used to vent the accelerator's insulating gas (sulfur hexafluoride or carbon dioxide) should the need arise, as described in Sections 5.1.2.1 and 5.1.2.2. A sensor system would activate the blower and an alarm in the event of a gas release. The 24-inch duct would feed to a new 10-ft. high, 6-inch diameter stack on the roof of the building for dispersal of any released gas to the atmosphere.

Sixteen 4 ft. by 10 ft. tanks would be placed outside the building. These tanks would contain 3,000 lbs. of SF6 or CO2 to balance the 3,000 lb. pressure of the SF6 or CO2 inside the injector. These tanks also would be used to contain the SF6 or CO2 from the injector while the accelerator is being serviced.

The control room for the accelerator would be placed in existing prefabricated Building 51G that would be relocated from the interior of Building 51B to the west of Building 51B for optimum use by researchers. Building 51G is a relocatable pre-fabricated metal "Butler" building measuring approximately 1500 sq. ft. that was installed within Building 51GB in 1979. The control room would contain instrumentation racks, the main control console, and conference tables. Outdoor area lighting would be installed on Building 51G and would be placed under the roof overhang and directed downwards to avoid any nighttime glare to the surrounding area.

Access gates and doors would incorporate necessary interlock systems and signage to ensure that personnel are protected from high voltage sources.

Existing mechanical and electrical shops at LBNL, such as Building 58, would be used for the fabrication of ILSE components and maintenance of the accelerator. No building modifications to these buildings would be necessary for the proposed ILSE project. Mechanical shops are equipped with general mechanical equipment and shop tools such as drills, saws, lathes, and vacuum furnaces. Electrical shops are equipped with test benches, test equipment such as oscilloscopes, and hand tools.

Figure 2. Stanford Linear Accelerator Center Vicinity

Figure 3. Cross-section View of the Proposed Building and Accelerator Area in Relation to Existing Building 51B

3.1.3 Pre-Construction Decontamination and Decommissioning

Building 51B contains stacks of concrete shielding blocks and a beamline that were used during operation of the Bevatron. The beamline and most of the concrete blocks would be removed from the area prior to the start of this project as part of another project and will be addressed in separate NEPA documentation. The concrete blocks that remain in Building 51B may be needed for later experiments at LBNL so they would be stacked in the area and seismically restrained (Figure 4).

Demolition work associated with the proposed ILSE project would be minor and would include sawcutting and removal of a portion of the existing concrete floor in Building 51B for construction of the above-mentioned pit. The concrete would be surveyed for contamination and would be disposed of as radioactive or non-hazardous solid waste as appropriate. Some of the building's structural steel contains paint with a high lead content that would be disturbed by construction activities. Precautions would be taken to ensure that an air release of this material would not occur during building modification, in accordance with the LBNL Lead Compliance Program and BAAQMD requirements.

3.1.4 Operation

The ILSE program would use a low-energy accelerator to advance the understanding of high-current heavy-ion accelerator physics (such as beam quality and stability) facing the development of a heavy-ion driver for the development of IFE. Experiments would consist of tests of the accelerator components and beam manipulation techniques.

Figure 4

ILSE consists of a 2-MV ion injector, an electrostatic focused induction accelerator where ions are accelerated to an energy of more than 5 MeV, a beam combiner, and a magnetic focused induction accelerator which accelerates the ions to 10 MeV. The beam would be used for experiments in bending, drift compression, and final focusing (Figure 4). The knowledge gained would be useful in future construction of driver-scaled accelerators. Some experiments that are anticipated include the following:

- Investigating the capabilities and limitations of various automated accelerator- error correction schemes;
- Developing and testing a four-beam, high-voltage injector to supply ions;
- Continuing development of techniques to manipulate ion beams at various points in the apparatus: steering, shaping, bending, focusing, and combining beams as well as pulse shaping; and
- Developing the capability to shorten (compress) the beam length, thereby increasing beam power just prior to stopping the beam.

The ion source to be used in the injector to produce the total required beam current would consist of a porous tungsten dish measuring 6.7 inches in diameter with a high heating efficiency. To fabricate the sources, potassium aluminosilicate (zeolite) is spread on the cup surface and fired in a vacuum oven to a high temperature, allowing it to melt and soak into the pores of the curved surface. This provides a coating that is mechanically bonded to the cup surface.

Fabrication and maintenance of accelerator components would take place in existing LBNL electrical and mechanical shops, such as Building 58.

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 its previous level during peak occupancy.

3.1.5 Post-Project Decontamination and Decommissioning

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.

3.2 Alternatives

In addition to the no action alternative, the LBNL Facilities Department Planning Section has reviewed potentially available space at LBNL and off-site and identified three other locations at LBNL and one off-site location as potential candidates for the proposed project. As discussed below, the alternative locations considered would require new buildings, building expansions or extensive interior modifications to existing buildings. The proposed Building 51B location provides an opportunity for the construction of ILSE within an existing high-bay facility that would not require building expansion, or extensive interior modifications and that provides ready access to all essential utility services.

3.2.1 No Action Alternative

Under the no action alternative, the proposed ILSE project would not be implemented. The interior of Building 51B would remain as currently configured.

3.2.2 LBNL Building 71 Alternative

Building 71 is located in the northwest portion of LBNL near the northern LBNL boundary (FigureÊ1). It was constructed in four increments between the years 1955 and 1965 and currently serves as the Center for Beam Physics. Building 71 houses the SuperHILAC (Heavy Ion Linear Accelerator), which when linked to the Bevatron in 1974, created the Bevalac. The SuperHILAC is no longer in operation since shut down of the Bevalac in February 1993.

3.2.3 LBNL Building 58 Alternative

Building 58 is located in the central portion of the LBNL site near the Advanced Light Source (Figure 1). This building was constructed in 1950 as a sheet metal shop. In 1963 a building addition was constructed to house a ceramic shop. Both of these shops provided support to the 184-inch Accelerator and the Bevatron. In the early 1960s and 1970s, an Accelerator Development Facility was added and identified as 58A. Shortly thereafter, and continuing up to the present, the building has been used by the Heavy Ion Fusion Program and the Superconducting Magnet Group.

Placement of ILSE in Building 58 would require construction of a building addition east of the existing structure. The addition would measure approximately 48 ft. by 240 ft. and would require extensive soil excavation and construction of retaining walls.

