CHAPTER 1.0
Executive Summary

1.1 Proposed Action

This Environmental Assessment (EA) describes a proposal by the U.S. Department of Energy (DOE) to demolish the Bevatron and the structure housing it, Building 51, at Berkeley Lab. During its operation from 1954 until 1993, the Bevatron was among the world's leading particle accelerators, and during the 1950s and 1960s, four Nobel Prizes were awarded for work conducted in whole or in part there. The Bevatron is approximately 180 feet in diameter. Building 51 is a large (approximately 126,500 gross square feet) shed-like structure built to shelter the Bevatron apparatus and its associated mechanical, electrical, shop and office functions. Since the end of the Bevatron's operations in 1993, Building 51 has had limited use for equipment storage, office space, and dry laboratories.

The Bevatron and Building 51 are no longer needed by LBNL. The Bevatron has not operated since 1993 and is non-functional. The Building 51 structure housing the Bevatron is deteriorating, and consumes disproportionate maintenance resources. It does not meet current building codes, the roof leaks in several locations, and portions of the structure do not comply with current seismic design standards. In addition, removal of the building and its contents would free up the site for future development. However, while development of the site is likely at some point in the future, at this time, there are no firm plans for future development that have reached the level of a proposed or reasonably foreseeable action.

The project site is approximately four acres in size, including parking and staging areas. Of this total, approximately 2.25 acres would be converted from developed area (i.e., occupied by Building 51) to an undeveloped area for an indeterminate time, until another project is proposed, approved, and initiated. Under the proposed project, the concrete shielding blocks that surround the Bevatron would be removed, the Bevatron apparatus would be disassembled, Building 51 and the shallow foundation and tunnels underneath the building would be demolished, and the resulting debris and other materials would be removed. Minor soil remediation effort is expected as part of this action. The site would then be backfilled, and the fill compacted and leveled. The duration of the physical work for the project may vary from four to seven years, from early 2008 through 2011 or beyond, contingent upon funding and results of material sampling. For the

purposes of conservative impact assessment, where impacts presumably are intensified in a shorter project timeframe, the project is assumed to take place over a four year period.[1]

Approximately half of the materials that would be removed would consist of non-hazardous debris and other items typical of building demolition projects. Hazardous waste, low-level radioactive waste, and mixed waste also would be shipped from the site. The project would seek to reuse or recycle materials (e.g., uncontaminated metals and concrete) where feasible. Items that could not be reused or recycled would be handled and disposed in accordance with applicable policies and regulations. An estimated maximum of about 4,700 one-way truck trips to ship items off-site, and to bring in such things as equipment and fill material for bringing the site back to a level condition, would be required over the course of the project. A maximum of about 50 temporary workers would be used by the project at any one time.

Depending upon funding, a project variant, under which project activities would be conducted in an alternative sequence, has been developed since publication of the Draft of this Environmental Assessment. The alternative-sequence project variant would begin with appropriate sampling and surveys for hazardous building construction materials and debris, followed by removal and abatement of all hazardous materials within Building 51. Prior to demolition of the building structures, systems and components, the project would set up additional stormwater drainage and collection systems. Once the building was demolished down to the grade level concrete slab, the Bevatron shielding blocks and equipment would be dismantled and removed with the use of two modern mobile cranes. Finally, the project would demolish and remove the building foundations, tunnels, trenches and slabs and backfill with suitable clean fill material. This alternative-sequence variant, if implemented, would not create a new significant impact, nor would it substantially increase the severity of a significant impact associated with the Project nor would it require new or altered mitigation measures.[2]

1.2 Alternatives

1.2.1 No Action

Under this alternative, the Bevatron would not be dismantled and Building 51 would not be demolished. Radioactive materials, as well as other hazardous materials such as lead dust, oils, and asbestos, would continue to remain in place.

[1] A variant of the project could reduce the minimum duration of the project from four years to three and a half years, but this reduction in schedule would have no resulting effect on project impacts, including traffic impacts. See revised page 76 and Appendix G.

[2] The alternative-sequence variant was analyzed in a Technical Memorandum dated July 3, 2007. The Memorandum was included in the Final EIR for the Demolition of Building 51 and the Bevatron, Appendix E. The Bevatron Final EIR was certified on July 19, 2007. The Memorandum is included in this Environmental Assessment as Appendix G. It determined that there would not be an increase in severity of impacts under the alternative-sequence or alternate duration.

1.2.2 Preservation

Under the Preservation Alternative, the entire site would be dedicated to non-LBNL uses and could be managed by another public agency, such as the National Park Service, with the intention of actively preserving Building 51 and the Bevatron equipment within it. The public agency would maintain and preserve the building in accordance with the *Secretary of the Interior's Standards for Preservation*, and would allow limited public access for interpretive/educational purposes. These Standards for Preservation define Preservation as "the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project." This alternative would also allow some level of abatement of hazardous materials, such as lead and asbestos removal, to the extent that abatement can be accomplished while maintaining the Bevatron equipment in place.

This alternative would not achieve most of the Laboratory's goals for the site. In addition, the facility would still require long-term maintenance and substantial financial investment for clean-up and refurbishment. This would include such things as significant reroofing and exterior waterproofing. Reinforcement would be required to strengthen the structure to make it seismically safe. New roll-up doors would also be required to replace those that were either removed or are inoperable. The facility would have to be patrolled periodically to prevent unauthorized uses, due to the continuing presence of hazardous materials, and, as would be the case for any unoccupied building, to ensure that it did not become occupied by unwanted animals or pests.

1.2.3 On-Site Rubbling

Under the On-Site Rubbling Alternative, activities called out in the Project Description would remain the same with the exception of activities related to concrete. In this alternative, a local "crushing plant" operation would be set up in the work zone outside of Building 51. Two large (approximately 35 feet [length] by 15 feet [width] by 10 feet [height]) diesel-powered concrete crushing machines would form the core of the operation. Concrete from shielding, the building walls and floor and foundation would be broken up using the crushing equipment. Following initial crushing, the material would require transfer by heavy equipment for processing through a second crusher to achieve the uniform sizing necessary to make the material attractive for reuse.

Under this alternative, most of the concrete from the building structure (i.e., walls and floors), foundation, and many of the concrete blocks shielding the Bevatron would be rubbled on-site. Metal (e.g., rebar) in the debris would be separated and disposed of separately. Only concrete containing no detectable added (i.e., non-naturally occurring) radioactivity and otherwise clear of contaminants would be rubbled. The rubbled material and segregated reinforcing steel would be

recycled if public or private sector demand was available at the time of production. If not, it would be disposed of at a landfill. LBNL could use the rubble as aggregate or fill material if the need for such materials coincided with its production, although this is speculative at the present time.

This alternative would result in increased air quality and noise effects on-site, although these impacts would be negligible.

1.3 Impacts and Mitigation Measures

LBNL incorporates various mitigation measures on a Laboratory-wide basis, as required under its site-wide environmental documents prepared in accordance with the California Environmental Quality Act (CEQA) (see Appendix A of this EA). In addition, to reduce potential impacts to negligible levels in the areas of biological resources and transportation and circulation, the following project-specific mitigation measures are included in the CEQA Environmental Impact Report prepared for the Proposed Action:

Biological Resources

Impact: Noise and activities associated with demolition may indirectly disturb nesting special-status birds such that they abandon their nests or such that their reproductive efforts fail. To address potential indirect adverse effects on nesting special-status birds, the following mitigation measure would be adopted.

Mitigation Measure: Pre-Demolition Special-Status Avian Survey and Subsequent Actions. No more than two weeks in advance of any demolition activity involving concrete breaking or similarly noisy or intrusive activities commencing during the breeding season (February 1 through July 31), a qualified wildlife biologist shall conduct pre-demolition surveys of all potential special-status bird nesting habitat in the vicinity of the Building 51 project site and, depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on nesting special-status nesting birds:

1. If active nests of special-status birds are found during the surveys, a no-disturbance buffer zone will be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them will be determined through consultation with the California Department of Fish and Game (CDFG), taking into account factors such as the following:

    a. Noise and human disturbance levels at the project site and the nesting site at the time of the survey and the noise and disturbance expected during the construction activity;

    b. Distance and amount of vegetation or other screening between the project site and the nest; and

    c. Sensitivity of individual nesting species and behaviors of the nesting birds.

2. If pre-demolition surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required.

3. Pre-demolition surveys are not required for demolition activities scheduled to occur during the non-breeding season (August 1 through January 31).

4. Noisy demolition activities as described above (or activities producing similar noise and activity levels in the vicinity) commencing during the non-breeding season and continuing into the breeding season do not require surveys (as it is assumed that any breeding birds taking up nests would be acclimated to project-related activities already under way). However, if trees and shrubs are to be removed during the breeding season, the trees and shrubs will be surveyed for nests prior to their removal, according to the survey and protective action guidelines 1a through 1c, above.

5. Nests initiated during demolition activities are presumed to be unaffected by the activity, and a buffer is not necessary.

6. Destruction of active nests of special-status birds and overt interference with nesting activities of special-status birds shall be prohibited.

7. The noise control procedures for maximum noise, equipment, and operations identified in Section 5.1.7 shall be implemented.

8. Shrubs that have been determined to be unoccupied by special-status birds may be removed as long as they are located outside of any buffer zones established for active nests.

Impact: Noise and activities associated with demolition may indirectly disturb nesting special-status bats such that they abandon their nests or such that their reproductive efforts fail. To address potential indirect adverse effects on roosting special-status bats, the following mitigation measure would be adopted.

Mitigation Measures: Pre-Demolition Special-Status Bat Survey and Subsequent Actions. No more than two weeks in advance of any demolition activity involving concrete breaking or similarly noisy or intrusive activities, commencing during the breeding season (March 1 through August 31), a qualified bat biologist, acceptable to the CDFG, shall conduct pre-demolition surveys, utilizing techniques acceptable to the CDFG, of all potential special-status bat breeding habitat in the vicinity of the Building 51 project site.

Under such surveys, potentially suitable habitat shall be located visually. Bat emergence counts shall be made at dusk as the bats depart from any suitable habitat. In addition, an acoustic detector shall be used to determine any areas of bat activity. At least four nighttime emergence counts shall be undertaken on nights that are warm enough for bats to be active, as determined by a qualified bat biologist.

Depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on breeding special-status bats:

1. If active roosts are identified during pre-demolition surveys, a no-disturbance buffer will be created, in consultation with the CDFG, around active roosts during the breeding season. The size of the buffer will take into account factors such as the following:

a. Noise and human disturbance levels at the project site and the roost site at the time of the survey and the noise and disturbance expected during the construction activity;

b. Distance and amount of vegetation or other screening between the project site and the roost; and

c. Sensitivity of individual nesting species and the behaviors of the bats.

2. If pre-demolition surveys indicate that no roosts of special-status bats are present, or that roosts are inactive or potential habitat is unoccupied, no further mitigation is required.

3. Pre-demolition surveys are not required for demolition activities scheduled to occur during the non-breeding season (September 1 through February 28).

4. Noisy demolition activities as described above (or activities producing similar noise and activity levels in the vicinity) commencing during the non-breeding season and continuing into the breeding season do not require surveys (as it is assumed that any bats taking up roosts would be acclimated to project-related activities already under way). However, if trees are to be removed during the breeding season, the trees would be surveyed for roosts prior to their removal, according to the survey and protective action guidelines 1a through 1c, above.

5. Bat roosts initiated during demolition activities are presumed to be unaffected by the activity, and a buffer is not necessary.

6. Destruction of roosts of special-status bats and overt interference with roosting activities of special-status bats shall be prohibited.

7. The noise control procedures for maximum noise, equipment, and operations identified in Section 5.1.7 shall be implemented.

8. Shrubs that have been determined to be unoccupied by special-status bats and that are located outside the no-disturbance buffer for active roosts may be removed.

Traffic and Circulation

Impact: The Proposed Action would temporarily and intermittently increase traffic volumes on roadways used by demolition-related vehicles. To address potential temporary and intermittent adverse effects to transportation and traffic, the following mitigation measure would be adopted.

Mitigation Measures: The frequency of truck trips (loaded or empty) shall be no greater than (a) one every 10 minutes (six truck trips per hour) during the a.m. and p.m. peak commute hours, and (b) one every five minutes (12 truck trips per hour) during periods other than the a.m. and p.m. peak commute hours.

Under this limitation, the projected level of truck traffic would have minimal effects on traffic flow, even if those trucks were to travel through the congested intersections on University Avenue at San Pablo Avenue and Sixth Street during the peak commute hours. Project-generated hourly truck trips would represent an increase of no more than about 0.9 percent above the a.m. and p.m. peak-hour traffic volumes, respectively, at the above-cited congested intersections.

Other Impacts

All other impacts identified in the analysis were determined to be unimportant for the reasons set forth in the EA. Regarding areas of relatively greater concern, minimal air quality impacts would be created by project-related emissions of construction dust, criteria air pollutants, diesel particulate matter, and asbestos, due to control measures that would be implemented as part of the project, and the nature or limited extent of the pollutants themselves. Similarly, impacts in the areas of water quality and noise would be negligible, due to control measures and the nature of the project site. The potential impacts of hazardous materials, hazardous waste, and other hazards would be reduced to negligible levels. In particular, it is expected that no detectable radioactivity would be contained in the dust generated by the project, and any exposures stemming from the off-site disposal of items containing radiological activity would be far below applicable regulatory limits.

Regarding cultural resources, a Memorandum of Agreement (MOA) has been signed among DOE, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding the demolition of Building 51. The stipulations of the MOA required that the building be documented in accordance with the National Park Service's Historic American Engineering Record (HAER) requirements. In September 1997, LBNL staff prepared the HAER documentation which included a written historical and architectural description of the building and accelerator, and extensive photographic recordation in accordance with the MOA's stipulations. The HAER documentation was submitted to and accepted by the US Department of Interior National Park Service (NPS) in March 1998.

With the acceptance of the HAER report by NPS, DOE may demolish Building 51 provided that DOE contacts the Historic American Building Survey (HABS) division of NPS to determine what level and kind of recordation is required for the buildings, and that such documentation is completed and accepted by HABS prior to demolition. LBNL has consulted with NPS. The latter determined that an addendum to the HAER report would meet HABS requirements. The HAER addendum has been completed and was accepted by NPS in August 2006. For NEPA purposes, with the signed MOA, completion of the HAER documentation, and approval of the HABS addendum by NPS, LBNL has adequately mitigated for the potential loss of Building 51, in accordance with the NHPA. As an additional measure, LBNL plans to commemorate the scientific achievements attributed to the Bevatron with a monument and/or display listing the historic discoveries that occurred there.

CHAPTER 2.0
Purpose and Need

The goal of the LBNL Building 51 and Bevatron Demolition Project is to eliminate existing potential hazards and make the building site available for eventual future use. By removing the structure and clearing the site, future site reuse could occur in a timely manner. For example, contaminated materials, equipment or environmental media, if any, would have been removed or otherwise managed as part of the proposed demolition project and would not impede future development. However, at this time, there are no existing plans for future development of the site. As future use is speculative, it is not described in this Environmental Assessment, nor are the impacts of such use evaluated. The proposed action would also reduce LBNL maintenance obligations and help off-set creation of new space.