3.2.4 LBNL Building 64 Alternative

Building 64 is located in the northwest portion of the LBNL site near Building 51 (Figure 1). This building was constructed in stages from 1951 through 1974 and was used to house accelerator design and engineering groups. Beginning in 1974 the building housed the Bevalac Engineering Group. Later it housed the Accelerator and Medical Physics Groups. Siting the ILSE at Building 64 would require construction of an approximately 13,000-gross-square-foot building addition on a paved area currently used as storage. Some surface grading, retaining walls, and minor modifications to the adjacent roadway would be required. In addition, asbestos siding would be removed from a portion of the building. This building was originally selected as the prime candidate for the proposed ILSE project. But in fiscal year (FY) 1993, the Bevalac was shut down and space became available within Building 51B for ILSE.

3.2.5 Off-site Location: Richmond Field Station

Under this alternative a parcel of land would be leased from the University of California and a new building to house ILSE would be built at the Richmond Field Station (RFS). The RFS is located approximately 7 miles northwest of the LBNL site.

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Air Quality

4.1.1 Regional Conditions

LBNL is located within the San Francisco Bay Area Air Quality Basin (Bay Area). The Bay Area Air Quality Management District (BAAQMD) has the authority to develop and enforce regulations to control ambient air quality in the Bay Area. Under California regulations, the Bay Area is considered a nonattainment area for State standards pertaining to ozone, carbon monoxide (CO), and particulate matter less than 10 microns in diameter (PM10). Under Federal regulations, the Bay Area has been designated as a ÒmoderateÓ nonattainment area for ozone. BAAQMD has adopted a new source review (NSR) rule for nonattainment pollutants to conform with a goal of Òno net increaseÓ in these emissions. New or modified sources of air emissions at LBNL are subject to lower applicable permitting thresholds under this more stringent rule.

4.1.2 LBNL Air Emissions

Currently, LBNL emits various criteria air pollutants, hazardous air pollutants (HAP), toxic air contaminants, and radionuclides. BAAQMD's regulations currently provide that bench-scale laboratory equipment and equipment used exclusively for chemical or physical analyses are exempt from permit requirements unless single criteria pollutant emissions exceed 150 pounds per day or HAP emissions exceed the BAAQMD threshold levels. Based on LBNL's assessment of its actual air emissions, LBNL is not considered a major source under the BAAQMD regulation that implements the new Federal requirements.

As designed in BAAQMD Regulation 2, Rule 6 ("Major Facility Review"), facilities with actual emissions less than 50 tons a year of regulated air pollutants (RAP) and/or 7 tons a year of any single HAP or 15 tons a year of combined HAPs shall not undergo a major facility evaluation under Title 5 (Clean Air Act) until 3 years after EPA approves Regulation 2, Rule 6. The latest facility-wide inventory of annual RAP air emissions is as follows: Carbon Monoxide 2 tons, Nitrogen oxides 9 tons, organic compounds 2.5 tons, particulate matter 1 ton, Class I ozone-depleting substances 3.3 tons (LBL, 1994). This total of 17.8 tons is well below the 50-ton limit applicable to RAP emissions.

There are a number of existing HAP sources and HAP emissions at LBNL. Existing sources that may emit HAPs at LBNL include the following: boilers, cooling towers, cleaners and degreasers, chemical laboratories, fume hoods, and tanks. Annual HAP emissions from LBNL include 1.6 tons of 1,1,1-trichloroethane and 9.5 tons of other hazardous air pollutants, including benzene, 1,4-dioxane, freon, toluene, and xylenes (LBL 1994).

There are currently no ongoing air emissions from or within Building 51B. Current emissions from Building 58 include the following solvents over a 12-month period (unless otherwise noted, all are precursor organic compounds):

acetone	6 gallons
ethyl alcohol	11 gallons
isopropyl alcohol	2 gallons
kerosene	56 gallons
methyl alcohol	6 gallons
methyl ethyl ketone	5 gallons
1,1,1-trichloroethane	57 gallons (nonprecursor)
freon	6 gallons (nonprecursor)

LBNLÕs permit from the BAAQMD allows emissions from Building 58 up to 175 gallons of precursor organic compound solvents during any 12-month period.

4.2 Hazardous Materials

Hazardous materials are stored and used for operations and research at LBNL. Estimated quantities of hazardous materials at LBNL for 1994 include 34,700 lbs. of hazardous solids, 101,400 gallons of hazardous liquids, and 502,000 cubic feet of hazardous gases (LBL, 1995b). Use of hazardous materials at LBNL requires special training to ensure protection of workers and the public.

4.3 Hazardous and Non-hazardous Solid Waste

4.3.1 Hazardous Waste

LBNL generated approximately 92.4 metric tons of hazardous waste (solid and liquid) in 1994. By contrast, 152.6 metric tons of hazardous waste were generated in 1993, which illustrates the considerable success of LBNLÕs Waste Minimization and Pollution Prevention Program (WMin/PP Program) in its first year of operation (LBL, 1995b). During Calendar Year 1994, LBNL greatly exceeded the waste reduction goals established by the WMin/PP. Whereas 5 percent reduction was the goal for acids, coolants, and contaminated solids, the actual reductions were 76 percent, 61 percent, and 28 percent, respectively. LBNL continues to pursue aggressive waste reduction through the performance of Pollution Prevention Opportunity Assessments, a Chemical Exchange Program, employee awareness campaigns, and other WMin/PP efforts.

Solid and liquid hazardous wastes are accumulated in satellite accumulation areas (SAAs). After accumulation, the wastes are either transferred to a 90-day waste storage area and then to LBNL's Hazardous Waste Handling Facility (HWHF) (Resource Conservation and Recovery Act (RCRA) Part B Permit #CA4890008986), or are transferred directly to the HWHF. Collected hazardous wastes are stored at the HWHF facility in appropriate waste storage areas, based on waste types. Wastes are generally stored for no more than two months after they are received. LBNL ships consolidated and appropriately packed hazardous waste to approved EPA and DOE off-site disposal facilities.

4.3.2 Non-hazardous Solid Waste

In 1994, LBNL generated 732.2 metric tons of solid waste, in contrast to 1160.7 metric tons in 1993. This 37 percent reduction reflects the success of LBNLÕs fledgling WMin/PP Program, discussed in Section 4.3.1. In 1993, 40.6 percent of the total waste collected was recycled, while approximately 90 percent of the office-type waste was recycled. Approximately 25 percent of LBNLÕs construction and grounds waste are recycled whenever possible (LBL, 1995b).

4.4 Hydrology and Water Quality

Because of its hillside location and moderate annual rainfall, surface runoff is a prevalent feature at LBNL. A storm drain system, designed and installed in the 1960s, discharges into the North Fork Watershed on the north side of LBNL and into the Strawberry Creek watershed on the south side. This system provides for runoff intensities expected in a 25-year maximum-intensity storm. The drainage facilities have proven to be adequate during previous heavy rains. No portion of the LBNL site is within the 100-year flood plain designated by the Federal Emergency Management Agency (FEMA, 1982).

Highly complex groundwater flow conditions are present at LBNL. The complex geologic development and structure of the Berkeley Hills have produced an underground structure which is difficult to model. The sedimentary rocks that underlie LBNL have been deformed and truncated by faults and volcanic vent structures (Converse Consultants, 1984). The presence of year-round springs and variable water levels in observation wells indicate discontinuous and localized aquifers (SAIC, 1991).

LBNL has carried out several surveys to determine the condition of the proposed project site's soils and groundwater with respect to contamination from past activities. Environmental studies, monitoring, and assessment indicate that the groundwater, soil, sediment, and biota at LBNL have been contaminated with low levels of organic and radioactive substances due to past spills, leaks, accidents, or waste handling practices at LBNL. LBNL conducted a RCRA facility assessment (RFA) in 1992 for LBNL to identify solid waste management units (SWMUs) or areas of concern (AOCs). The RFA, which has been completed, and the subsequent RCRA Facility Investigation (RFI), which is in progress, comply with corrective action program requirements found in 40 CFR, Part 258, Subpart F.

Although the RFI does not identify any contamination in the immediate area of Building 51B, it does indicate that soil and groundwater contamination are present in the adjacent Building 64 and Building 51 areas. A total of 8 SWMUs and 6 AOCs are identified in these areas. Chlorinated hydrocarbons, THC (total hydrocarbons), and BTEX (benzene, toluene, ethylbenzene, xylenes) were identified in the soil and low concentrations of arsenic, barium, copper, and molybdenum were found in the groundwater (LBL, 1992c).

4.5 Geology, Soils, and Seismicity

LBNL is sited on the west-facing slope of the Berkeley Hills, at elevations ranging from 500 ft to 1000 ft above mean sea level. Because of the hilly terrain, grading and filling has often been necessary at LBNL to create suitable building sites. As a result, earth fills of up to several tens of feet thick are present in some of the original ravines and depressions. Most of these fills were mechanically compacted during placement, and have been satisfactory for foundation support.

LBNL is located in a region of frequent seismic activity. The seismically-active Hayward Fault, part of the San Andreas Fault system, developed as the Berkeley hills were uplifted. The Hayward Fault trends in a northwest-southeast direction along the base of the hills below LBNL. The maximum credible earthquake postulated for the proposed project site would occur on the Hayward Fault and would have a Richter magnitude of 7.5 (LBL, 1986). Building 51B is not located within the zones designated by the State of California for seismic review under the Alquist-Priolo Special Studies Zones Act. The Act places special restrictions on certain construction within a zone. Building 51B is located approximately 1200 ft northeast of the Hayward Fault Zone.

To mitigate potential damage from seismic activity, LBNL has had a comprehensive earthquake safety program in place since 1973. As required by University policy, Building 51B was evaluated in 1972 by a structural engineering consultant to assess the seismic risk inherent in the building. Building 51B was determined to have a "fair" rating performance per the University Policy on Seismic Safety (Engle and Engle, 1972), which means that performance during a major seismic disturbance is anticipated to result in structural and nonstructural damage and/or falling hazards that would represent a "low" life hazard (UC, 1988). This performance rating is based on a level of ground shaking that corresponds to a Modified Mercalli Scale intensity of IX at the proposed site. The level of structural and non-structural damage that would be expected from a Mercalli IX seismic event would not be expected to pose a significant threat to the safety of building occupants. The integrity of building exits would be maintained, and occupants would be able to exit the building. Because this proposed project would impose no additional gravity loads on the structure and would not reduce the building's lateral load carrying capacity, there are no DOE, University, or Uniform Building Code criteria that require compliance with the current seismic code.

Surface deposits in the Building 51B vicinity consist primarily of artificial fill. Undifferentiated Cretaceous sandstones and siltstones, the Orinda Formation, Moraga volcanics, and Quaternary landslide deposits also outcrop in the area (LBL, 1992c).

Building 51B is not located on a slope and there are no steep hillsides located adjacent to the building; therefore there is no potential for impacts to the building from landsliding.

As stated in Section 4.4, soil sampling and boring performed in the vicinity of Building 51B has indicated that although there is no soil contamination in the immediate area, there are localized concentrations of chlorinated hydrocarbon, BTEX, and THC contamination in the adjacent Building 64 and Building 51 areas. An RFA performed in 1992 designated 8 SWMUs and 6 AOCs in the vicinity; however, the RFA determined that there is no ongoing release potential and no additional RCRA Facility Investigation work has been proposed for these areas.

4.6 Land Use

LBNL is located in a highly urbanized region that extends from Vallejo in the north to San Jose in the south. Two cities within a 50-mile radius have a population greater than 500,000: San Francisco and San Jose. LBNL is located in the hills within the cities of Oakland and Berkeley. Building 51B is located in Berkeley. LBNL is sited on 130 acres of land owned by the University of California, on land leased to the DOE.

The University of California, as a State agency, and DOE, as a federal agency, are exempt from local zoning and planning regulations. However, the University and LBNL cooperate with local agencies in planning matters of mutual concern.

4.7 Traffic and Parking

The primary access routes to LBNL are Grizzly Peak Boulevard/Centennial Drive, University Avenue, Hearst Avenue, and Piedmont Avenue/Gayley Road. Access to LBNL is provided by three entry-controlled gates: Blackberry Canyon (main gate), Strawberry Canyon, and Grizzly Peak. More than 5,400 vehicles per day arrived at or departed LBNL on a typical work day in 1992.

Traffic flow conditions in an urbanized area are often described through peak-hour level of service (LOS) analysis. Many of the existing LBNL access routes have traffic backups and delays (LOS of "E" or "F") during peak traffic periods.

The supply of parking at LBNL is limited. Parking demand exceeds the number of available spaces; however, LBNL continues to meet the ratio of 1.7 employees to one parking space called for in the LBNL's Long Range Development Plan (LBL 1987).

4.8 Utilities

LBNL's onsite utility systems have sufficient capacity to meet present and future requirements for electrical power, natural gas, water, cooling, and waste management.