The Laboratory's Long Range Development Plan (LRDP) is a planning document for development at LBNL. When the Draft of this Environmental Assessment was published in 2006, its analysis was completed in accordance with the 1987 LRDP Environmental Impact Report (EIR), as amended,[1] prepared pursuant to the California Environmental Quality Act (CEQA). Since publication of the Draft Environmental Assessment, two documents were prepared by Berkeley Lab that supersede the former LRDP and the 1987 LRDP EIR, as amended: the 2006 LBNL Long Range Development Plan and its accompanying LRDP EIR.[2] The analysis of this Environmental Assessment, is consistent with the 1987 LRDP EIR, as amended, is also consistent with the 2006 LBNL LRDP, as well as the 2006 LRDP EIR.[3] Project-level NEPA and CEQA environmental analysis will be conducted if and when necessary for any future development at the Building 51 site.

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[1] The 1987 LRDP EIR consists of the following documents:

- The *Lawrence Berkeley Laboratory Site Development Plan Environmental Impact Report*, August 1987 (State Clearinghouse No. [19]85112610);
- The *Supplemental Environmental Impact Report for the Proposed Renewal of the Contract between the United States Department of Energy and The Regents of the University of California for Operation and Management of the Lawrence Berkeley Laboratory*, September 1992 (State Clearinghouse No. [19]91093068); and
- The *Supplemental Environmental Impact Report Addendum for the Proposed Renewal of the Contract between the United States Department of Energy and The Regents of the University of California for Operation and Management of the Ernest Orlando Lawrence Berkeley National Laboratory*, September 1997 (State Clearinghouse No. [19]91093068).

These documents are referred to collectively as the "1987 Long Range Development Plan (LRDP) EIR, as amended."

[2] The draft LRDP and the LRDP EIR were circulated for public review on January 22, 2007. The EIR was certified on July 19, 2007. NEPA documentation is not required for a University of California LRDP.

[3] This Environmental Assessment includes references to the 1987 LRDP EIR, as amended, although the analysis is consistent with both the 1987 LRDP EIR and the 2006 LRDP EIR.

2.1 Project Objectives

The primary objectives of the Building 51 and the Bevatron demolition project are as follows:

- Eliminate potential hazards associated with Building 51;
- Reduce the burden on LBNL maintenance resources;
- Free space for potential future activities; and
- Help satisfy a DOE policy requiring that the square footage of new construction at a DOE facility be balanced by elimination of an equivalent amount of excess space.[4]

[4] This policy is set out in an August 9, 2002 memorandum from Bruce M. Carnes, Director, DOE Office of Management, Budget, and Evaluation. No specific proposed facility at LBNL is contingent or otherwise dependent upon this proposed demolition project.

CHAPTER 3.0
Description of Proposed Action and Alternatives

3.1 Proposed Action

3.1.1 Introduction

Lawrence Berkeley National Laboratory (LBNL; also referred to as "Berkeley Lab," "the Laboratory," or "the Lab" in this document) is an approximately 200-acre multi-program research laboratory operated and managed by the University of California (UC or the University) under a contract with the U.S. Department of Energy (DOE). This Environmental Assessment (EA) evaluates a proposal to demolish the Bevatron and the structure housing it, Building 51,[1] at Berkeley Lab.

The approximately 180-foot-diameter Bevatron was constructed as a proton synchrotron—a particle accelerator that accelerated protons within a beam pipe to near the speed of light. When the protons struck "targets" composed of various materials placed within a target chamber, the resulting interactions often produced new types of particles. Study of these interactions and the particles themselves led to important advances in the fields of particle and nuclear physics. Later modifications of the Bevatron enabled researchers to accelerate heavy ions and expand the facility's usefulness in additional areas, including medical research, cancer treatment, and cosmic ray experiments. During its operation from 1954 until 1993, the Bevatron was among the world's leading accelerators, and during the 1950s and 1960s four Nobel Prizes were awarded for work that utilized this apparatus.

Building 51 is a large, approximately 126,500-gross-square-foot steel-frame shed-like structure built to shelter the Bevatron apparatus and its associated mechanical, electrical, shop, and office functions. Since the end of the Bevatron's operations in 1993, Building 51 has had limited use for equipment storage, office space, and dry laboratories (e.g., for computer repair). The building presently is largely unoccupied. The history of the facility is discussed in Section 4.3.3, Cultural Resources.

Under the Proposed Action, the Bevatron apparatus would be disassembled, Building 51 and the foundation underneath the building would be demolished, and the resulting debris and other materials would be removed. The site would then be backfilled, and the fill would be compacted

[1] Building 51 includes Building 51A, an integral addition to the main building.

and leveled.[2] This would make future reuse of the site more feasible, although further preparatory site work outside of the scope of this project would be necessary. However, there are no firm plans for future development of the site at this time.

3.1.2 Location and Existing Conditions

LBNL is located in the cities of Berkeley and Oakland in Alameda County on land owned by the University of California. The project site comprises approximately four acres. Of this total, approximately 2.25 acres (the "demolition zone") would be converted from developed area (i.e., occupied by Building 51) to an undeveloped area for an indeterminate time, until another use for this area is proposed, approved, and initiated. The remaining acreage would be used for parking and staging. The site is located within the City of Berkeley portion of LBNL, in the west-central part of LBNL, and is located adjacent to Lawrence Road (from which vehicles enter and leave the site) and McMillan Road within Berkeley Lab. See **Figures 1** through **4**. Laboratory, office, engineering, and computing functions occupy the LBNL buildings immediately adjacent to Building 51. Open space or landscaped areas border the site immediately to the east and north. Surrounding land uses include residential areas to the north of the LBNL property line; LBNL buildings and UC Berkeley athletic fields to the south; LBNL buildings, non-UC Berkeley residences, and UC Berkeley student housing, amphitheater, and classrooms to the west; and additional LBNL buildings and the UC Berkeley Lawrence Hall of Science to the east. Building 51 is approximately 1,100 feet from the nearest residences to the west and north, and about 1,300 to 1,400 feet from the Lawrence Hall of Science to the east.

The project site is entirely developed with the exception of two small areas of ornamental landscaping at the entrance to Building 51. With the exception of two ornamental low-lying trees at this location, no trees would be removed as a result of the project. Small areas of the site are underlain by the edges of two groundwater plumes containing volatile organic compounds (VOCs). Soils underneath portions of the site were contaminated by VOCs, petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and/or mercury that were released at unknown times during the period when the Bevatron was in operation. Starting in the early 1990s, investigation and cleanup actions have been undertaken. These actions are under the oversight of the California Department of Toxic Substances Control, which consults with such other agencies as the San Francisco Bay Regional Water Quality Control Board, DOE, and the City of Berkeley Toxics Management Division. As a result of the completion of interim corrective measures at two soil units at Building 51 under the Laboratory's Environmental Restoration Program, soil contaminants have been reduced to levels considered "protective of human health and the environment" under U.S. Environmental Protection Agency risk assessment guidelines. Groundwater contamination continues to be remediated under the Environmental Restoration Program. Contamination and remediation activities are discussed in more detail in Section 5.1.5, Hazards and Human Health. The site is not listed on the California Environmental Protection Agency (Cal/EPA) Hazardous Waste and Substances Sites List compiled pursuant to Government Code Section 65962.5, also known as the Cortese List.

[2] A potential alternative-sequence project variant that would demolish the structure of Building 51 before disassembly and removal of the Bevatron is analyzed and addressed in Appendix G.

3.1.3 Project Characteristics/Components

In brief, under the Proposed Action, the concrete block shielding surrounding the Bevatron would be removed, the Bevatron apparatus would be disassembled, Building 51 and the shallow foundation and tunnels underneath the building would be demolished, and the resulting debris and other materials would be removed. Minor site remediation effort would be included as part of this action. The site would then be backfilled, and the fill would be compacted to grade. This would make future reuse of the site more feasible, although further preparatory site work outside of the scope of this project would be necessary.

Depending upon funding, a project variant, under which project activities would be conducted in an alternative sequence, has been developed since publication of the Draft of this Environmental Assessment.[3] The alternative-sequence project variant would begin with appropriate sampling and surveys for hazardous building construction materials and debris, followed by removal and abatement of all hazardous materials within Building 51. Prior to demolition of the building structures, systems and components, the project would set up additional stormwater drainage and collection systems. Once the building was demolished down to the grade level concrete slab, the Bevatron shielding blocks and equipment would be dismantled and removed with the use of two modern mobile cranes. Finally, the project would demolish and remove the building foundations, tunnels, trenches and slabs and backfill with suitable clean fill material. This alternative-sequence variant, if implemented, would not create a new significant impact, nor would it substantially increase the severity of a significant impact associated with the Project or would it require new or altered mitigation measures.

3.1.4 Project Activities

The Proposed Action would entail the removal of approximately 22,000 to 26,000 tons of reinforced concrete, structural steel, siding, glass, and other building materials; 12,000 to 16,000 tons of reinforced concrete shielding blocks that enclose the Bevatron and protected personnel from penetrating radiation produced by the Bevatron when it was in operation; and 12,000 to 15,000 tons of Bevatron materials, mostly metals, such as yokes, support steel and equipment. Approximately half of the shipments of materials that would be generated by the project would consist of non-hazardous debris and other items typical of building demolition projects. The other half of these shipments would be of materials having some hazardous characteristics. Portions of the Bevatron apparatus, its concrete block shielding, and other items have low levels of induced radioactivity above naturally-occurring levels, due to their exposure to neutron and charged particle radiation produced by the Bevatron. Also, there may be small

[3] The alternative-sequence variant was analyzed in a Technical Memorandum dated July 3, 2007, which was included in the Final EIR for the Demolition of Building 51 and the Bevatron as Appendix E. The Bevatron Final EIR was certified on July 19, 2007. The Memorandum is included in this Environmental Assessment as Appendix G. It determined that there would not be an increase in severity of impacts under the alternative-sequence or alternate duration.

amounts of surface radioactivity on some pieces of equipment.[4] The concrete in a small number of shielding blocks contains concentrations of uranium slightly above background levels, and a small number of other shielding blocks are composed of depleted uranium encased in steel. Other types of hazardous materials also would be encountered. For example, the exterior siding of Building 51 is made of transite, an asbestos-containing material, and some surfaces were painted with lead-containing paint.

The duration of the physical work for the project may vary from four to seven years, from mid 2008 through 2011 or beyond, contingent upon funding and results of material sampling. For the purposes of conservative impact assessment, where impacts presumably are intensified in a shorter project timeframe, the project is assumed to take place over a four-year period.[5]

Apart from planning activities and actions to secure the site (e.g., locating and deactivating electrical lines as necessary), the main categories of project activities would be as follows:

Clean-out would remove equipment and materials that are not an integral part of the building structure. This includes the 750 to 800 concrete shielding blocks and the Bevatron itself. The shielding blocks would be removed in advance of the Bevatron components. The Bevatron itself, including steel yokes, magnets, and beamline pipes, would then be disassembled using such means as pneumatic impact tools, saw cutting, and possibly torch cutting. Other large mechanical equipment (e.g., fans and electrical panels) would also be removed, using similar methods.

Demolition would involve removal of the building structure and its shallow foundations. The general sequence of demolition activities would be (1) identification and isolation of building elements to be demolished; (2) abatement of all hazardous materials; (3) demolition of the building structure; and (4) segregation and disposal of the debris.

Manual removal of the external asbestos-containing siding materials, by unbolting fasteners, would be conducted prior to building demolition to prevent creation of airborne particles. Asbestos-containing materials in the roof membrane would be abated. The building superstructure would be dismantled and demolished to the grade level concrete slab. This slab would be surveyed, decontaminated if required, and removed along with the shallow foundation structures and tunnels. Those portions of the concrete slab that are not beneath the building would remain in place. In addition, a cooling tower adjacent to and surrounded on three sides by Building 51 that formerly provided chilled water for air conditioning has been demolished and removed. Deep underground concrete foundations would remain, as would most of the concrete retaining walls that support the hillside above the facility.

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4 Induced radioactivity was produced when energetic particles from the accelerator interacted with elements in items struck by the beam. Surface radioactivity resulted from the presence of radioactive targets that were used in some accelerator experiments. It is anticipated that very limited amounts of surface radioactivity, affecting a small volume of materials, would be encountered.

5 A variant of the project could reduce the minimum duration of the project from four years to three and a half years, but this reduction in schedule would have no resulting effect on project impacts, including traffic impacts. See revised page 76 and Appendix G.

The Building 51 outer wall forms a portion of the retaining walls. In order to keep the hillside in place during and after the building is demolished, approximately 170 feet of new concrete retaining wall would be constructed inside Building 51 prior to the demolition of that building, which would be kept in place after demolition. An alternative would be to reinforce existing walls to retain the hillside.

The particular demolition methods that would be employed have not been finalized. However, the most likely methods for the removal of the superstructure would involve the use of mobile cranes and other heavy equipment for superstructure dismantling, in conjunction with torch and mechanical cutting procedures. The concrete slab and foundations would be demolished using pneumatic, hydraulic, and/or chemical breaking techniques. For the latter, an expansive slurry would be poured into holes drilled into the concrete mass. Over several hours, this product expands through the process of hydration, generating cracks between holes and free faces in reinforced concrete. The slurry hardens into a non-hazardous solid that would be disposed of in the same manner as the concrete itself, and would not pose any contamination issues.

Materials disposition would occur at various stages of the project. About half of the demolition materials would consist of non-hazardous debris and other items typical of demolition projects. The project would seek to reuse or recycle such materials (e.g., uncontaminated metals and concrete) where feasible. Items that could not be salvaged would be sent to appropriate municipal landfills, such as the Altamont Landfill in Livermore, California.

Some materials are not suitable for salvage and cannot be sent to municipal landfills. For example, while it is known that there is no radioactivity above naturally-occurring levels in the outer structure of Building 51, portions of the Bevatron apparatus, the concrete block shielding, and other items have low levels of such radioactivity. Also, some non-radioactive hazardous materials would be encountered, including asbestos, lead, mercury, machine oils, and polychlorinated biphenyls. As part of Berkeley Lab's Environment, Health and Safety program, sampling and instrument surveys are conducted at various facilities, including Building 51, to characterize the types, locations, and degree of chemical or radiological contamination. Such monitoring would be continued at Building 51 during the project. Potentially contaminated items would be screened and characterized based on their location and the associated degree of potential hazard.

In general, characterization of potentially radioactive materials would be accomplished by taking external radiation measurements using appropriate survey instrumentation and/or swipe samples according to DOE-approved protocols. The results of these surveys would determine the eventual destinations of the materials. For example, concrete shielding blocks that are found to have no detectable DOE-added radioactivity could be transferred to a third party for reuse, transferred to a third party for crushing and recycling, or transported to a landfill permitted to accept this type of waste.

Any items showing detectable DOE-added radioactivity would be sent to an approved disposal site, such as Envirocare in Clive, Utah (a licensed, privately operated facility), or the Nevada Test

Site (a DOE facility approximately 65 miles from Las Vegas). Also, other DOE facilities are permitted to receive and reuse such materials, for example, for their own accelerator operations. However, at this time, no DOE users for Bevatron components or shielding blocks have been found. Based on prior experience, the Laboratory anticipates that less than one-third of the shielding blocks would have detectable DOE-added radioactivity. It is expected that much of the Bevatron apparatus itself will have detectable radioactivity.

Items contaminated with non-radioactive hazardous materials would be sent to treatment and disposal facilities or landfills permitted to receive such items. Mixed waste (i.e., waste that is both hazardous and radioactive) would be handled in accordance with applicable regulations and DOE policies. In addition, the project would comply with the DOE Metals Recycling Moratorium, which restricts metals from radiological areas from being recycled.