4.8.1 Electrical Power

Western Area Power Administration currently supplies electrical power to LBNL and will continue to do so up to 11 MW. Above that amount, Pacific Gas and Electric will be LBNL's supplier, which LBNL anticipates will occur in FY96.The peak demand in FY94 was 10.89 MW and is expected to be no more than 9.5 MW in FY95 (LBL, 1995c). Total electrical consumption by LBNL in FY94 was 59,557,000 kilowatt-hours.

4.8.2 Natural Gas

Natural gas, provided by Defense Fund Supply Center, is used primarily for space and water heating and for equipment and experimental use in shops and laboratories. In 1994, natural gas usage at LBNL, including offsite leased space, was 1,669,482 therms. Capacity is ample to meet anticipated demand for the foreseeable future (LBL, 1995c).

4.8.3 Water

LBNL's water is supplied continuously from two sources. The primary water supply is the East Bay Municipal Utility District's (EBMUD) Shasta Reservoir. A secondary source is EBMUD's Berkeley View tank, with a capacity of approximately 3 million gallons. The LBNL system provides domestic water and fire-protection water to all LBNL installations. It also supplies make-up water for cooling towers, irrigation water, and water for other miscellaneous uses. The onsite water distribution system is gravity fed. The system has sufficient capacity to meet the flow-rate and duration requirements for fire protection. There is no present restriction on the volume of water available from EBMUD, except the capacity of the existing on-site pipes (LBL, 1994).

4.8.4 Sanitary Sewer

The sanitary sewer system at LBNL is a gravity-flow system that discharges through two monitoring stations, one located at Hearst Avenue and the other at Centennial Drive in Strawberry Canyon. Discharges are transported by the City of Berkeley sewer system to an EBMUD wastewater treatment plant.

LBNL has three wastewater discharge permits issued by EBMUD: one for each of the outfalls at Hearst and Strawberry, one for the Building 77 Fixed Treatment Unit (FTU), and one for the Building 25 FTU. The City of Berkeley has instituted a 20-year program to upgrade their sanitary sewers (which receive wastewater from LBNL). UC agreed to contribute $250,000 per year to the City of Berkeley for these sewer upgrades (LBL, 1992b).

The measured volume of wastewater (both sanitary and industrial sanitary) discharged into LBNL's sanitary sewer system in 1991 was 125,000 gal. per day (approximately 50 percent of water purchased from EBMUD during this period) (LBL, 1994). Sewer and wastewater treatment capacity are anticipated to be sufficient to meet the foreseeable future demand.

4.8.5 Industrial Sanitary Sewage

Industrial sanitary sewage is combined with domestic wastewater and is discharged to East Bay Municipal Utility District through two monitoring stations. One is located at Hearst Avenue and the other is at Centennial Avenue in Strawberry Canyon. This wastewater effluent is sampled periodically and analyzed for radioactive materials, heavy metals, organics, and other contaminants to ensure compliance with discharge requirements imposed by DOE and the EBMUD (LBL, 1992b). EBMUD has ample capacity to meet anticipated demand for the foreseeable future.

4.9 Biological Resources

No federal or State rare, endangered, or threatened plant or animal species have been located or are expected to be present on the LBNL site. No habitat at LBNL has been designated as critical habitat by the Secretary of the Interior pursuant to the Endangered Species Act of 1973.

4.10 Cultural Resources

All undeveloped land and proposed building locations within the LBNL site were examined for cultural resources in support of the 1986 LBNL Site Development Plan (LBL, 1986). No indications of archaeological resources were identified within the LBNL site. Recent verification of applicable Archaeological Resource Service data indicated that no new archaeological sites have been reported since 1982 (LBL, 1992b). LBNL is currently conducting historic inventories of existing buildings and equipment in consultation with the State Historic Preservation Officer.

4.11 Aesthetics

Steep hillside topography is the primary determinant of LBNL's visual character. Level building sites are benched into hill slopes and individual buildings or aggregations of buildings are separated vertically from each other. Buildings that are located quite close together in plan view are seen as discrete elements in the landscape because of differences in elevation. Few buildings on the LBNL site are visible from any distance. Because the most visible face of the site is its west face, the buildings are usually defined in the daytime by strong shadows and blend into the hillside because of their earth-tone colors.

4.12 Noise

Within the boundaries of LBNL, the ambient noise environment is generated by vehicular traffic and building heating, ventilating and air-conditioning equipment. On-site noise levels are also raised when jet aircraft and general aviation aircraft pass overhead. Traffic to and from LBNL also contributes to overall traffic noise in residential neighborhoods.

Ambient noise levels measured during the period from 1979 to 1991 ranged from 41 decibels (dB) [see Glossary] to 53 dB at distances of 100 to 2,400 feet from the LBNL site (LBL, 1992b). These noise levels are lower than in most of the City of Berkeley (City of Berkeley, 1977), where in September 1974, the most recent period for which noise measurements were made, levels measured over a 24-hour period at 42 sites were equal to or greater than 58 dB.

The nearest on-site noise receptor to Building 51B is Building 51, which houses some administrative offices and where a geosciences laboratory is under construction. Buildings 56 and 64 are also located within 100 feet of Building 51B. The nearest off-site receptor is a residence located approximately 800 feet away.

5.0 POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES

5.1 Proposed Action

5.1.1 Renovation

5.1.1.1 Air Quality

Construction of Elise would begin in the second quarter of FY97 and would last for 7 months. Elise construction would include construction of the steel frame building, recessed foundation, and concrete slab. Installation of the ILSE components would begin in the fourth quarter of FY 98 and would last 24 months.

Renovation-related emissions at the proposed Building 51B construction site would include suspended particulates, including PM10, volatile organic compounds (VOCs), and exhaust emissions (e.g. carbon monoxide and nitrogen oxides). Particulates would be generated from indoor excavation activities associated with construction of the accelerator foundation. In addition, if electrical utilities are placed below ground, particulates would be generated from outdoor trenching activities. VOC emissions would result from painting. Because there would be no grading and limited excavation and because the offsite traffic would be less than 15 trips per day, resultant air impacts from site preparation activities would be minor and short term.

Because lead-based paint is present on the building's structural steel, precautions would be taken to ensure that an air release of this material would not occur during building modification, in accordance with the LBNL Lead Compliance Program and BAAQMD requirements (LBL, 1994b). Little welding of metal surfaces is anticipated in the proposed construction work; however, where this occurs, lead would be removed by trained LBNL personnel prior to the start of the construction contractorÕs work. Removal would be done by high-efficiency particulate air filter vacuuming or other appropriate methods.

5.1.1.2 Hazardous and Non-hazardous Solid Waste Management

The proposed project would include removal of existing concrete in the floor of Building 51B as part of the excavation of the recessed foundation for the injector subsystem. Removed sections of concrete slab 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. About 150 cubic yards of construction waste would be generated. Recycling or disposal of demolition waste would be the responsibility of the construction contractor.

Lead-based paint is present on the building's structural steel, and some welding of existing metal surfaces is anticipated in the proposed project. Precautions that would be taken are addressed in Section 5.1.1.12.

The proposed renovation activities would require the use of hazardous materials such as paints, thinners, and cleaning solvents. The small quantities of hazardous waste generated would be recycled or disposed of as described in Section 4.3.1.

Because of the very limited proposed grading and trenching activities, there would be only a limited need to dispose of excess soil. Although the soil is not expected to be contaminated, samples would be collected and analyzed for contaminants to determine whether or not the excavated soils would be classified as hazardous waste. If so, the soils would be handled and disposed of in accordance with LBNL policies and RCRA and Toxic Substances Control Act (TSCA) regulations for disposal of hazardous waste.

5.1.1.3 Hydrology and Water Quality

Proposed construction activities would not have an adverse effect on hydrology as a result of erosion. Most of the proposed limited excavation activities would take place under the roof of Building 51B, which would prevent rainwater from falling on any exposed soil, and existing drainage facilities in place around the building would continue to preclude surface storm runoff from intruding into the building. Existing fencing around and adjacent to the building would serve as shielding to prevent erosion due to wind. Some trenching for electrical utilities would be done outside of Building 51B. To prevent erosion of excavated soil while the trench remains open, the soil would be stockpiled in a protected location, covered with plastic, and surrounded by hay bales.

No currently unpaved surfaces would be paved over and thus the proposed project would have no effect on groundwater recharge. The LBNL stormwater drainage facilities are adequate to handle storm water runoff from this area of LBNL.

5.1.1.4 Geology, Soils, and Seismicity

Proposed construction activities are expected to have very minor effects on soils because only small areas would be disturbed by construction activities. The proposed project would have no impact on geological resources.

As stated in Section 4.5, areas of contaminated soil have been identified in the vicinity of Building 51B. However, no contamination is known to exist under or immediately adjacent to the building. As stated above, small samples of excavated soils would be collected and analyzed for contaminants to determine whether or not the excavated soils would be classified as hazardous waste. If so, the excess soils would be handled and disposed of in accordance with LBNL policies and RCRA and Toxic Substances Control Act (TSCA) regulations for disposal of hazardous waste. Otherwise the soil would be reused on site or taken to an approved landfill for disposal.

The accelerator, beam line, sulfur hexafluoride gas tank, racks containing power equipment and controls, and other structural elements that would be installed as part of the proposed project would be seismically secured to prevent injury or blockage of egress pathways. The LBNL natural gas system is protected with seismically-activated automatic shutoff valves. During a seismic event, ground surface rupture is not expected to occur at LBNL, because actual displacement would occur only along fault traces that are actively involved in the seismic event, none of which passes through the site.

5.1.1.5 Land Use

The proposed modifications to Building 51B would not involve the development of additional acreage. Building 51B is currently unoccupied. The area surrounding the building is paved and contains no natural features. Adjacent to Building 51B are developed areas containing LBNL research facilities.

The proposed Building 51B modifications and use of the proposed ILSE project are consistent with institutional land uses designated for this area in the City of Berkeley General Plan (Berkeley, 1976), and is in general conformance with the LBNL Long Range Development Plan, which designates the building as dedicated to accelerator research (LBL, 1987).

The proposed action does not conflict with adopted environmental goals and plans of the region, or with established recreational, educational, religious, or scientific uses of the area.

5.1.1.6 Traffic and Parking

During the proposed renovation, short-term traffic effects would include vehicle trips by workers to and from the proposed project site, and truck travel related to construction. During the two separate construction periods, estimated at 7 and 24 months, respectively, there would be approximately 15 round-trip vehicle trips per day, including the travel of construction workers and transport of materials. A construction staging area would be located within the fenced area around the Building 51 complex; no existing parking would be displaced. During the proposed renovation, the upper parking lot at Lawrence Hall of Science would be used as a satellite parking area for the anticipated average of 10 construction workers per day. The workers would be transported to the proposed project site via a shuttle bus. The effects of the proposed renovation on traffic and parking would be of minor severity and limited duration.

5.1.1.7 Utilities and Services

During the construction phase, temporary electrical power (generally, 100 amp/110 volt) and water would be provided to the proposed construction site through temporary connections to existing on-site distribution systems. This temporary consumption of water and electrical power during proposed project construction is expected to be minor.

5.1.1.8 Biological Resources

No rare, endangered, or threatened plant or animal species have been located at LBNL. The entire proposed site is paved and contains no natural resources.

5.1.1.9 Cultural Resources

Based on a 1986 archaeological survey, no archaeological resources have been identified within LBNL (LBL, 1986). Building 51B was constructed in 1967 and was used to house accelerator particle beam experiments. LBNL is currently completing a historic inventory form for Building 51B that will be submitted by DOE to the Office of Historic Preservation declaring that the building is not eligible for listing in the National Register of Historic Places. In addition, the only modification to the building itself would consist of installing a 10-ft. high, 6-inch diameter stack on the roof.

5.1.1.10 Aesthetics

The proposed project would have no impact on the aesthetics of the site. Although Building 51B is visible from off-site areas, modifications included in the proposed project would take place within the building and would not change or add to the appearance of the building itself.

The proposed project would be constructed within existing Building 51B. The only exterior modifications would include the relocation of Building 51G from the inside of Building 51B to the outside of the building along the west wall, the placement of sixteen 4 ft. by 10 ft. tanks adjacent to Building 51B, and installation of a 10-ft high, 6-inch diameter stack on the roof of Building 51B.. Building 51G is a relocatable pre-fabricated metal "Butler" building measuring approximately 1500 sq. ft. Building 51G and the tanks would not be visible from offsite locations. Because the stack would be painted to blend with its surroundings, would be partially hidden by the building roofline, and would be only 6-in. in diameter, it also would not be visible from offsite locations.

The exterior finish of the pre-formed insulated metal siding that would be placed within Building 51B to protect the ILSE accelerator would complement the exterior siding of Building 51B (Figure 2).