Testing, fill replacement, and stabilization would be the final set of field activities. The area to be demolished extends to the exterior of Building 51. Soil under this area would be surveyed for contaminants under the auspices of the Laboratory’s Environment, Health, and Safety (EH&S) Division. Residual chemical or radiological contamination, if any, would be addressed by the EH&S Division in consultation with the appropriate regulatory agency. Newly discovered environmental releases of hazardous constituents will meet the notification and corrective action requirements in LBNL's Hazardous Waste Facility Permit (EPA ID. no. CA 4890008986), section IV. B. "Newly Identified Releases". Cleanup standards and methods will be consistent with LBNL's Environmental Assessment and Corrective Measures Study Report for Remediating Contamination at LBNL Regulated under the Resources Conservation and Recovery Act (DOE/EA-1527).

The open area, or demolition zone, which would be approximately 2.25 acres, would then be backfilled with suitable clean fill material and compacted to grade in accordance with engineering requirements. The source of this material would be determined at the time of need, based upon local supply, and would be partially drawn from LBNL stockpiles. It is also likely that some clean residual rubble from the slab and foundations would be used as fill material. Although the Laboratory would use clean LBNL-derived fill material as much as possible, this EA conservatively assumes that half of the project’s backfill requirements would be fill certified as clean by the provider and brought in from off-site. The demolition zone would be hydro-seeded with native grasses. Sampling wells for the Laboratory’s Environmental Restoration Program would continue to function. The Proposed Action would not add any impervious surfaces to Berkeley Lab. In fact, it would decrease the amount of impervious surfaces. There are no longer any natural drainages on the site, and no streams or rivers would be altered.

Utility systems that traverse the project site and serve other areas would need to remain in continuous operation; thus, new segments would be built to re-route those services prior to disconnection at Building 51. No new utility connections would be required.

If it would be necessary to perform some work activity after sunset or before sunrise, such as truck loading and departure, or to complete a critical phase of work that would not cause

important noise or other impacts, the Lab would install night shields on all outdoor fixtures used during demolition activities to minimize potential light and glare spillover impacts.

3.1.5 Related Traffic and Employment

An estimated maximum of about 4,700 one-way truck trips would be required over the four- to seven-year term of the Proposed Action. Most of the trips would be one of two types: (1) trips removing material (inbound trips with empty trucks and outbound trips removing material for appropriate disposal), or (2) trips delivering backfill (inbound trips delivering clean backfill and outbound empty trucks). Other truck trips would be for the delivery of project-related demolition equipment and miscellaneous supplies.

Demolition materials would be staged at or near the project site, inside the LBNL property line. Truck shipments from the site are planned to proceed west on Hearst Avenue, south on Oxford Street, and then west on University Avenue to Interstate 80. Shipments to the site would follow this route in reverse. Demolition work would be conducted approximately 40 hours per week, Monday through Friday. Normal work hours would be between 7:00 a.m. and 3:30 p.m. It is possible that some truck loading and departure would take place on Saturdays or Sundays, although this would be infrequent. No roads would be closed as a result of the action, and no new roads, road extensions, or improvements would be required. Similarly, project equipment (including excavators, front-end loaders, graders, hoe-rams, and mobile cranes) would be staged at or near the site, primarily at the parking lot north of Building 51.

Demolition activities would require temporary workers. Their number would vary over the multi-year demolition period, but is estimated to be about 20 to 25 workers on average per day, with a maximum of up to about 50 workers. For the purpose of calculating traffic impacts, this EA conservatively assumes that all would drive alone to the project site. Parking would be available near the site or elsewhere at LBNL.

3.1.6 Environmental and Workplace Controls

Agency-approved environmental protection measures would be employed as part of the proposed project, including dust and hazardous materials controls specified by Bay Area Air Quality Management District regulations and guidelines; hazardous waste handling in accordance with Cal/EPA, DOE, and other agency requirements; and stormwater pollution prevention measures as required by the San Francisco Bay Regional Water Quality Control Board. Further, as described in Section 3.1.7, below, applicable mitigation measures from Berkeley Lab's program EIR, the 1987 LRDP EIR, as amended (see Chapter 2, Purpose and Need), would be part of this present project. Also, as part of its normal operations, the Laboratory would implement other measures to address site-specific potential environmental impacts.

LBNL has an organizational structure and the technical expertise to self-monitor and control on-site safety and environmental conditions so that LBNL implements DOE and UC policies and

procedures, complies with federal and state regulatory requirements, adheres to agreements with other parties, and carries out applicable mitigation measures.

A primary mechanism at LBNL for implementing these requirements and agreements into specific projects is to incorporate them into the general contract terms and conditions for the contractor that will be conducting the demolition work, and then to monitor the contractor's implementation steps and the efficacy of the measures. LBNL or independent technical staff would conduct project-related monitoring and/or oversight to assure that the requisite control measures implemented by the contractor are effective in controlling off-site emissions and on-site health and safety risks.

For the proposed demolition project, a series of reviews has been and continues to be performed by LBNL to identify potential adverse effects and to assess and develop the environmental monitoring and the structural and operational control measures needed to prevent project actions from exceeding relevant standards. LBNL has adapted existing procedures, or has prescribed new specific procedures or performance standards, to assure that the proposed project would be in regulatory compliance. Although not all of these specific procedures or performance standards for the proposed project have been completed, LBNL policy (as described, for example, in various sections of LBNL PUB-3000, Berkeley Lab's Health and Safety Manual; LBNL 2005c), requires that they be complete and in place before work may proceed.

3.1.7 Standard LBNL Project Features

LBNL has identified several environmentally proactive measures in its 1987 LRDP EIR, as amended, that are required in all LBNL projects and development to avoid or minimize potentially important environmental impacts. These mitigation measures have been adopted as part of the LRDP EIR by The Regents of the University of California, and thus are required of all LBNL activities pursuant to the California Environmental Quality Act, and are included as part of this NEPA analysis. Measures relevant to and incorporated into the project description of the Proposed Action are listed in Appendix A of this document.

3.2 Alternatives

3.2.1 No Action Alternative

Under this alternative, the Bevatron would not be dismantled and Building 51 would not be demolished. Radioactive materials, as well as other hazardous materials such as lead dust, oils, and asbestos, would continue to remain in place.

Under this alternative, the induced radioactivity contained in the concrete and other material of the Bevatron would remain on site and continue to decay over time.[6] The facility would remain a

[6] This alternative is also a decay-in-place alternative. The nuclei of radioactive atoms are unstable. Over time, the nuclei will eventually decay by emitting a particle and/or radiation, which transforms the nucleus into another nucleus, or into a lower energy state. The chain of decays continues until the resulting nucleus is stable. Decay for an interval of 10 half-lives would reduce the radioactivity to roughly 1/1000 of the original. Thus, for Co-60, which has a half-life of 5.2 years; decay for 52 years would reduce the Co-60 radioactivity to roughly 1/1000 of its present value.

long-term maintenance and financial drain on LBNL, and would not address the multiple legacy hazards on site. As indicated in the Project Description, the Bevatron has not operated since 1993 and is non-functional. The Building 51 structure housing the Bevatron does not meet current building codes or standards, including seismic design standards, and, as it is relatively old and deteriorating (e.g., roof leaks exist in several locations), it consumes disproportionate maintenance resources. Currently, the building and its contents are in fair to poor condition. Other hazards also exist, e.g. unabated hazards for lead dust, lead paint, and asbestos. Because of these problems, all present occupants are slated for relocation during 2005-2006. Further, under this alternative the deterioration of Building 51 and Bevatron would continue and eventually, the value of the historic resource would be lost. Lastly, this alternative would not include any hazard abatement or seismic upgrade activities, and therefore, long-term impacts to worker or public health could be greater than under the Proposed Action.

3.2.2 Preservation Alternative

Under the Preservation Alternative, the entire site would be dedicated to non-LBNL uses and could be managed by another public agency, such as the National Park Service, with the intention of actively preserving Building 51 and the Bevatron equipment within it. The public agency would maintain and preserve the building in accordance with the *Secretary of the Interior's Standards for Preservation*, and would allow limited public access for interpretive/educational purposes. These Standards for Preservation define Preservation as "the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project." This alternative would also allow some level of abatement of hazardous materials, such as lead and asbestos removal, to the extent that abatement can be accomplished while maintaining the Bevatron equipment in place.

This alternative would not achieve most of the Laboratory's goals for the site. Apart from the other disadvantages of the Preservation Alternative, the facility would still require long-term maintenance and substantial financial investment for clean-up and refurbishment. This would include such things as significant re-roofing and exterior waterproofing. Reinforcement may be required to strengthen the structure. New rollup doors would also be required to replace those that were either removed or are inoperable. The facility would have to be patrolled periodically to prevent unauthorized uses due to the continuing presence of hazardous materials, and, as would be the case for any unoccupied building, to ensure that it did not become occupied by unwanted animals or pests.

3.2.3 On-Site Rubbling Alternative

Under the On-Site Rubbling Alternative, the Proposed Action activities would remain the same with the exception of activities related to concrete. A local “crushing plant” operation would be set up in the work zone outside of Building 51. Two large (approximately 35 feet [length] by 15 feet [width] by 10 feet [height]) diesel-powered concrete crushing machines would form the core of the operation. Concrete from shielding, the building walls, and the floor and foundation would be broken up using the crushing equipment. Following initial crushing, the material would require transfer by heavy equipment for processing through a second crusher to achieve the uniform sizing necessary to make the material attractive for reuse.

Under this alternative, most of the concrete from the building structure (i.e., walls and floors), foundation, and many of the concrete blocks shielding the Bevatron would be rubbled on-site. Metal (e.g., rebar) in the debris would be separated and disposed of separately. Only concrete free of detectable added (i.e., non-naturally-occurring) radioactivity and otherwise clear of contaminants would be rubbled. The rubbled material and segregated reinforcing steel would be recycled if public or private sector demand was available at the time of production. If not, it would be disposed of at a landfill. LBNL could use the rubble as aggregate or fill material if the need for such materials coincided with their production, although this is speculative at the present time.

This alternative would share most of the advantages and disadvantages of the proposed project, although impacts would vary in some respects (e.g., this alternative would result in increased dust generation). However, sufficient space adjacent to Building 51 does not currently exist for this alternative to be feasible, and a site or sites would have to be made available elsewhere at LBNL, at a sufficient distance from off-site sensitive receptors to avoid nuisance impacts.

3.2.4 Alternatives Considered but Rejected as Infeasible

Adaptive Reuse Alternative

An Adaptive Reuse Alternative would keep as much of the Building 51 structure as practical, remove the Bevatron and other unused equipment, and construct new offices or laboratories inside the structure. Under this alternative, the building would be structurally upgraded. This would include extensive rebuilding to seismically update the building and to meet current building code requirements. The roof and exterior cladding and window systems would be removed and replaced with insulated and weather-tight roofing, glazing, and siding; mechanical and electrical systems would be removed and replaced with updated systems; and existing hazards such as lead dust, lead paint, and asbestos would be abated.

This alternative would also eliminate most of the existing potential hazards associated with Building 51, and reduce some of the burden on existing LBNL maintenance resources, although not to the extent achieved by the proposed project. Costs for hazard abatement and Bevatron and equipment removal would be similar. However, this alternative would be more costly, in terms of building and safety code compliance. The building does not meet modern fire/life safety

regulatory codes or seismic requirements, and to upgrade it with fire proofing, fire separations, and structural enhancements would prove to be cost prohibitive. Compared with new construction, costs per square foot for building-wide renovation, including complete rebuilding of heating, ventilation, and air conditioning; electrical; communication; and plumbing systems would likely be greater, while the quality and configuration of the resulting space would be less desirable and inefficient for modern laboratory or office uses.

Finally, this alternative would not meet the other objectives of the proposed project, such as helping to meet the DOE policy requiring that the square footage of new construction at a DOE facility be balanced by elimination of an equivalent amount of excess space.

Encasing the Facility as a Central Courtyard Feature for Future Development at the Site

Under this alternative, which was suggested by members of the public, the Bevatron and Building 51 would be enclosed within a new building superstructure and utilized as a central design feature for any future development that may occur at the project site. This alternative is essentially another version of a preservation alternative, and would have similar advantages in avoiding impacts to cultural resources, and similar disadvantages in requiring major upgrades to the building and in not fulfilling the objectives of the proposed project. Also, this alternative would entail significant additional costs in creating the new building superstructure.

CHAPTER 4.0
Affected Environment

4.1 Regional and Local Setting

LBNL is located in the cities of Berkeley and Oakland in Alameda County on land owned by the University of California. The project site comprises approximately four acres. Of this total, approximately 2.25 acres (the "demolition zone") would be converted from developed area (i.e., occupied by Building 51) to an undeveloped area for an indeterminate time, until another use for this area is proposed, approved, and initiated. The remaining acreage would be used for parking and staging. The site is located within the City of Berkeley portion of LBNL, in the west-central part of LBNL, and is located adjacent to Lawrence Road (from which vehicles enter and leave the site) and McMillan Road within Berkeley Lab. Laboratory, office, engineering, and computing functions occupy the LBNL buildings immediately adjacent to Building 51. Open space or landscaped areas border the site immediately to the east and north. Surrounding land uses include residential areas to the north of the LBNL property line; LBNL buildings and UC Berkeley athletic fields to the south; LBNL buildings, non-UC Berkeley residences, and UC Berkeley student housing, amphitheater, and classrooms to the west; and additional LBNL buildings and the UC Berkeley Lawrence Hall of Science to the east. Building 51 is approximately 1,100 feet from the nearest residences to the west and north, and about 1,300 to 1,400 feet from the Lawrence Hall of Science to the east.

4.2 Environmental Resources Potentially Affected

4.2.1 Air Quality

The project site is located in the city of Berkeley and is within the boundaries of the San Francisco Bay Area Air Basin (Bay Area). Storm tracks typically stay north of the Bay Area for much of the year. Berkeley's proximity to the Pacific Ocean also contributes to its moderate climate. The annual temperature at Berkeley Lab averages in the mid 50s (degrees Fahrenheit). Low temperatures during winter months seldom drop below the mid 30s, while the warmest days of the summer infrequently see high temperatures that exceed 80 degrees Fahrenheit. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby ocean. In contrast, rainfall generally tends to be confined to the period from early November through late April or early May. On average, Berkeley Lab receives about 30 inches of rainfall annually. The annual total can vary considerably, depending on climatic conditions, such as drought. Winds in the Berkeley area display several characteristic patterns. During the day, especially under fair weather conditions, winds are typically from the west and northwest as air comes in off the Pacific Ocean. At night, cooling of the land generates winds from the east and southeast. Southeast winds typically also precede weather systems passing through the region.

Criteria Air Pollutants

The federal Clean Air Act of 1970 and its amendments established maximum allowable concentration standards for six ambient air pollutants known as "criteria" pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (respirable PM_{10} and fine $PM_{2.5}$), and lead.[1] Each of these standards was set to meet specific public health and welfare criteria. Individual states were given the option to adopt more stringent state standards for criteria pollutants and to include other pollutants. California has done so through the California Clean Air Act.

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with regulatory authority over stationary sources in the Bay Area, while the California Air Resources Board (CARB) has regulatory authority over mobile sources such as construction equipment, trucks, and automobiles throughout the state. The BAAQMD has the primary responsibility to meet and maintain the state and federal ambient air quality standards in the Bay Area.

Both the federal and state Clean Air Acts require that air basins, or portions thereof, be classified as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether or not the federal and state standards have been achieved. The Bay Area Air Basin is currently designated nonattainment for the state ozone standards and the federal 8-hour ozone standard, though ozone levels measured at monitoring stations in Berkeley and Oakland[2] have not exceeded either standard in recent years. Ozone and ozone precursors such as reactive organic gases (ROG) and nitrogen oxides (NO_x) are the pollutants of greatest concern in the Bay Area. The Bay Area also is designated as nonattainment for the state PM_{10} standard and the state $PM_{2.5}$ standard. The Bay Area is designated as either attainment or unclassified with respect to all other pollutants.

There have been no exceedances of the state and the federal 1-hour ozone standards in the last five years at the monitoring sites nearest Berkeley Lab. There have been no exceedances of state and federal ambient carbon monoxide standards at the Alice Street station in Oakland in the last five years. Data from the monitoring station in Fremont indicate that there were two days over the state 24-hour PM_{10} standard in 2000, three in 2001, one in 2002, and none since. The standards for the other criteria pollutants (i.e., nitrogen dioxide [NO_2], sulfur dioxide [SO_2], and lead) are being met in the Bay Area, and the latest pollutant trends suggest that these standards will not be exceeded in the foreseeable future (CARB, 2005b).

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1 PM-10 and PM-2.5 consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. A micron is one-millionth of a meter, or less than one-25,000th of an inch. For comparison, human hair is 50 microns or larger in diameter. PM-10 and PM-2.5 represent particulate matter of sizes that can be inhaled into the air passages and deep into the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of aerosol-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles (PM-2.5) of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility.

2 The BAAQMD operates a regional monitoring network that measures the ambient concentrations of the six criteria pollutants. The station closest to the project site is the Alice Street station in Oakland, approximately six miles south of the project site. This station monitors ozone and carbon monoxide. The nearest station that monitors size-specific particulate matter (PM_{10} and $PM_{2.5}$) is located at Chapel Way in Fremont, approximately 30 miles southeast of the project site. The project site is considered typical of urban areas in the East Bay, so PM_{10} and $PM_{2.5}$ concentrations at the Fremont station provide some indication of likely concentrations at the project site.

Toxic Air Contaminants (Diesel Particulate Matter)

Toxic air contaminants (TACs) are air pollutants that may cause or contribute to an increase in mortality or an increase in serious illness, or may pose a present or potential hazard to human health. The CARB, California's air quality management agency, recognizes hundreds of substances as toxic air contaminants. CARB identified diesel particulates, referred to as diesel particulate matter or DPM, as a TAC in August 1998 (CARB, 2005a). While some other TACs could be expected to be present at the site or could be used in the proposed demolition, the potential hazard from these TACs would be much smaller than the potential hazard from the particulate emissions from diesel-fueled engines of the demolition equipment and haul trucks. For this reason, it is sufficient to consider DPM alone in determining impact.

The central issue of concern with DPM is the risk of chronic heath effects associated with long-term exposure to these particulates. To address this risk, CARB developed a risk management guidance document and risk reduction plan to reduce DPM and resultant health risk by 75 percent in 2010 and 85 percent by 2020. Since approval of these documents in September 2000, CARB has adopted a series of rules for stationary and portable diesel engines, solid waste collection vehicles, transport refrigeration units, and idling of diesel vehicles. Additional measures and specific regulations to reduce DPM emissions will be evaluated and developed over the next several years. In addition, in May 2004, the U.S. Environmental Protection Agency (EPA) adopted a comprehensive national program known as the Clean Air Nonroad Diesel Rule to reduce emissions from future nonroad diesel engines by more than 90 percent by integrating engine and fuel controls (EPA, 2004). As part of the Clean Air Nonroad Diesel Rule, EPA introduced sulfur content requirements for highway diesel fuel. The highway vehicle diesel fuel sulfur limit, which was originally 5,000 parts per million (ppm), was first revised to a limit of 500 ppm (low sulfur fuel), and then further reduced to 15 ppm (ultra-low sulfur fuel), beginning, for retail and wholesale consumers, on October 15, 2006. The 15 ppm sulfur limit is required to prevent the malfunction of catalyzed filtration systems that are needed to meet the future diesel engine emission standards. These federal limits on sulfur in fuel apply only to fuel for highway vehicles. CARB regulations mandate the same sulfur content for highway diesel fuel as do the EPA regulations, except that the effective date for retail and wholesale consumers is September 1, 2006.

Nonroad vehicle federal restrictions on sulfur content in diesel fuel follow a different schedule. The 2004 EPA Nonroad Diesel rule limits the sulfur in nonroad fuels to 500 ppm effective June 1, 2007, and 15 ppm effective June 1, 2010. Subsequent to these federal restrictions for nonroad engines, CARB moved up the dates for compliance with sulfur restrictions and on December 14, 2004, required that nonroad diesel fuel sold in California, except for diesel fuel used for locomotives or marine engines, must meet the same sulfur restrictions as fuel used for highway vehicles. In this case, the sulfur content in fuel for nonroad engines in California must not exceed 15 ppm as of September 1, 2006, rather than EPA date of June 2010.

Sensitive Receptors

Some land uses are known as "sensitive receptor areas" because people there are considered more sensitive to air pollutants than others for reasons that include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered relatively sensitive to air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are also considered sensitive to air quality because people such as children, elderly people, and the infirm (i.e., those most susceptible to air-quality related health problems) usually stay home for extended periods of time, with associated greater exposure to ambient air quality in residential areas. Recreational uses are also considered sensitive receptors because vigorous exercise associated with recreation places a high demand on the human respiratory system.

Sensitive receptor areas in the vicinity of the project site include residential areas and nearby dormitories associated with the University. The nearest sensitive receptors are the single- and multi-family residences to the southwest and single-family residences to the north of the project site. These areas are generally not downwind of the site, given that the predominant daytime winds are from the west and northwest, and those predominant winds would carry airborne emissions from the project site away from those sensitive receptors.

4.2.2 Biological Resources

LBNL is located on the western slopes of the Oakland-Berkeley Hills, where low- to moderate-density residential neighborhoods are mixed with open space containing a mosaic of vegetation types and wildlife habitats, including oak and mixed evergreen forests, native and non-native grasslands, chaparral, coastal scrub, marsh and wetland communities, and riparian scrubs and forests. The Lab is within a mile of several large tracts of relatively undeveloped open space and preserved land, including Tilden Park and Claremont Canyon Preserve, which are themselves contiguous with undeveloped East Bay Municipal Utility District (EBMUD) watershed lands. The Lab consists of a mix of built and undeveloped spaces, where activities range from industrial-scale operations and construction to minimally invasive vegetation management, often adjacent to one another. The Building 51 site is located in the northern portion of LBNL, an area that is approximately two-thirds developed and one-third open space. The site is thus surrounded by existing buildings and fragmented areas of open space. The site is part of a substantial plateau that was graded (cut and filled) for development into a northeast to southwest sloping hillside.

The Building 51 site itself is almost entirely developed, with the exception of two small areas of ornamental landscaping adjacent to the front entrance, although adjacent vegetated areas provide potential habitat for common and special-status wildlife species.[3] Vegetation types in the vicinity

[3] The term "special-status species" includes species that are listed and receive specific protection defined in federal endangered species legislation. The term also includes other species that have not been formally listed as threatened or endangered but have been designated as species "of concern," or as "rare" or "sensitive" on the basis of adopted policies and expertise of federal resource agencies or organizations with acknowledged expertise, including the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (now known as "NOAA Fisheries"). For purposes of this analysis, State of California designations are also included; that is, species

include annual grassland, coast live oak woodland, California bay woodland, oak-bay woodland, conifer stand, eucalyptus stand, and landscaped areas. Common wildlife observed at the proposed site, as well as in other similarly developed sites during field surveys throughout the LBNL hillside area (ESA, 2005; ESA, 2002a, 2002b, and 2002c; and ESA, 2003a, 2003b) includes species tolerant of human presence such as California mule deer (*Odocoileus hemionus californicus*), fox squirrel (*Scirius niger*), California towhee (*Pipilo crissalis*), chestnut-backed chickadee (*Poecile rufescens*), and western scrub jay (*Aphelocoma coerulescens*). No special-status plants or wildlife have been identified on the Building 51 project site or elsewhere at LBNL during field surveys (ESA, 2005; ESA, 2002a, 2002b, and 2002c; and ESA, 2003a, 2003b), although nine special-status animal species are judged to have at least a moderate potential to occur, based on habitat conditions. **Table 1** lists these species.[4]

Of these species, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, American kestrel, great horned owl, and olive-sided flycatcher may all potentially make use of the oak, conifer, or eucalyptus trees in the vicinity of the Building 51 project site for nesting purposes. Bewick's wren may potentially use coast live oaks or landscaped areas adjacent to Building 51 for nesting. Long-eared and fringed myotis may potentially establish maternal roosts in trees with cavities, such as oaks, conifers, and eucalyptus that occur in the project vicinity.

Under Section 9 of the federal Endangered Species Act, a "take" is defined as an act to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or to attempt to engage in any such conduct." Therefore, for special-status birds, this EA considers direct removal of nesting substrate or the destruction of nests and eggs, as well as indirect impacts such as noise generated by construction, which can result in disturbance of breeding birds, nest abandonment, and mortality of young, as "take" under the regulations protecting special-status species. For special-status bats, destruction of maternal roosts or indirect impacts resulting in maternal roost abandonment are considered as "take."

Generally, the potential for special-status plant species to occur at LBNL is low; none have been observed in past environmental studies prepared for LBNL (LBNL, 1992; LBNL, 1994; LBNL, 1997b; and SAIC, 1994), and none were observed during recent general biological resource

identified by the California Department of Fish and Game (CDFG) and the California Native Plant Society,. Specifically, the following categories are included: federally listed endangered and threatened species; species proposed for listing as endangered or threatened; candidates for such listing; federally identified species of concern and species of local concern; state-listed endangered and threatened species, and rare (plants only) species; California Species of Special Concern; species designated "special animals" by the state; "fully protected" species (of which there are about 35, most of which are also listed as either endangered or threatened); and raptors (birds of prey), which are specifically protected by Fish & Game Code Section 3503.5, which prohibits the take, possession, or killing of raptors and owls, their nests, and their eggs. The inclusion of birds protected by Fish & Game Code Section 3503.5 is in recognition of the fact that these birds are substantially less common in California than most other birds, having lost much of their habitat to development, and the recognition that the populations of these species are therefore substantially more vulnerable to further loss of habitat and to interference with nesting and breeding than are most other birds. It is noted that a number of raptors and owls are already specifically listed as threatened or endangered by state and federal wildlife authorities.

4 Alameda whipsnake (*Masticophis lateralis euryxanthus*), federally listed as "threatened," has not been sighted at LBNL, although suitable habitat may be present on the Lab site. However, this would most likely be at the eastern corner of the Lab property, contiguous with open space to the north and east. Suitable habitat is not present at or near Building 51. Critical habitat for the species was re-proposed in October 2005 (USFWS, 2005d) and, as adopted in October 2006 (USFWS, 2006), includes the easternmost portion of the Lab site.

surveys (ESA 2002a, 2002b, 2002c and ESA, 2003a, 2002b). The LBNL hill site as a whole has been subject to ongoing disturbance, first in the form of grazing and then in the form of development, for the past 200 years. These types of disturbances, combined with the introduction of highly competitive non-native plant species, have resulted in the extirpation of a number of plant species that were documented in the Berkeley area in the late 1800s and early 1900s. In addition, the suppression of fire in the urbanized hills has resulted in mature stands of scrub and woodland with dense canopy cover and little understory, further reducing the likelihood for herbaceous species to be present. LBNL aggressively manages vegetation on virtually the entire

TABLE 1
SPECIAL-STATUS SPECIES POTENTIALLY PRESENT IN PROJECT AREA

Common Name ***Scientific Name***	**Listing Status USFWS/ CDFG**	**General Habitat**	**Potential for Species Occurrence within the Project Area**	**Period of Identification**
Birds				
Cooper's hawk *Accipiter cooperi*	--/CSC	Nests in riparian growths of deciduous trees and live oak woodlands	**Moderate potential.** Nesting habitat is available adjacent to project site. Observed with kill upslope from Blackberry Canyon gate (ESA, 2003a).	March–July
Sharp-shinned hawk *Accipiter striatus*	--/CSC	Nests in riparian growths of deciduous trees and live oaks	**Moderate potential.** Potential nesting habitat is present on the north fork of Strawberry creek, low potential to forage in and around project site.	March–July
Olive-sided flycatcher *Contopus cooperi*	FSC/--	Inhabits open conifer or mixed woodlands; nests in large coniferous trees	**Moderate potential.** Suitable perching, foraging and nesting habitat is present adjacent to project site, but species is relatively rare in East Bay Hills.	May–August
Bewick's wren *Thryomanes bewickii*	FSC/--	Inhabits chaparral, scrub, and landscaped areas; may also be found in riparian and edges of woodland habitats	**Moderate potential.** Preferred habitat is present throughout LBNL. Species has potential to nest in landscape shrubs and oaks on and adjacent to project site.	Year-round
Great horned owl *Bubo virginianus*	--/3503.5	Often uses abandoned nests of corvids or squirrels; nests in large oaks, conifers, eucalyptus	**Moderate potential.** Suitable nesting habitat occurs in eucalyptus and conifer stands adjacent to project site.	Year-round
Red-tailed hawk *Buteo jamaicensis*	--/3503.5	Usually nests in large trees, often in woodland or riparian deciduous habitats	**Moderate potential.** Suitable nesting habitat is present in stands of large trees adjacent to site. Observed foraging at LBNL (ESA, 2002a).	Year-round
American kestrel *Falco sparverius*	--/3503.5	Frequents generally open grasslands, pastures, and fields; primarily a cavity nester	**Moderate potential.** Observed foraging at LBNL (ESA, 2003b). Potential nesting habitat available in cavities in mature oaks or pines adjacent to project site.	Year-round
Mammals				
Long-eared myotis *Myotis evotis*	FSC/--	Inhabits woodlands and forests up to approximately 8,200 feet in elevation; roosts in crevices and snags	**Moderate potential.** Suitable foraging and roosting habitat is present in project area.	March–August
Fringed myotis *Myotis thysanodes*	FSC/--	Inhabits a variety of woodland habitats, roosts in crevices or caves, and forages over water and open habitats	**Moderate potential.** Suitable foraging and roosting habitat is present in project area.	March–August

Status codes:

FEDERAL: (U.S. Fish and Wildlife Service [USFWS])
FSC = Federal species of concern; may be endangered or threatened, but not enough biological information has been gathered to support listing at this time

STATE: (California Department of Fish and Game [CDFG])
CSC = California Species of Special Concern
3503.5 = California Fish and Game Code Section 3503.5, Protection for nesting species of Falconiformes (hawks) and Strigiformes (owls)

hill site for fire protection. Through the reintroduction of grazing, as well as fuel reduction by mechanical means, LBNL has converted both coastal scrub habitat and stands of eucalyptus and French broom to grassland in recent years. Although small areas of patchily distributed native grasses remain scattered throughout LBNL, the native herbaceous species observed in these areas are those that are commonly found throughout the Oakland-Berkeley Hills (ESA 2002a, 2002b, 2002c and ESA, 2003a, 2002b). Generally, less common species in the hills tend to be found on serpentine or other ultramafic soils or on thin soils, such as occur in roadcuts, where non-native species do not compete as readily. These types of soils were not observed at LBNL during ESA's field surveys. The Building 51 site itself is fully developed, precluding the establishment of plant cover; the grassy and wooded slopes directly adjacent upslope are not expected to support special-status plants for the reasons outlined above.

There are no wetlands or streams located on the Building 51 project site, and the site is located approximately 500 feet south of the head of the north fork of Strawberry Creek. Therefore, there is no potential for the Proposed Action to affect any streams or other "waters of the United States" that would fall under the jurisdiction of the U.S. Army Corps of Engineers, and this topic will not be discussed in the impacts analysis.