5.1.1.11 Noise

The proposed modifications to Building 51B would generate noise at the building site during the two construction periods, lasting 7 and 24 months, respectively. Noise generated would be a result of materials delivery and operation of heavy equipment. These activities would cause noise levels to exceed ambient levels. Effects of construction noise would be noticed most by occupants of adjacent LBNL buildings. LBNL would not allow personnel located in these buildings to be exposed to levels at or exceeding the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) (i.e., 85 dBA [see Glossary] over an 8-hr day, 90 dBA over 4 hours, or 95 dBA over 2 hrs.)

Most of the proposed construction activities would take place on the building's interior. Although the lower sides of the building are not enclosed, the enclosure of the upper portion of the building would serve to reduce any noise migrating offsite. Given the indoor construction, roof enclosure, presence of surrounding equipment and buildings (which would serve to further muffle sound), and the buildingÕs location in the central portion of the LBNL site, it is not anticipated that construction noise would affect off-site receptors, the nearest of which is approximately 800 feet away.

5.1.2 Operation

5.1.2.1 Air Quality

The proposed project operations would result in minimal air emissions. In Building 51B, inert gases, including helium, nitrogen, and argon would be used in small quantities and released to the atmosphere. It is possible that the SF6 could unintentionally become mixed with air during project operations, and no longer function properly as an insulating gas. In such an event, the SF6/air mixture would be vented to the atmosphere through a stack on the roof of Building 51B, and would be replaced with a new supply of SF6. 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.

Solvents would be used in the electrical and mechanical shops that would support the project. It is anticipated that emissions from this use would be about twice the current emission rate from Building 58, which is 149 gallons per year. Of the 149 gallons, 86 gallons are from precursor organic compound solvents . LBNLÕs permit from the BAAQMD allows emissions from Building 58 up to 175 gallons of precursor organic compound solvents during any 12-month period.

5.1.2.2 Human Health Effects

The potential health effects to workers from ILSE operations are described below. The proposed project would have minimal impact to public health.

Electrical Hazards

ILSE electrical systems consist of pulsed high voltage from 10 kV to 2 MV and DC high-voltage supplies from 5 kV to 200 kV. AC power for the electronics inside the dome of the injector is supplied by a 150-volt, 3-kW hydraulic generator, and there are voltages from 3 kV to 100 kV in the diagnostic systems. These high voltage hazards 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 (for example, lockout/tagout procedures, proper electrical grounding, and use of approved safety procedures) would be enforced.

Compressed Gas Hazards

Compressed gases that would be used in the operation of the accelerator would include compressed air at a pressure of 100 pounds per square inch (psi) and helium, nitrogen, and argon stored in standard cylinders. In addition, a pressurized gas system would be installed which would consist of a Marx Generator Tank, gas recovery system, and sixteen storage tanks. During normal operations, 3,000 pounds of SF6 and/or CO2 would be in the injector vessel and 3,000 pounds would be in the sixteen storage tanks. (SF6 is classified as an irritant by the Uniform Fire Code, Article 80.) These tanks are 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. During maintenance or modification of the injector, the total quantity of insulating gas would be stored in the sixteen storage tanks.

Oxygen-Deficient Atmosphere

CO2 and/or SF6 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. Passsive 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 and Procedure Volume XVII, No. 36.

Potential release of ionizing radiation in off-normal conditions (for example, a seismic event) would not occur because any rupture of the beamline would cause the accelerator operation to immediately cease and there would be no residual radiation effect.

Non-Ionizing Radiation

Equipment used in proposed project operation is not expected to generate high electrical or magnetic fields outside the beamline. To verify the absence of these potential hazards, the power generator, linac cell modules, and adjacent areas would be surveyed for electrical and magnetic fields during beam operation to ensure that levels are below the ACGIH TLVs.

Hazardous Materials Use

Hazardous materials that would be used in proposed project operations 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-ft3 and two 100-ft3 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 mid-distillate hydraulic oil with a boiling point greater than 600 degrees F and a flash point of approximately 410 degrees F. This is a non-halogenated non-PCB containing oil. Extensive operating experience has shown that airborne oil mist is quite unlikely to be generated, even when the oil is heated. 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.

Helium, nitrogen, and argon would be used in small quantities for beam experiments and released to the atmosphere.

As discussed above, pressurized gases that would be used during operation consist of CO2 and/or SF6 as an insulating gas in the generator tank. SF6 and CO2 would be normally recovered to storage vessels and not released to the atmosphere. This recovery system consists of 16 high-pressure storage tanks, a gas compressor, and a vacuum pump. The storage tanks each hold 150 cubic feet at 150 psi or 3,300 lb of SF6 or CO2. Each tank would have a 200-psi rupture disc for safety.

In the unlikely event of an accidental total release of SF6 or CO2, 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 CO2.

5.1.2.3 Hazardous Waste and Non-hazardous Solid Waste Management

Hazardous Wastes

Hazardous wastes would be generated in the electrical and mechanical shops that would support the proposed ILSE project. These wastes include such materials as solvents, paints, diala oil, sealants, resins, and epoxy. It is estimated that approximately 120 lb of solid hazardous waste and 300 gallons of liquid hazardous waste would be generated annually in the shops that would support the ILSE project. These quantities represent .003 percent of LBNL's total amount of liquid and solid hazardous wastes generated in 1994. These wastes would be recycled or disposed of as described in Section 4.3.1.

ILSE activities would not generate radioactive or biomedical wastes.

Non-hazardous Solid Waste

Proposed project operations would generate non-hazardous solid waste, which would be recycled, if possible, or disposed of in a landfill. The generation of non-hazardous solid waste at LBNL would not change under the proposed ILSE project. Solid waste generated in the support shops would be about the same as under current operations.

Solid waste disposal would be the responsibility of LBNLÕs waste management contractor. The contract for non-recyclable waste disposal is currently held by the Richmond Sanitary Landfill in Contra Costa County, which has approximately two years of remaining fill capacity. However, a new transfer station is being constructed to receive waste after closure of the landfill. It is anticipated that waste received at the transfer station would be transferred to Keller Canyon Landfill, also in Contra Costa County. This new state-of-the-art landfill has remaining permitted capacity of at least 30 years. In the past LBNL has also let waste disposal contracts to the Altamont Landfill in Alameda County. This large landfill has recently opened a new Class II cell, which provides the facility with approximately 58 years of remaining capacity.