4.2.3 Cultural Resources

The entire lab property, including the project site, was surveyed in 2000 for the presence of potential archaeological and historical resources. No indications of historic or prehistoric archaeological resources eligible for listing on the National Register of Historic Places were encountered (Kielusiak, 2000). The Northwest Information Center has indicated there is a "low potential for Native American sites in the project area" and thus "a low possibility of identifying Native American or historic-period archaeological deposits in the project area" (Northwest Information Center, 2003). Native American archaeological sites in this portion of Alameda County tend to be situated on terraces along ridgetops, midslope terraces, alluvial flats, and near sources of water. As the project site is not located on these types of terrain and it is not adjacent to Strawberry Creek, historically the primary natural source of water in the area, there is a low potential for Native American sites to exist at the project site.

In terms of historic buildings, field surveys and historic research is being conducted at LBNL by a team of licensed cultural resource professionals to evaluate the potential for historically important buildings or structures. In coordination with LBNL, DOE, and the State Office of Historic Preservation (SHPO), this team is systematically investigating and reporting on all previously unsurveyed buildings and structures at the Lab. Upon completion, these reports will be submitted to SHPO for review and concurrence.

One historic resource eligible for listing in the National Register of Historic Places (NRHP) has been identified on the project site: Building 51 and the Bevatron equipment within it. Construction of Building 51 began in 1949, and the building was occupied in 1950. When the Bevatron began operating in 1954, it was the world's largest and highest energy accelerator, designed for the study of high-energy nuclear processes of cosmic energy range. Four Nobel Prizes were awarded for discoveries in the field of physics that were made at the Bevatron.

Additions and structural changes to Building 51 and modifications to the Bevatron continued until the facility was closed by the DOE in 1993.

The State Office of Historic Preservation assigned Building 51 a rating of "2S2," which is defined as an "individual property determined eligible for the NRHP by consensus through Section 106 process. Listed in the California Register" (CSOHP, 2003; CSOHP, 2004).[5] As such, both the structure of Building 51 and the Bevatron accelerator equipment within it form a single historic resource, since Building 51 was purposefully designed and built to house the Bevatron.

In accordance with Section 106 of the National Historic Preservation Act (NHPA), LBNL has consulted with the SHPO and the Advisory Council on Historic Preservation (ACHP) regarding effects of the demolition of Building 51 and the Bevatron equipment within it, which are discussed in Section 5.1.3, Cultural Resources.

4.2.4 Geology and Soils

The project site is situated on the western slopes of the Oakland-Berkeley Hills, which are raised uplands of the Diablo Range located between the Hayward Fault on the west and the northern Calaveras Fault Zone to the east. Building 51 is underlain by what geologic mapping identifies as sandstone, siltstone, and mudstone bedrock of the Great Valley Complex (Graymer, 2000). Geologic mapping is consistent with bedrock observed in road-cut exposures along Cyclotron Road which consist mostly of sandstone, with some interbedded mudstone (Fugro West, Inc., 2002a, 2002b, and 2002c).

The steep sloping hillsides of the Oakland-Berkeley Hills characterize the general topography throughout the majority of the LBNL site. Building 51 is constructed on a series of graded level areas adjacent to vegetated natural or manmade slopes, some of which reach a steepness of up to 100 percent. Given the degree of grading on the LBNL site, many of the slopes are supported by retaining structures or have otherwise been engineered for stability. Level, graded areas are connected by sloping roads and pedestrian walkways. The Building 51 site is located on one of the larger graded, near-level areas on the LBNL site with elevations varying between approximately 720 and 760 feet above mean sea level. The northeast side of the project site is bound by an upsloped area with average gradients approaching 60 percent while to the west of Building 51, past the parking lot across Lawrence Road**,** the hillside slopes downward, in places at slopes approaching 100 percent (USGS, 1980).

The U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) (formerly known as the Soil Conservation Service) has characterized the majority of Building 51 site soils as Maymen loam, 30- to 75-percent slopes. Maymen loam is a shallow, moderately permeable soil that exhibits rapid to very rapid runoff and has a high to very high erosion hazard (USDA, 1981).

[5] Section 106 of the National Historic Preservation Act is a consultation process which requires federal agencies to consult with the Advisory Council on Historic Preservation on federal actions which may affect a building or structure listed in, or eligible for listing in, the National Register of Historic Places.

The San Francisco Bay Area contains both active and potentially active faults and is considered a region of high seismic activity.[6] The USGS Working Group on California Earthquake Probabilities has evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years. The result of the evaluation indicated a 62-percent likelihood that such an earthquake event will occur in the Bay Area between 2003 and 2032 (USGS, 2003).

Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. The Modified Mercalli (MM) intensity scale is commonly used to describe earthquake intensity and its effects on people or buildings due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total); intensities ranging from IV to X could cause moderate to significant structural damage (CGS, 2002).[7] At LBNL, maximum ground shaking intensity resulting from an earthquake generated on the Hayward Fault, discussed below, is anticipated to be very violent with a Mercalli Intensity of X (ABAG, 2003).

The project site is immediately adjacent to the Hayward Fault Zone and approximately 19 miles northeast of the active San Andreas Fault Zone. Other principal faults capable of producing significant ground shaking at the project site are the San Gregorio-Hosgri, Calaveras, Concord–Green Valley, Marsh Creek–Greenville, and Rodgers Creek faults. The USGS Working Group on California Earthquake Probabilities estimates that there is a 27-percent chance that the Hayward–Rodgers Creek Fault System will experience an earthquake of magnitude 6.7 or greater in the next 30 years (USGS, 2003). Two active traces of the Hayward Fault are close to but not within the project site; the nearest ("Main Trace") is approximately 1,000 feet downslope, southwest of the project site, while the West Trace is located an additional 100 to 150 feet west (CGS, 1982). The USGS Working Group on California Earthquake Probabilities recently estimated that there is a 21-percent chance of the San Andreas Fault experiencing an earthquake of magnitude 6.7 or greater in the next 30 years (USGS, 2003).

4.2.5 Hazards and Human Health

Hazardous Materials and Waste

Hazardous materials are substances with certain physical and/or chemical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed of, or otherwise managed. Hazardous materials are grouped into the following

6 An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. "Sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

7 The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance.

four categories, based on their properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), and reactive (causes explosions or generates toxic gases).[8] Hazardous materials are commonly used in commercial, agricultural, and industrial applications, as well as in residential areas to a limited extent. A hazardous waste is any hazardous material that is discarded, abandoned, disposed, or in some cases is to be recycled. The same criteria that render a material hazardous also make a waste hazardous.[9]

Hazardous Materials Potentially at Building 51

A number of hazardous materials were used or generated at Building 51. Among these are asbestos-containing materials used in the construction of Building 51, polychlorinated biphenyls (PCBs) and mercury used in electrical or research equipment, lead used as shielding during operation of the Bevatron, lead-based paint used in the building, radioactivity in Bevatron components and shielding, and beryllium in Bevatron beamline targets, as well as other chemicals or radioactive materials.

Major examples of hazardous materials that may be encountered in the course of the proposed demolition project are described below, along with the LBNL approach to dealing with these materials. Estimates of the quantities and destinations of the hazardous and non-hazardous materials that would be sent off-site are presented in **Table 5** in Section 5.1.9, Public Utilities Impacts.

Radioactive Materials

While it is known from previous surveys that there is no radioactivity above naturally occurring levels in the outer structure of Building 51,[10] portions of the Bevatron apparatus, its concrete block shielding, and other items have low levels of radioactivity above naturally occurring levels. All of the radioactive waste that would be generated by the Proposed Action would be classified as low-level radioactive waste, or mixed waste containing low-level radioactive waste, as discussed below. Three main types of low-level radioactive waste would be sent off-site as a result of the Proposed Action:

- Volume contamination. Some concrete shielding blocks and concrete foundation, metal Bevatron components, and miscellaneous items (e.g., some tools) have volume contamination from induced radioactivity. For many years, the Bevatron accelerator beams produced thermal neutrons as a byproduct of normal operations for research experiments. These neutrons had the ability to penetrate into solid items to varying depths depending on the properties of the material. This process has resulted in low levels of induced radioactivity contained within the matrix of the present-day concrete and metals. This induced radioactivity is securely contained within the matrix of the concrete and metal and cannot be removed or transferred by simple contact with the surface of the concrete.

  There is little likelihood of induced activity in the majority of the concrete shielding blocks, as only the blocks closest to the beams produced by the Bevatron were exposed to thermal neutrons. Surveys to date of similar blocks found within the Building 51 complex confirm

8 Title 22 of the California Code of Regulations, Division 4.5, Chapter 11, Article 3.
9 California Health and Safety Code, Section 25151.
10 *Protocol for Survey and Release of Bevatron Materials* (June 30, 2005).

that most blocks have no detectable induced activity. Those that have induced activity have low levels of such activity. This low-level induced activity is of a magnitude similar to the natural radioactivity within the concrete, which typically ranges from 15 to 30 picocuries[11] per gram (pCi/g) total activity. This background radioactivity originates from the elements within crushed stone aggregate that is present in all concrete, and comes primarily from the decay of naturally-occurring radioisotopes of potassium, uranium and its decay series, and thorium and its decay series. The induced radioisotopes that are contained within the concrete shielding include cobalt-60, europium-152/154, barium-133, and cesium-137.

In the Bevatron accelerator apparatus itself, the most prevalent material is steel, with a substantial amount of copper and minor amounts of aluminum and other metals. Preliminary surveys indicate that while a greater proportion of the metals may be activated, the range of activity will be similar to that found in the concrete blocks. The primary isotopes in metals are cobalt-60, titanium-44, and iron-55.

- Surface contamination. A far smaller number of items may have surface contamination. Surface radioactivity resulted from the disintegration of radioactive targets that were used in some accelerator experiments. As a result of particle beam collisions with these targets, some interior surfaces of the beam tube were contaminated with low levels of various radioactive materials. It is anticipated that very limited amounts of surface radioactivity, affecting a small volume of materials, would be encountered.

- Uranium. Two types of shielding blocks contain uranium in excess of naturally occurring amounts. As a result of the materials or processes used in their manufacture to increase their density, a small number of blocks may have concentrations of uranium that cause the radioactivity of these blocks to be above background levels.[12] A small number of other blocks are composed of solid depleted uranium metal encased in steel.[13]

Materials that LBNL has reason to suspect might contain radioactivity would be characterized[14] by taking external radiation measurements using appropriate survey instrumentation and/or swipe samples according to DOE-approved protocols. Following characterization, the different categories of radioactive waste discussed above would be handled as follows:

- Volume contamination. DOE requires that waste items that have detectable DOE-added induced radioactivity (i.e., radioactivity above the background level that is added while the materials are at a DOE site or under DOE control) are to be managed as radioactive waste. For this Proposed Action, as set out in the LBNL EH&S Protocol for Survey and Release of Bevatron Materials (June 30, 2005), the DOE Berkeley Site Office has approved methods that can detect radioactivity down to 2 pCi/g of radioactivity above background.[15] The Laboratory anticipates that less than one-third of the shielding blocks, as well as some

[11] A picocurie is a combination of the Curie, a basic unit of measurement of the rate of radioactive decay, and the prefix pico, which modifies that unit to be 1/1,000,000,000,000 of its basic value. A picocurie is equal to 2.2 disintegrations per minute.

[12] A typical background concentration of U-238 in concrete is 0.5 - 1 pCi/g; the blocks with the elevated levels are typically 35 to 200 pCi/g.

[13] Depleted uranium blocks have activity levels of approximately 500,000 pCi/g.

[14] Characterization is the detailed documentation of the waste constituents such that the appropriate treatment, storage, and disposal decisions can be made. Characterization can include, for example, process knowledge, laboratory analysis, or written documentation (log books, formulas, etc.). LBNL's laboratory is accredited by the State of California Environmental Laboratory Accreditation Program for radionuclide analysis.

[15] This level is more conservative than the clearance screening level of 30 pCi/gram that is recommended in the national standard ANSI N13.12 “Surface and Volume Radioactivity Standards for Clearance” (ANSI, 1999). It is also comparable to the concentration of the natural radioactivity found in concrete.

other items, will have volume contamination. However, it is expected that much of the Bevatron apparatus itself will have detectable DOE-added radioactivity above naturally occurring levels.

Two main options exist for the disposition of items with detectable volume contamination. The first is to transfer the items to other DOE facilities for reuse. Other DOE facilities are permitted to receive and reuse such materials, e.g., for their own accelerator operations. At this time, however, no DOE users for Bevatron components or shielding blocks have been found. The second option, and the one expected to apply to all such items generated during the Proposed Action, is disposal as low-level radioactive waste at a DOE-authorized facility for, such as Envirocare in Clive, Utah, a licensed, privately operated facility; or the Nevada Test Site, a DOE facility approximately 65 miles from Las Vegas.

- Surface contamination. Different regulatory thresholds apply for surface contaminated items, varying with the nature and type of contamination involved. These are presented in DOE Order 5400.5. All material with surface contamination above these thresholds would be disposed as low-level radioactive waste at a DOE-authorized facility, as discussed above.

- Uranium. All blocks containing uranium above background levels, and all depleted uranium blocks, would also be sent to a DOE-authorized disposal facility.

It is anticipated that all Bevatron accelerator components would be disposed of at Envirocare. Regarding metals, the Proposed Action would comply with the July 2000 DOE Metals Release Suspension[16] and with an April 2005 agreement between LBNL and the DOE Berkeley Site Office regarding LBNL's implementation of this policy (*Agreement between LBNL and DOE Berkeley Site Office, LBNL Implementation of DOE Metal Release Suspension*; LBNL, 2005d). Applicable provisions include the following:

- Metals from radiation-controlled areas at accelerators where the metals may have become activated by exposure to beams would not be released for unrestricted recycling into commerce. Some areas within Building 51 contain such controlled areas. Metals covered by the suspension policy would be surveyed in accordance with the June 2005 *Protocol for Survey and Release of Bevatron Materials* referenced earlier. If the metal is contaminated, it would be held in a controlled area until disposed as radioactive waste. If there is no detectable activity, it would be disposed of at an appropriate landfill with a written agreement by the landfill that the metals would be prohibited from being recycled into commerce.

- The following are not within the scope of the DOE Metals Release Suspension: the release of property or equipment for reuse for their intended purpose, metals from locations other than former Radiological Areas, the recycle of non-metal materials, and rebar and other embedded metal materials in concrete that are not surface contaminated or volumetrically contaminated due to induced activity. Such metals, including Building 51 structural steel, are subject to unrestricted, "free" release, as long as there is no detectable DOE-added radioactivity above naturally occurring levels. For example, they could be reused, recycled, or sent to a landfill taking non-hazardous solid waste.

16 The DOE Metals Release Suspension suspended the unrestricted release of metals from Radiological Areas for recycling into commerce. There currently are no such Radiological Areas at Building 51. However, when the Bevatron was in operation, some of these areas did exist, due to the dose produced by Bevatron operations. Metals from former as well as current Radiological Areas are included in LBNL's implementation of this DOE policy.

Items contaminated with both radioactivity and non-radioactive hazardous waste (e.g., any lead shielding with induced radioactivity) would be managed as mixed waste and would be disposed at Envirocare or other authorized disposal facilities.

Asbestos

Asbestos is a naturally occurring fibrous material that was used as a fireproofing and insulating agent in building construction (e.g., in insulation, shingles, ceiling tiles, and floor tiles) before such uses were banned by EPA in the 1970s. The potential risk to human health is from inhalation of airborne asbestos when asbestos-containing materials (ACM) are disturbed during such activities as demolition and renovation. ACM can be divided into two general categories: friable and non-friable. Friable ACM products are those that can be readily crumbled or powdered by hand pressure, and are of more concern than non-friable ACM because of their greater potential for generating airborne fibers. Intact and sealed friable asbestos materials are considered non-friable and do not pose a health risk if they are undisturbed and undamaged. Non-friable ACMs generally possess a strong binder such as cement or vinyl, which stabilizes the asbestos, reducing the likelihood of generating airborne asbestos dust. However, actions such as sanding, grinding, cutting or drilling of non-friable asbestos can result in the release of asbestos fibers.

The exterior siding of Building 51 is composed of transite, a material typically containing approximately 20 percent non-friable chrysotile asbestos fibers. Building 51 is also known to contain non-friable ACMs in vinyl asbestos floor tiles, roofing felt, and insulation. In addition, due to the age of the building, friable asbestos might be encountered.

Federal regulations governing asbestos include EPA's National Emission Standard for Hazardous Air Pollutants, the Asbestos Hazard Emergency Response Act, and Occupational Health and Safety Administration's (OSHA) Asbestos Standard for the Construction Industry. On the state level, several laws mirror or exceed the federal requirements. Similar to federal laws, state laws and regulations also pertain to building materials containing asbestos. These regulations prohibit emissions of asbestos from asbestos-related manufacturing, demolition, or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb asbestos; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to regulatory agencies prior to beginning renovation or demolition that could disturb asbestos.

Section 19827.5 of the California Health and Safety Code, adopted January 1, 1991, requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos. The California legislature has vested the BAAQMD with authority to regulate airborne pollutants, including asbestos, through both inspection and enforcement responsibilities. The BAAQMD is to be notified ten days in advance of any proposed demolition or abatement work.

LBNL has a comprehensive Asbestos Management Program to manage the presence of asbestos materials at the Laboratory. Prior to undertaking demolition activities, a screening survey is

required to identify ACMs, along with sampling to assess and quantify ACMs for removal. Removal of ACMs would be conducted by a licensed and certified asbestos abatement contractor who would remove ACMs in accordance with the LBNL Asbestos Management Program. The ACM abatement would be conducted under the oversight of Lab personnel and subject to inspection by the BAAQMD. All of the abatement work must meet the requirements of OSHA, EPA, and BAAQMD regulations.

PCBs

Polychlorinated biphenyls (PCBs) are synthetic organic oils that formerly were used in many types of electrical equipment, including transformers and capacitors, primarily as electrical insulators. In 1979, the EPA banned the use of PCBs in most new electrical equipment and began a program to phase out certain existing PCB-containing equipment.

All transformers and capacitors known to contain PCBs have already been removed from Building 51 and properly disposed. The only remaining equipment that may contain PCBs are light ballasts. PCBs were found in soil and groundwater samples taken from under the foundation of the building. Soil cleanup measures were completed such that the PCB contaminants have been reduced to levels considered "protective of human health and the environment" under EPA risk assessment guidelines. Some groundwater contamination remains and continues to be remediated by LBNL under a program that is separate from this Proposed Action.

The use and management of PCBs in electrical equipment is regulated pursuant to the Toxic Substances Control Act (TSCA) and its implementing regulations. These regulations generally require labeling and periodic inspection of certain types of PCB equipment and set forth detailed procedures to be followed for disposal of these items and for responding to PCB spills. The TSCA regulations are administered by the EPA. Materials or equipment containing PCBs not regulated as hazardous under TSCA regulations may still be regulated as hazardous waste under Title 22 of the California Code of Regulations, depending on the concentration. PUB-3000, Berkeley Lab's Health and Safety Manual, contains LBNL EH&S Division policies and procedures for the handling of PCBs (LBNL, 2005c).

Lead

Lead-based paint was common until 1978, when the Consumer Product Safety Commission banned the use of paint containing lead at levels of over 600 parts per million for residential and toy purposes.[17] Some painted surfaces at Building 51, such as structural steel, drywall, ceilings, and exterior surfaces, could contain lead-based paint. In addition, lead dust contaminates some of the interior surfaces of Building 51. Sources of this dust include the operation of internal combustion engines using leaded gasoline and the handling of solid forms (blocks, sheets, bricks) of lead, which were used as radiation shielding during operation of the Bevatron. LBNL has a Lead Compliance Program that covers all facets of lead handling from the use of lead in experiments to disposal of lead-containing materials. In accordance with this program, lead-

[17] Lead in industrial-use paints is still permitted. However, most manufacturers have substantially reduced the amount of lead in such paints.

contaminated surfaces would be vacuumed using HEPA-filter-equipped[18] vacuums to remove surface deposits. Any such lead control measures would also be effective in controlling surface contamination by any other hazardous materials that may be present.

Mercury

Mercury was present in klystron tubes that were used for high energy physics research associated with the accelerator at Building 51, and some electrical switches, diffusion pumps, and gauges still at the facility may contain mercury. A mercury spill on the concrete floor of the facility was detected and cleaned up in the late 1990s. Similarly, mercury was found in plumbing and floors in another section of the building and cleaned up around this same time. It is possible that other mercury contamination may be discovered during the Proposed Action, e.g., in a location near the Motor Generator Room where components containing mercury were stored and handled. Mercury would be handled in accordance with PUB-3000 (LBNL, 2005c).

Beryllium

Small amounts of solid beryllium have been found inside portions of the shielded area within Building 51. Dust containing beryllium also was found in shelves where the solid beryllium was stored. In addition, beryllium may be present in beamline target areas inside the Bevatron. Beryllium found to date has been cleaned up in accordance with regulatory standards. If additional beryllium is found, contractors meeting DOE requirements (10 CFR 850) for beryllium cleanup operations would be engaged. All work would be performed in accordance with the LBNL *Integrated Worker Health and Safety Program for Beryllium Activities at the Berkeley Laboratory* (LBNL, 2000).

Chromium

The wooden and plastic parts of the cooling tower contain low concentrations of chromium, which was used in water treatment chemicals. Handling and disposal of the cooling tower would be performed in accordance with PUB-3000 (LBNL, 2005c).

Crystalline Silica Dust

The concrete slab and foundation that would be demolished contain crystalline silica.[19] Silica is a hazardous substance when it is inhaled, and the airborne dust particles that are formed when the concrete is broken, crushed, or sawn pose potential risks. The potential risks are to workers performing demolition activities or other activities adjacent to the demolition.

LBNL would require contractors to meet the Threshold Limit Values (TLVs) for crystalline silica in air set by the American Congress of Governmental Industrial Hygienists. Dust control measures, such as the use of water/fogger sprays, HEPA-filtered equipment, or other engineering controls,

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18 HEPA filters are high-efficiency filters that remove at least 99.97 percent of all particles that are greater than 0.3 microns in size.

19 There are no plans to demolish the concrete shielding blocks; these would be removed intact.

would be implemented at the point of dust generation. If these controls cannot keep worker exposures below TLVs, workers would use respirators to limit their exposure to silica dust.

The levels of silica dust at neighboring buildings or off-site locations would be at non-hazardous levels in large part due to dust control measures. For any crystalline silica that would be released, dilution and dispersion would ensure that ambient dust levels at these locations would remain well below BAAQMD levels of concern.

Subsurface Contamination

The proposed site is not listed on the state Department of Toxic Substances Control (DTSC) Hazardous Waste and Substances Sites List, also known as the Cortese List. However, subsurface investigations have been conducted by Berkeley Lab in the vicinity of Building 51 since the early 1990's, and it is known that a portion of the demolition zone (the Building 51 footprint) is underlain by the edges of two groundwater plumes -- the Building 51/64 and the Building 51L Groundwater Solvent Plumes -- containing volatile organic compounds (VOCs).[20] These are shown in **Figures 5** and **6**.[21]

The Building 51/64 Groundwater Solvent Plume extends westward from the southeast corner of Building 64. The principal plume constituents are halogenated VOCs that were used as cleaning solvents, including 1,1,1-trichloroethane, trichloroethene (TCE), tetrachloroethene (PCE), and their associated degradation products (e.g., 1,1-dichloroethene (DCE), 1,1-dichloroethane, cis-1,2-DCE, and vinyl chloride). The Building 51L Groundwater Solvent Plume is centered near the southwest corner of the former Building 51L. The principal plume constituents are halogenated VOCs that were used as cleaning solvents, including TCE, PCE, and associated degradation products (e.g., cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride).

In addition, PCBs were detected in groundwater samples collected beneath the Building 51 foundation. Soils underneath portions of the site were contaminated by VOCs, petroleum hydrocarbons, PCBs, and mercury.

Remediation (i.e., cleanup) of the above contamination has proceeded as follows:

<u>General (LBNL-Wide)</u>

- Berkeley Lab’s Hazardous Waste Handling Facility (HWHF) operates under a Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit. Under RCRA, LBNL is required to undertake corrective action for all historical releases of hazardous wastes, including hazardous constituents from any Solid Waste Management Unit (SWMU).22 (Corrective action refers to the activities related to the investigation, characterization, and cleanup of releases of hazardous waste or

[20] Groundwater at the site varies from 10 to 90 feet below ground surface. Groundwater samples are analyzed at LBNL's own state-certified laboratory, while soil samples are sent to off-site state-certified laboratories.

[21] These figures show partial footprints of Building 51. For orientation purposes, see **Figure 2** in Chapter 3.0 (Project Description). It should also be noted that **Figures 5** and **6** include the former outlines of Building 51B and Building 51L, structures that were removed from LBNL in 2004.

[22] “Solid Waste Management Unit” means any unit at a hazardous waste facility from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of wastes.

hazardous constituents under RCRA.) Therefore, the permit requires that Berkeley Lab investigate and address historic releases of hazardous waste and hazardous constituents that may have occurred both at the HWHF and at SWMUs throughout the Berkeley Lab site. The DTSC is the regulatory agency responsible for enforcing the provisions of Berkeley Lab's Hazardous Waste Facility Permit, including the activities required under the RCRA Corrective Action Plan (RCRA CAP) process. DTSC consults with such other agencies as the San Francisco Bay Regional Water Quality Control Board, DOE, and the City of Berkeley Toxics Management Division.

The RCRA CAP Process has several primary components:

- RCRA Facility Assessment (completed in 1992);
- RCRA Facility Investigation (completed in 2000);
- Interim Corrective Measures (ICMs; ongoing);
- Corrective Measures Study (CMS, completed in 2005; see below) and Corrective Measures Implementation (CMI; ongoing).

Berkeley Lab currently is in the CMI phase of the RCRA CAP process. In February 2005, a revised CMS Report was submitted by the Laboratory to DTSC (LBNL, 2005f). NEPA documentation is contained in Chapter 7 of this document. The purpose of the CMS Report was to recommend appropriate remedies that can eliminate or reduce potential risks to human health from chemicals of concern in soil and groundwater and that can protect groundwater and surface water quality. The components of the RCRA CAP process are described in detail in the CMS Report, and the reader is referred to that document for information beyond that provided in this EA.

A CEQA Initial Study/Negative Declaration was prepared for the CMS Report (DTSC, 2005). DTSC solicited public comments on the CMS Report and the Initial Study/Negative Declaration from April 25 through June 8, 2005, and held a public hearing on May 26, 2005. DTSC approved the CMS Report and final Remedy Selection, effective October 2005. DOE issued a NEPA Environmental Assessment/Corrective Measures Study Report in September 2005 (DOE, 2005). The EA has the same content as the CMS Report, but also includes a Finding of No Significant Impact under NEPA, and responses to comments by DTSC and DOE.

The IS/ND is available on the DTSC website at http://www.dtsc.ca.gov/HazardousWaste/Projects/upload/LBNL_CEQA_Initial-Study1.pdf. The approved CMS Report and the DOE EA/CMS Report are available on the Lab's Environmental Restoration Program website at http://www.lbl.gov/ehs/erp/html/documents. These documents also are available at the downtown Berkeley Public Library.

Corrective Action at Units Relevant to Building 51

The RCRA CAP process identified two SWMUs at Building 51. While corrective action measures have addressed and will continue to address subsurface contamination in the vicinity of Building 51, the RCRA CAP is a preexisting activity that is independent of the proposed Building 51 and Bevatron demolition project. The RCRA CAP would take place whether or not

the Proposed Action proceeds. At the same time, the Proposed Action would be configured such that it would not interfere with the successful continuation of the RCRA CAP.

As part of interim corrective measures, cleanup activities have already been conducted in many areas of the Lab, including two soil units at Building 51, the Motor Generator Room and Vacuum Pump Room. The main contaminants of concern were PCBs, waste oil, and vacuum pump oil. After soils were excavated, contaminants were reduced to levels considered "protective of human health and the environment" under EPA risk assessment guidelines.

To remediate the Building 51/64 Groundwater Solvent Plume, contaminated source area soils located at the southeast corner of Building 64 were excavated as an ICM in August 2000 and a groundwater extraction system was installed in the backfilled excavation. In addition, an in situ soil flushing pilot test is being conducted in the source area to prevent further migration of contaminants in groundwater. To divert discharges away from the North Fork of Strawberry Creek, an ICM was also implemented that routes water from a portion of the Building 51 subdrain system to a groundwater treatment system using granular activated carbon. The treated groundwater is then discharged to the sanitary sewer under an EBMUD wastewater discharge permit.

As a result of these measures, the remaining soil contaminant concentrations in the source area are below cleanup standards, and groundwater contaminants have generally shown gradual long-term declines over most of the plume area. The CMS Report recommends that the following further corrective actions be undertaken in the CMI phase: continued in situ soil flushing combined with groundwater capture in the plume source area, monitored natural attenuation for the downgradient portion of the plume, and continued surface water (subdrain effluent) capture and treatment until groundwater discharge to surface water is shown to be below detectable levels.

To remediate the Building 51L Groundwater Solvent Plume, the groundwater level has been lowered, using pumping from two extraction wells, to stop any discharge of contaminated groundwater to surface water. The treated groundwater is then discharged to the sanitary sewer under EBMUD permit.

The CMS Report recommends that the following further corrective actions be undertaken in the vicinity of the project site in the CMI phase: excavation and off-site disposal of saturated and unsaturated zone soils in the plume source zone, monitored natural attenuation for the remaining plume area, and rerouting or lining of the storm drain to prevent migration of groundwater contaminants to surface water. For more complete descriptions of contamination and corrective action measures in the vicinity of Building 51, the reader is directed to the CMS Report.

Once Building 51 is demolished, further investigation for potential soil and groundwater contamination at portions of the site that were previously inaccessible would take place, and appropriate corrective measures would be undertaken. Newly discovered environmental releases of hazardous constituents will meet the notification and corrective action requirements in LBNL's Hazardous Waste Facility Permit (EPA ID. no. CA 4890008986), section IV. B. "Newly

Identified Releases." Cleanup standards and methods will be consistent with LBNL's Environmental Assessment and Corrective Measures Study Report for Remediating Contamination at LBNL Regulated under the Resources Conservation and Recovery Act (DOE/EA-1527).

Fire Hazards

LBNL is located near undeveloped land in the Oakland and Berkeley Hills. Portions of this land are wooded with native canyon stands of oak and California bay or with introduced plantations of eucalyptus or conifers. At the project site, extensive natural vegetation both within and surrounding LBNL creates the greatest potential for fire hazard. The Building 51 site itself is almost entirely developed and devoid of vegetation, with the exception of small landscaped areas. It is surrounded by a mosaic of other existing buildings, paved areas, and fragmented areas of open space.