5.1.2.4 Emergency Preparedness

There currently exists a Building 51 Complex Emergency Plan that includes Buildings 51, 60, 63, and 64. Procedures addressed in that plan include instructions for reporting any emergency, instructions for specific emergencies, duties of building managers and deputies, building emergency organization, utility shut-down procedures, hazard and evacuation areas, assembly areas, and locations of fire equipment. Additional considerations are training and exercises that evaluate emergency plans and operational procedures.

5.1.2.5 Hydrology and Water Quality

Proposed routine operations would not discharge effluents to the ground, but would discharge (when allowable) to the sanitary sewer system, or effluents would be disposed of as hazardous waste. No adverse impacts to hydrology or water quality would result from proposed project operations because, as discussed in Section 5.1.2.2 under Hazardous Materials, secondary containment would be provided for all hazardous materials. There would be no opportunity for spills to reach ground or surface waters.

5.1.2.6 Traffic and Parking

Approximately six personnel would occupy Building 51B during proposed project operations. This represents only one fourth the number of people who occupied this building during its previous occupancy. The number of people who would occupy Building 58 would be no more than occupied the building at the peak period during its current occupancy. Traffic in and out of LBNL during operation of the proposed project would remain below the goals set forth in the agreement with the City of Berkeley. There is adequate parking at LBNL to meet the 1.7 employees per parking space established in the LBNL Long Range Development Plan (LBL, 1987).

5.1.2.7 Utilities and Services

Proposed project effects on the capacity of the sanitary sewer system would be minor; a maximum of 3 additional employees would be added to the existing LBNL workforce. The estimated increase in water usage over current LBNL levels is less than 1 percent. The proposed project would not use large amounts of electricity (it would require less than 3 MW-hr/yr. compared to a site usage of 80 GW-hr/yr.). It would require little from limited resources such as law enforcement/security and the fire department. The levels of utilities and services required would be less than used by Building 51B during its previous occupancy, and no more than that used by Building 58 during its peak occupancy.

5.1.2.8 Noise

The regular operations of the proposed project would produce little noise, the major sources of which would be the heating/cooling equipment and alternator which are in current use. Noise levels at a typical LBNL laboratory are 55 dB (LBL, 1992b). Similar noise levels are anticipated for the proposed project. Therefore, it is not anticipated that there would be an increase in the ambient noise level at on-site LBNL receptors or at the nearest Berkeley residential neighborhood.

5.1.3 Cumulative Impacts

5.1.3.1 Traffic, Parking, and Noise

Minor, short-term construction-related impacts are anticipated in the areas of traffic, parking, and noise. Because no similar construction projects are expected in the same general vicinity of LBNL during time of construction, these activities would not contribute to cumulative impacts.

5.1.3.2 Air Quality

Because the Bay Area does not meet emissions standards for carbon monoxide, ozone, and PM10, any project that creates new mobile and stationary emission sources would contribute to this nonattainment status. Vehicle traffic associated with proposed project construction activities would provide a minor and short-term contribution of carbon monoxide to the local air basin.

5.1.3.3 Waste

The proposed project would increase very slightly the quantity of hazardous wastes that are being generated at LBNL in the form of Kimwipes used for cleaning accelerator parts with solvents. The generation of non-hazardous solid waste at LBNL would not change under the proposed ILSE project. California lacks adequate disposal capacity to handle current or projected quantities of hazardous wastes generated within the state, and has embarked on a hazardous waste facility siting and development process to provide the needed disposal capacity. Until these facilities are developed, LBNL and other California generators continue to rely on licensed hazardous waste treatment and disposal facilities located outside of California. The increase in hazardous waste generated from the proposed project would represent less than .01 percent of total LBNL hazardous waste.

Despite the implementation of aggressive solid waste recycling and reduction programs, limited landfill space exists in the Bay Area and in many other regions in California. California has enacted recent legislation aimed at reducing solid waste by 50 percent by the year 2000, coupled with a planning process designed to ensure adequate new solid waste disposal capacity. If the agencies charged with implementing the requirements of this solid waste planning system fail to do so, it is probable that shortfalls in solid waste disposal capacity will become acute within the foreseeable future (LBL, 1992b).

5.1.4 Environmental Justice

As discussed in Section 5.1, the proposed project would have minimal impact on public health and the environment. Based upon a preliminary assessment of the economic and demographic makeup of the communities that surround LBNL, it appears that there are not disportionately high and adverse human health or environmental effects from LBNL activites on minority and low-income populations.

5.2 No Action Alternative

As discussed in Section 3.5, under the no action alternative modifications to Building 51B would not take place and the proposed ILSE project would not be undertaken. However, this alternative would not allow DOE to test, at reduced scale and cost, features of a heavy-ion accelerator driver for inertial fusion energy. The no action alternative would have no effect on the environment above existing conditions. The potential environmental effects associated with proposed project construction and operation identified for the proposed action would not occur under the no action alternative.

5.3 LBNL Building 71 Alternative

Location of ILSE in Building 71 would have greater environmental impacts than the proposed action. Building 71 is currently occupied by other programs that would have to be relocated. In addition, the space is inadequate to accommodate the proposed activities and therefore a building addition would be required. 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, with potential impacts relating to geology, soils, and seismicity. In addition, Building 71 likely contains asbestos that would have to be removed as part of building modifications.

5.4 LBNL Building 58 Alternative

The potential environmental impacts of the Building 58 alternative are similar to the Building 71 alternative because

Building 58 is also currently occupied by other programs that would have to be relocated. In addition, the space is inadequate to accommodate the proposed activities and therefore additional construction would be required to expand the building. 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.

5.5 LBNL Building 64 Alternative

The potential environmental impacts of the Building 64 alternative are similar to the Building 71 alternatives because the space is inadequate to accommodate the proposed activities and therefore additional construction would be required to expand the building.

5.6 Offsite Location: Richmond Field Station

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 nearby sensitive zones for potential historical and cultural resources, within the 100-year coastal flood zone, and near wetlands. Two federal endangered and one state-listed threatened species associated with wetland habitats may be present at the RFS. 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.

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

6.0 PERSONS AND AGENCIES CONSULTED

No persons or agencies were consulted.