Fire protection services for the project site are provided by Berkeley Lab through a contract with the Alameda County Fire Department, which maintains an on-site fire station. Fire personnel are also trained in emergency medical services and hazardous materials response. In addition, LBNL maintains an automatic aid agreement with the City of Berkeley to provide support during the summer fire season and in the event of a hillside wildfire.

4.2.6 Hydrology and Water Quality

The Berkeley Lab facility lies within the upper portion of the Strawberry Creek watershed; this upper portion consists of approximately 874 acres of land east of the UC Berkeley campus. The entire Strawberry Creek watershed occupies approximately 1,163 acres and includes other UC properties, public streets of both Oakland and Berkeley, and private property (LBNL, 2005e).

Approximately 35 percent of the LBNL site is covered with impervious surfaces such as buildings, roads, and paved surfaces. Compared to natural ground cover (pervious surfaces), impervious surfaces restrict natural infiltration of surface water and increase stormwater runoff rates and volumes. The remaining 65 percent surface area at the site is pervious surface area consisting of steep hillsides covered with natural grasses and other vegetation to minimize erosion (LBNL 2002).

Building 51 is located within Blackberry Canyon. Situated at an elevation of about 720 feet above mean sea level, the building complex is constructed on a series of graded level areas adjacent to vegetated natural or manmade slopes, some of which reach a steepness of up to 100 percent. A portion of the building has a second story that opens to another level, graded area. The two levels are connected by internal staircases or a sloping roadway. Building 51 is located on the largest graded area of the LBNL site. Surface water flows from the project site and the larger Strawberry Creek watershed are ultimately discharged into San Francisco Bay south of the Berkeley Marina at the terminus of the municipal storm drain system that conveys Strawberry Creek through the city of Berkeley (LBNL, 2005e).

The LBNL site is situated over bedrock, which is covered by a shallow soil surface. The flow and occurrence of groundwater at the LBNL site is controlled by the underlying complex geology, the presence of faults, and fractures in the bedrock (LBNL, 2002). Groundwater flows through the fractures in the bedrock and is therefore slow to recharge. Groundwater flow generally follows the surface topography either west or south toward the City of Berkeley or toward streams (Strawberry Creek and its tributaries).

Groundwater flows beneath Building 51 in a northwest direction through the artificial fill materials and appears to be influenced by the natural topography that underlies the graded cut and fill supporting Building 51 (LBNL, 2005e). Water level elevation mapping of the Bevalac area (between Buildings 51 and 71), which was generated from groundwater data collected in the fourth quarter of 2003 (when groundwater was at a seasonal high), indicates that groundwater depths can range between 15 feet and 50 feet below the ground surface, depending on location (LBNL, 2005e). Groundwater levels are deeper during the summer months or drought periods when the water table is not recharged by precipitation. Based on the water level map, shallower groundwater depths occur along the base of the slope on the east side of Building 51 (depths of 15 feet to 30 feet) and become deeper toward the northwest (depths of 30 feet to 60 feet). Groundwater elevations beneath the central portion of Building 51 are relatively level, reflecting the flat surface topography of the Building 51 site (LBNL, 2005e).

4.2.7 Noise

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL[23], while along arterial streets, noise levels typically range from 65 to 70 DNL. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

The Building 51 project site is located on a large parcel of flat land along Lawrence Road and McMillan Road. The primary sources of noise at the project site are activities from the operation of the adjacent buildings and noise from the LBNL shuttle buses, trucks, and other vehicles.

Some land uses are considered more sensitive to ambient noise levels than others because of the duration of noise exposure as well as the types of activities that typically occur there. People in residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, natural areas, parks and outdoor recreation areas are generally more sensitive to noise than are people at commercial and industrial establishments. Housing, outdoor recreation, and similar land uses are therefore considered “sensitive receptor areas” for noise.

[23] DNL = day-night average sound level, which is the energy average of the A-weighted sound levels occurring during a 24-hour period, accounting for the greater sensitivity of most people to nighttime noise by weighting noise levels at night (“penalizing” nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted by adding 10 dBA to take into account the greater annoyance of nighttime noises.

Figure 7 shows the position of Building 51 in relation to other LBNL buildings as well as the nearest sensitive-receptor areas to the north, east, and west; there are no nearby sensitive receptor areas to the south. The noise-sensitive land uses are as follows:

- Area 1. This area to the west consists of the Nyingma Institute (Buddhist facility) and single- and multi-family residences. This area is approximately 1,100 to 1,400 feet west of Building 51 and approximately 160 to 250 feet lower in elevation. As a result of intervening hillside terrain and building structures, there is no direct line-of-sight between any of the residences or the Buddhist facility and Building 51.

- Area 2. This area to the north consists of single-family residences along Campus Drive, Olympus Avenue, and Summit Road. The nearest residences are located on Campus Drive approximately 1,100 feet north of Building 51 and are approximately 270 feet higher in elevation. A partial line-of-sight exists between some of these residences and Building 51, although none has a completely unobstructed view due to the intervening terrain and building structure.

- Area 3. To the east is the UC Berkeley Lawrence Hall of Science Museum (LHS), which is located approximately 1,300 to 1,400 feet away from Building 51. The LHS rests on a hillside approximately 350 feet higher than Building 51. No line-of-sight exists between Building 51 and the buildings at LHS because LHS is offset from the edge of the hillside. However, a person standing directly in front of the 3.5-foot-tall boundary wall at the edge of the hillside where the LHS property faces Building 51 would have a partial line-of-sight. This wall is at the boundary of the LHS outdoor area where children often play on the outdoor fixtures. The play fixtures themselves do not have a line-of-sight to Building 51.

As shown in **Figure 7**, the average existing noise levels were measured at six sites in the three areas described above. **Table 2** lists the measured background noise levels.

TABLE 2
AVERAGE EXISTING BACKGROUND NOISE LEVELS AT SENSITIVE RECEPTOR LOCATIONS

Measurement Location (see Figure 7)	Average Existing Background Noise Level (dBA)	Noise Sources
Site 1	54	Distant roadway noise
Site 2	46	
Site 3	44	
Area 2		
Site 4	54	Intermittent distant construction noise
Site 5	52	
Area 3		
Site 6 (at wall)	54	Distant construction noise and children playing on Lawrence Hall of Science outdoor fixtures
Site 6 (15 ft. from wall)	53	

SOURCE: Parsons (2003)

Noise measurements taken in connection with the ongoing preparation of the LBNL LRDP EIR indicate that hourly average noise levels at locations measured nearest Building 51 range between 52 and 66 decibels (dBA, Leq[24]). Maximum noise levels measured were between 61 and 83 dBA, with the second highest reading (74 dBA) at Building 71, near the top of the McMillan Road grade. These levels likely were the result of shuttle bus traffic on the hill.[25]

A less frequent but regular noise source is a nearby 2-megawatt diesel emergency power generator, located approximately 200 feet northwest of Building 51 and abutting the tree line. This generator is tested monthly for a minimum of four hours, and it creates noise of up to 85 dB at a distance of 50 feet. In addition, regular vegetation management is performed in and around the area of trees under analysis. This management includes use of equipment such as weed-whackers, leaf blowers, chippers, and chain saws.

4.2.8 Public Services

LBNL secures firefighting services through a contract with the Alameda County Fire Department, which staffs a fire station located on the LBNL grounds. This station, which is Alameda County Station No. 19, is located at LBNL Building 48. Station 19 is staffed with four persons 24 hours a day, every day of the year: two firefighters, one engineer, and one officer. Three of these personnel are required to be trained in hazardous materials response, and one is a paramedic. Equipment at Station 19 includes one fire engine, one reserve fire engine, a hazardous materials vehicle, and a light-duty four-wheel drive “brush patrol unit” that can be used for wildland fires.

An Emergency Operations Center has been established at LBNL’s Station 19, which is equipped with fault-tolerant telecommunications. LBNL's Fire, Medical, Protective Services, Plant Engineering, Maintenance, and Environmental Health and Safety personnel are trained and equipped to respond to local emergencies. Each building, including Building 51, has an Emergency Team headed by the building manager.

Police services at LBNL are provided through a contract with the UC Berkeley Police Department (UCPD). UCPD handles all patrol, investigation, and related law enforcement duties for UC Berkeley and associated University-owned properties. UCPD operates 24 hours a day, seven days a week, coordinating closely with the City of Berkeley Police Department. UCPD includes 77 police officers, 45 full-time non-sworn personnel, and 60 student employees. Located at 1 Sproul Hall on the UC Berkeley campus, UCPD has primary law enforcement jurisdiction on the campus of the University of California and associated University properties, including LBNL UCPD, 2005).

LBNL also contracts with a private security firm, which is responsible for on-site security needs including Laboratory access, property protection, and traffic control. The on-site security staff at LBNL totals approximately 18 personnel, divided into approximately five to six personnel per

[24] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements; Leq represents the constant sound level which would contain the same acoustic energy as the varying sound level.

[25] All noise readings were based on 15-minute measurements.

shift. Staffing and resources include an on-site manager, two roving patrols 24 hours per day, and gate access attendants 24 hours per day at the Blackberry Gate and fewer hours at the Strawberry and Grizzly Peak gates.

The City of Berkeley Public Works Department maintains public streets within the city limits of Berkeley. Caltrans maintains public highways in the project site vicinity.

4.2.9 Public Utilities

The LBNL Facilities Division collects non-hazardous solid waste from Berkeley Lab buildings. In calendar year (CY) 2004, the Lab generated 191.5 metric tons (about 423,000 pounds) of routine solid sanitary waste, which was disposed by the Richmond Sanitary Service. In addition, it generated 1,087.43 metric tons (about 2,396,000 pounds) of waste that was recycled. As a government-owned facility operated through contract by the University of California, LBNL complies with the waste minimization reporting requirements of DOE, the State of California, the University of California, and Berkeley Lab itself, and has achieved significant reductions in the amount of waste it generates. As of CY 2004, LBNL had reduced the amount of routine solid sanitary waste going to land disposal by almost 80 percent compared with the baseline year set by DOE of CY 1993. The reductions were achieved through waste segregation and recycling efforts and through a composting and mulching program.

4.2.10 Traffic and Circulation

LBNL is located close to two major highways: Interstate 80/580 (I-80/I-580) approximately three miles to the west, and State Route (SR) 24 approximately two miles to the south. Access from the Lab to I-80/I-580 is through the city of Berkeley via east-west arterial streets. Access to SR 24 is via Tunnel Road. The primary local access routes to the Berkeley Lab site are University Avenue-Hearst Avenue, Grizzly Peak Boulevard-Centennial Drive, and Piedmont Avenue-Gayley Road.

Vehicles can enter Berkeley Lab through three gates: Blackberry (main) Gate, Strawberry Gate, or Grizzly Peak Gate. Normally, Blackberry Gate is staffed continuously, Strawberry Gate is staffed for about 13 hours encompassing both the morning and evening commute hours, and Grizzly Peak Gate is staffed during morning commute hours only.

The Laboratory’s main vehicle routes are two-way, except for three sections where roadside parking reduces traffic lanes, permitting only one-way travel. Main routes within the boundaries of LBNL include Cyclotron Road and Lawrence Road. Vehicle access to the project site is from Lawrence Road. Cyclotron Road and Lawrence Road each have two lanes, and on-street parking is prohibited. As part of its standard practices, the Laboratory uses or requires subcontractors to use advance warning signs and flaggers to direct traffic as needed to maintain safe and efficient traffic flow during construction projects.

The Berkeley Lab site is served indirectly by Bay Area Rapid Transit (BART) and by Alameda–Contra Costa Transit (AC Transit) bus routes, and directly by two LBNL-operated shuttle service routes.

LBNL operates a free on-site shuttle bus and several shuttle buses that travel off-site. Two of the latter travel around some of the perimeter of the UC Berkeley campus, and one shuttle goes to downtown Berkeley, connecting with the Berkeley BART Station and AC Transit bus lines. A separate off-site shuttle provides express service to and from the Rockridge BART Station at selected commute hours. Off-site shuttle service starts at 6:20 a.m. from the main Laboratory shuttle bus hub located at Building 65 and continues until 6:50 p.m. Buses run every 10 minutes up to 6:10 p.m. Between the hours of 6:10 p.m. and 6:50 p.m., the shuttle runs at 20-minute intervals. The internal shuttle operates every 10 minutes from 6:40 a.m. until 5:20 p.m.; it then operates at 20-minute intervals until 6:50 p.m. The closest internal shuttle bus stop to the project site is below Building 70, across the street from the entrance to Building 51.

The UC Berkeley 2020 LRDP EIR assessed existing traffic level of service (LOS) conditions during weekday a.m. and p.m. peak traffic hours at the following intersections (UC Berkeley, 2004):

- Hearst Avenue and La Loma Avenue / Gayley Road – signalized
- Hearst Avenue and LeRoy Avenue – side-street stop-sign control
- Hearst Avenue and Euclid Avenue – signalized
- Hearst Avenue and Scenic Avenue – side-street stop-sign control
- Hearst Avenue and LeConte Avenue – side-street stop-sign control
- Hearst Avenue and Spruce Street – signalized
- Hearst Avenue and Oxford Street – signalized
- Hearst Avenue and Shattuck Avenue – signalized
- Oxford Street and Berkeley Way – signalized
- Oxford Street and University Avenue – signalized
- University Avenue and Shattuck Avenue (northbound) – signalized
- University Avenue and Shattuck Avenue (southbound) – signalized
- University Avenue and Milvia Street – signalized
- University Avenue and Martin Luther King, Jr. Way – signalized
- University Avenue and San Pablo Avenue – signalized
- University Avenue and Sixth Street – signalized
- Shattuck Avenue and Bancroft Avenue – signalized
- Shattuck Avenue and Durant Avenue – signalized
- Gayley Road and East Gate – side-street stop-sign control
- Gayley Road and Stadium Rim Way – all-way stop-sign control
- Stadium Rim Way and Centennial Drive – all-way stop-sign control
- Centennial Drive and Grizzly Peak Road – all-way stop-sign control

The LOS concept is a qualitative characterization of traffic conditions associated with varying levels of traffic, based on delay and congestion. Descriptions of conditions range from LOS A (free-flow condition) to LOS F (jammed condition). LOS C or better are generally considered to be satisfactory service levels, while LOS D is minimally acceptable, LOS E is undesirable, and LOS F conditions are unacceptable. The determination of LOS for signalized and all-way stop-sign-controlled intersections is based on the average delay (in seconds per vehicle) for the entire intersection. The LOS for intersections controlled by stop signs on side-street approaches

only is presented for the worst movement at the intersection (i.e., the movement with the highest average delay in seconds per vehicle) that is controlled by stop signs.

Traffic counts were conducted at each of the above-cited intersections when UC Berkeley was in session.[26] Based on methodologies presented in the 2000 *Highway Capacity Manual*, all of these intersections operate at an acceptable LOS D or better during both the a.m. and p.m. peak hours, except for the signalized intersections of University Avenue / Sixth Street and University Avenue / San Pablo Avenue, which operate at LOS F during both peak hours.[27]

The Alameda County Congestion Management Agency's 2002 level of service monitoring indicates that the segments of I-80 through Berkeley are congested (LOS E or F) in both directions during morning and afternoon peak commute periods, and frequently during off-peak periods as well (Abrams Associates, 2002). The portion of SR 24 within the Oakland city limits experiences LOS F in the eastbound direction from I-580 to the Caldecott Tunnel during the p.m. peak hour. The only Alameda County Congestion Management Program arterial roadway operating at LOS F within the city of Berkeley is SR 13 (Ashby Avenue).