7.0 GLOSSARY

accelerator
: A device that accelerates charged particles to high energies. The Bevatron, located at LBNL from 1949 to 1993, was capable of accelerating particles to 6.2 billion electron volts. Accelerators are used to study the structure of atoms, to determine the structure of materials, to detect flaws in manufactured items, and as a medical treatment for cancer and other diseases. It is hoped that they will one day be used as an energy driver (see below) in fusion reactors.

decibel (dB)
: A logarithmic measurement of amplitude, which is the difference between ambient air pressure and the peak pressure of a sound wave. Amplitude and frequency are the two characterizing parameters of sound, which is transmitted by pressure waves in the air.

dBA
: Adjusted or A-weighted decibel, an adjusted measurement of frequency that reflects the sensitivity of the human ear. The normal range of human hearing extends from about 0 dBA to about 140 dBA.

driver
: The particle accelerator or laser that focuses energy on the target fuel in an inertial fusion energy reactor.

fusion
: The combination of two light nuclei to form a heavier nucleus (and perhaps other reaction products), with a release of some binding energy.

heavy ion

An ion created by removing an electron(s) from a heavy atom, e.g., xenon, cesium, barium, etc. For a heavy ion fusion driver, the heavy ion is expected to have an atomic mass ^{3} 100.

induction

The production of an electromotive force either by motion of a conductor through a magnetic field so as to cut across the magnetic flux or by a change in the magnetic flux that threads a conductor.

ion

An isolated atom or molecule which by loss or gain of one or more electrons has acquired a net electric charge.

inertial fusion

One of two types of fusion currently being explored for development as an energy source, inertial fusion uses tiny pellets of solid fuel that are dropped through a reaction chamber and bombarded by laser beams or particle beams. The fuel burns so rapidly that it is confined by its own inertia during the process. External confinement is not required, in contrast to the other main approach to fusion, magnetic fusion energy, in which the burning fuel is confined by magnetic fields.

ionizing radiation

Particles or photons which have sufficient energy to strip electrons from molecules as they traverse a substance. High enough doses of ionizing radiation may cause cellular damage.

nonionizing radiation

Particles or photons which have sufficient energy to strip electrons from molecules as they traverse a substance. Prolonged exposure to these particles and rays may be harmful to humans.

8.0 REFERENCES

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U.S. Department of Energy
Finding of No Significant Impact
Construction and Operation of an Office Building at the Stanford Linear Accelerator Center, CA

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The Department of Energy (DOE) has prepared an Environmental Assessment (EA), DOE/EA-1107, analyzing the environmental effects relating to the construction and operation of an office building at the Stanford Linear Accelerator Center (SLAC). SLAC is a national facility operated by Stanford University, California, under contract with DOE. The center is dedicated to research in elementary particle physics and in those fields that make use of its synchrotron facilities. The objective for the construction and operation of an office building is to provide adequate office space for existing SLAC Waste Management (WM) personnel, so as to centralize WM personnel and to make WM operations more efficient and effective.

Based on the analyses in the EA, the DOE has determined that the proposed action 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 (NEPA). Therefore, the preparation of an Environmental Impact Statement is not required.

DESCRIPTION OF THE PROPOSED ACTION:

The proposed action is to construct a 40 feet x 100 feet office building on an undeveloped, grassy area approximately 50 feet south of the Centralized Hazardous Waste Management Facility (CHWMF). The proposed design of the building is a single story, rigid frame type metal building with a concrete slab foundation, eight foot interior ceilings, and a sloping metal roof. The proposed building would provide office space for approximately 20 Waste Management personnel. The proposed project includes parking spaces for 23 vehicles, and a 25 foot long driveway with a width that exceeds the requirements for a fire lane.

ALTERNATIVES:

Two alternatives were considered: (1) constructing two separate office facilities, and (2) no action. The scenario with two separate office facilities would have constructed one facility near the Radioactive Material Storage Yard (RAMSY) housing about five people, with the second facility near the CHWMF, which would house 10 people. This alternative was eliminated for the following reasons:

- Personnel located in the office building near the RAMSY would be too far away from their supervisors and work area because WM operations are being consolidated at the CHWMF.
- There would only be enough space for fifteen personnel, rather than twenty WM personnel.
- It would be cost prohibitive to construct two office buildings rather than one.
- Under the no action alternative, WM personnel would continue to occupy office space in three different locations at SLAC.

ENVIRONMENTAL IMPACTS:

Air Quality: Construction activities would be a temporary source of emissions. However, potential air quality effects are short-term and will not require a Clean Air Act conformity determination.

Hazardous Materials: No PCBs, asbestos-containing, or other hazardous materials will be used in the construction of the proposed office building, parking lot, or driveway.

Public Health and Safety: The proposed office building would be constructed of essentially inflammable components. Moreover, the proposed office building would be constructed in compliance with applicable codes to minimize the spread and effects of any fires. Should a fire occur in the proposed office building, no effects on the public or the environment are expected, beyond those resulting form any other small structure fire. The proposed project would not affect police services at SLAC.

Noise: The net effect of noise from the project will be minimal and will occur only during construction. Typical construction noise would consist of bulldozers, front end loaders, and heavy trucks operating in the same area. However, the relatively small size of the project site, which is approximately one acre, reduces the amount of equipment operating simultaneously. Additionally, no noise-sensitive land uses or receptors are within 1,500 feet of the site.

Public Services and Utilites: There would be a very slight increase in water consumption at SLAC, due to water required for landscape irrigation. Measures would be taken to minimize stormwater runoff and additionally, runoff would either drain to the existing storm sewer system or be recycled for grounds irrigation. Electrical and gas usage would have a net increase of less than two-tenths percent (< 0.2%) of the current total SLAC demand. Short-term increase in local traffic would occur due to the transportation of construction materials and office furnishings. Long-term effects on transportation and traffic from the proposed action would be minimal.

Areas Not Affected: The proposed action do not affect biological or cultural resources, land use, communications, or aesthetics.

Cumulative Effects: No other actions in the foreseeable future have been planned in the same geographic area, therefore, no adverse cumulative effects would occur.

DETERMINATION:

Based on the analyses in the EA, DOE has determined that the proposed construction and operation of an office building at the Stanford Linear Accelerator Center do not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Envionmental Policy Act of 1969. Therefore, an Environmental Impact Statement on the proposed action is not required.

PUBLIC AVAILABILITY: Copies of this EA (DOE/EA-1107) are available from:

Robert Kong
U.S. Department of Energy
1301 Clay Street
Oakland, CA 94612
(510) 637-1522

For further information regarding the DOE NEPA process, contact:

Anthony J. Adduci
DOE/OAK NEPA Compliance Officer
U.S. Department of Energy
1301 Clay Street

Oakland, CA 94612
(510) 637-1807

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James M. Turner, Ph.D.
Manager
Oakland