4.2.11 Visual Quality

LBNL is located on approximately 200 acres in the eastern hills of Berkeley and Oakland. It is surrounded by open space, institutional uses, and residential and neighborhood commercial areas. The project site is located entirely within the City of Berkeley. South and east of the Lab is the University of California, Berkeley campus, characterized by a variety of buildings, open space, student parking areas, and mature landscaping. The stadium and other University buildings are located farther southeast. To the west and north of the Lab are residential neighborhoods and a small commercial area located in the City of Berkeley. The residential neighborhoods are characteristically a mix of single- and multiple-family homes, some small retail uses, and a variety of local, landscaped roadways. Some of the homes closest to the Lab are tucked into the lower reaches of the hillside, while others are situated atop the higher ridges, and therefore have an unimpeded panoramic view of the Lab and its environs. Building 51 is approximately 1,100 feet from the nearest residences to the west and north, and about 1,300 to 1,400 feet from the Lawrence Hall of Science to the east. Farther away and to the northeast of the site are Tilden and Claremont Canyon Regional Parks. These large open space areas are heavily vegetated with eucalyptus, oak, and other herbaceous species, and include numerous paved and unpaved recreational trails, open field areas, and a variety of public amenities.

The project site is approximately four acres, including parking and staging areas. Approximately 2.25 acres of the project site (the "demolition zone") would be converted from developed area (i.e., occupied by Building 51) to an undeveloped area for an indeterminate time, until another use for the site is proposed, approved, and initiated. The site is located adjacent to Lawrence Road and McMillan Road within Berkeley Lab, and is generally flat. As shown in **Figure 8**, an aerial view of Building 51, the project site is surrounded by parking lots, other LBNL research

[26] Peak-period traffic counts were conducted at the study intersections during November and December 2002 for the UC Berkeley LRDP Update analysis.

[27] The *Highway Capacity Manual* is published by the Transportation Research Board. Characterization of existing levels of service is taken from the *UC Berkeley LRDP Final EIR* (April 2004).

structures, landscaping, and roadways. The character of the immediate area is highly urbanized and developed as an institutional facility. Parks and other open spaces are located beyond the perimeter of LBNL, but do not define the character of the site.

Views of the vicinity of the project site are available from long-, medium-, and short-range distances, although, due to topography, other buildings, and the presence of many large trees, Building 51 is generally not visible from publicly accessible long-range views of LBNL.

The existing sources of light and glare at the project site are generally limited to the interior and exterior lights of Building 51. Other sources of light include interior and exterior lighting associated with adjacent buildings, parking lots, and access roads. All on-site buildings and parking areas are currently equipped with outdoor, downward-directed light fixtures for nighttime lighting and security. In addition, the cars and trucks traveling to and from the site represent sources of glare. The project site is located near internal LBNL roadways such as Cyclotron Road, Alvarez Road, Lawrence Road, and McMillan Road, where street lighting results in light and glare during evening hours.

CHAPTER 5.0
Environmental Consequences

5.1 Environmental Consequences of the Proposed Action

5.1.1 Air Quality

Demolition activities could create a temporary adverse effect on the local air quality of the site and its surroundings. These activities have the potential to generate 1) dust (including PM_{10} and $PM_{2.5}$), primarily from "fugitive" sources (i.e., emissions released through means other than through a stack or tailpipe); and 2) lesser quantities of other criteria air pollutants, primarily from tailpipe emissions from haul trucks, heavy construction equipment, demolition machinery (primarily diesel-powered) and worker automobile trips (primarily gasoline-powered). The Proposed Action may also involve demolition and removal of asbestos-containing building materials.

The Bevatron apparatus would be disassembled and Building 51 and the foundation slabs and tunnels underneath the building would be demolished. All work related to disassembly and removal of the internal structures (i.e., the concrete shielding blocks and the Bevatron machine) would occur while the exterior building structure is in place, minimizing the release of dust and other emissions. Subsequently, this external building would be demolished.[1] After demolition of the building, the slab and foundation structure would be demolished. Later demolition steps would include the possible excavation of approximately 200 cubic yards of contaminated soils and backfill of the site with an estimated 20,000 cubic yards of clean fill.

Fugitive Dust

The two major fugitive dust sources would be 1) concrete breaking using a hoe-ram and loading of the broken concrete into trucks, and 2) general demolition[2] of the building and loading of structural debris. Because much of the concrete breaking and demolition of internal structures would occur while the external Building 51 structure is in place, fugitive dust emissions would tend to be largely contained within the volume of the structure, where they could be more easily controlled. For the remaining fugitive dust that would not be contained within the building, the

1 A potential alternative-sequence project variant that would demolish the structure of Building 51 before disassembly and removal of the Bevatron is analyzed and addressed in Appendix E of the Bevatron Final EIR, which was certified on July 19, 2007. The analysis is included in this document as Appendix G.

2 Removal and disposal of the asbestos-containing siding would be completed before the general demolition of the building would begin. Effective dust control measures would be a part of the asbestos abatement procedure.

majority of the particles would settle out of the atmosphere well within the boundaries of LBNL, due to the substantial distances from the project site to the LBNL boundaries.

The BAAQMD's approach to analyses and evaluation of construction impacts, including demolition activities, is to emphasize implementation of effective and comprehensive control measures, as detailed in the *BAAQMD CEQA Guidelines* (BAAQMD, 1999), rather than detailed quantification of emissions. These control measures are included as part of the Proposed Action. Measures that would be applied to control fugitive dust include the Basic Control Measures set out in the *BAAQMD CEQA Guidelines*. These are:

- Water all active construction areas at least twice daily;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard;
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites;
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; and
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Measures required by the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) to control fugitive dust would also be applied. Concrete dust created by breaking or cutting of concrete shielding blocks and of slabs and foundation must be controlled by OSHA-required measures that limit worker exposure to crystalline silica dust. These control measures, to be implemented at the point at which the fugitive dust would be generated, require the use of water sprays or engineering controls. Such measures would be required during the demolition of the slab and foundation structure.

The BAAQMD considers a project's construction-related fugitive dust (including PM_{10} and $PM_{2.5}$) impacts to be less than significant if all of the required dust control measures, listed above, are implemented. Because the various dust control measures included in the project description and the standard LBNL procedures noted above incorporate all of the BAAQMD's basic required measures, construction dust impacts to both on-site and off-site receptors would be negligible.

Tailpipe Emissions

In addition to fugitive dust emissions, the operation of diesel- and gasoline-powered demolition equipment and demolition-related haul trucks, along with worker commute trips, would also generate ozone precursors, carbon monoxide, and diesel particulate matter (DPM) emissions. The diesel-powered demolition equipment that would be working on-site at various times during the span of the project could include heavy equipment such as boom cranes, fork-lift, front-end loader, back-hoe, ram impact hammer, grader, and compaction roller. The flat-bed and dirt haul trucks required to transport materials to and from the site would also be diesel-powered. Overall, an estimated maximum of about 4,700 one-way truck trips would be required over the lifetime of the project. Maximum frequency is expected to be no more than 34 daily one-way truck trips for

hauling material into and out of the site. In addition, as described below in Section 5.1.10, Traffic and Circulation, worker trips are estimated at up to 124 daily individual trips during peak demolition activity periods.

Criteria Air Pollutant Emissions

Not all demolition equipment would be on-site or operating at the same time, thereby reducing the potential short-term impact of these tailpipe emission sources. Moreover, diesel- and gasoline-powered equipment operation would be limited to work hours, and LBNL contract provisions would place limits on equipment idling, require use of electric power in lieu of internal combustion engine power, require use of ultra low-sulfur diesel fuel, and require equipment maintenance to reduce gaseous emissions. As a result of these measures, emissions of criteria air pollutants would be reduced.

Likewise, as described in Section 5.1.10, Traffic and Circulation, haul truck and worker commute trips would occur over a limited period of time, and would represent negligible increases in auto and truck traffic on those streets and roads. Therefore, the resulting impact on local air quality from criteria pollutant emissions would be negligible.

Diesel Particulate Matter Emissions

In addition to criteria pollutants, the diesel-powered trucks and demolition equipment would also generate DPM. As noted previously, CARB identified DPM as a Toxic Air Contaminant in 1998. In addition, CARB implemented a diesel risk reduction plan.

The project activities involving diesel-operated equipment releasing DPM emissions would be temporary, occurring periodically over a more than four-year period, but the scheduled regulatory reductions of DPM emissions that begin in 2007 to lower the resultant health risk from DPM by 75 percent in 2010 would further lower emissions from these sources if newer equipment is used. Although the exact amount of the DPM emissions reduction is not known, substantially greater reductions in DPM emissions are expected to occur for large on-road trucks than for off-road equipment.

Even accounting for the source reductions, the exposure of the public to DPM emissions from haul trucks would be greater than the exposure to DPM emissions from on-site demolition equipment, primarily because the haul trucks would pass within approximately 30 feet of some residences in Berkeley, while the Building 51 work site, where the demolition equipment would operate, is 1,100 feet or more from the nearest residences. This very large difference in distances is sufficient to determine that the concentrations of project DPM in exhaust emissions that would reach any residence would be much less for on-site equipment than for haul trucks.[3] It is possible to make a conservative estimate of the health risk from DPM emissions from project-related truck

[3] Although the project's on-site demolition equipment would be additional sources of DPM, the DPM that would reach off-site residences would be reduced by dispersion, due to the distance of the project site from these residences. As a net result, DPM concentrations from on-site equipment would be roughly 1/100 to 1/10 of the annual DPM concentrations from hauling, based on the amount of demolition equipment assessed and results of modeling described below.

hauling for a resident along a truck route by considering that the exposure, and the related health risk, would be a function of the number of trucks, on a yearly basis, that would pass by a residence. The overall incremental risk from these truck emissions would also be a function of the specific years in which the activities would occur. As stated above, the total number of one-way truck trips that would occur over the multi-year duration of demolition activities is estimated to be approximately 4,700.

DPM emissions from the truck trips were estimated using the CARB model, EMFAC2002. This model relies on emission factors for heavy-duty diesel trucks, similar to those to be used for the project; these factors are derived from emission measurements of equivalent-sized trucks. The estimated DPM emissions for 2,000 annual truck trips[4] were then input into the EPA dispersion model SCREEN3 to calculate ambient air concentrations of DPM (exposure levels) at receptors near the haul truck route roadways. Distances as close as 30 feet from the roadway were assumed in the modeling. The model predicted the worst-case annual average concentration of DPM to be 0.0008 $\mu g/m^3$. Assuming that these project truck emissions would occur beginning in 2006, the total exposure of DPM at the maximum receptor would result in an incremental cancer risk of approximately 0.01 in a million.[5] This would be 1/1000th of the health risk significance criterion value of 10 in a million.

For the reasons stated above, the concentrations of project DPM that would reach any residence from on-site equipment would be much less than the concentrations of project DPM at residences near haul truck routes. Even with longer durations of exposure, the total of the exposures to DPM from on-site project equipment, and the associated health risk, at any residence would also be smaller than the DPM exposure and risk at residences near haul truck routes.

Because the DPM health risk from the on-site sources would be much less than the DPM health risk from haul trucks, the overall health risk from DPM from both sources would therefore be approximately 0.01 in a million.

This estimate of the Proposed Action's incremental cancer risk can be considered to be conservative for several reasons. First, the model SCREEN3 that was used in the analysis uses hypothetical worst-case meteorology to calculate ambient air concentrations. This includes very stable atmospheric conditions and low wind speeds over an entire year. In addition, the DPM emissions that were input into the model were estimated for the first year of expected activities (2006). By 2010, as shown by EMFAC2002, DPM emissions are expected to be reduced by about 30 percent because stricter state and federal emission regulations would come into effect. Lastly, the risk estimate assumes that residents are present during all exposure periods.

4 The 2,000 one-way truck trips per year for each of 3 years is an overestimate of the anticipated truck traffic, so it overestimates total DPM emissions and total risk.

5 Calculated using the carcinogenic risk factors published by the California Office of Environmental Health Hazard Assessment. The risk factors for DPM are based on a total dosage or exposure over a human lifetime of 70 years.

Thus, the health risk from the exposure to DPM from both on-site diesel-powered equipment and project haul trucks would be approximately 1/1000th of the health risk significance criterion value of 10 in a million; the impact of the public exposure to DPM would be minimal.

Asbestos

The exterior siding of Building 51 was constructed with transite, a material typically containing approximately 20 percent non-friable chrysotile asbestos fibers. Given the age of Building 51 and demolition characterization surveys of the facility, other parts of the building were also constructed using asbestos-containing materials. Since airborne asbestos poses a serious health threat, the demolition and removal of any potential asbestos-containing building materials would be handled according to LBNL's Asbestos Management Program, which is tailored to meet the requirements of BAAQMD Regulation 11, Rule 2: Hazardous Materials–Asbestos Demolition, Renovation and Manufacturing. This program includes standards of operation necessary to control asbestos emissions, and identifies any prior notification and permitting requirements. With adherence to this program, the exposure of the public and of the workers to airborne asbestos would be controlled and the impacts associated with exposure to airborne asbestos would be minimal.[6] An asbestos demolition notification to the BAAQMD would be required; if regulated asbestos is present, an asbestos renovation notification would also be needed.

5.1.2 Biological Resources

Since with the exception of the two small areas of ornamental landscaping at the entrance to Building 51, demolition activities would include no tree or shrub removal or damage to trees, and the ornamental landscaping to be removed does not represent appropriate habitat, there would be no potential for direct adverse effects on special-status nesting birds. However, there are a number of oak and conifer trees in close proximity to Building 51 on the slopes to the east and south of the building. These trees are located in a relatively narrow strip of vegetation between two developed areas and alongside Lawrence Road, which has regular daytime traffic flow, including heavy diesel trucks and buses moving up the grade to McMillan Road. The trees nevertheless may provide nesting habitat for special-status birds, as do other trees within a 500-foot radius of the Building 51 site, including oak, eucalyptus, and conifers. Some activities, most notably noise generated by demolition under the Proposed Action, would have the potential to disturb any nesting raptors or other special-status nesting birds present in these trees. Such activities could result in the abandonment of special-status bird nests, eggs, or fledglings.

Ambient noise in the area of Building 51 is generated most notably by vehicle traffic, especially diesel trucks and the Lab's shuttle bus fleet (also diesel-powered), which circulates the Lab at 10-minute intervals throughout the day, as well as automobiles and motorcycles. In particular, McMillan Road, which includes a steep incline at its closest proximity to Building 51 and thus promotes particularly loud vehicular engine noises, is closer to many of the trees of concern than most of the actual sources of demolition noise would be, as the roadway defines the border of the tree area. Stationary sources, including heating, ventilating, and air-conditioning equipment

[6] Section 5.1.6, Hazards and Human Health, addresses impacts associated with demolition of radioactively-contaminated building material as well as building surfaces painted with lead-based paint.

associated with buildings, and other stationary equipment at the Lab, including pumps, generators, cooling towers, exhaust hoods, and machine shop equipment, also generate noise, as do current activities at the Building 51 site and immediate vicinity, which include laydown and vehicle storage space for LBNL's "riggers," crane operators, and construction crews for various projects at LBNL.

Noise measurements taken in July 2003 and January 2004 indicate that hourly average noise levels at locations measured nearest Building 51 range between 52 and 66 decibels (dBA, Leq[7]) (ESA, 2003c; ESA, 2004). Maximum noise levels measured were between 61 and 83 dBA, with the second highest reading (74 dBA) at Building 71, near the top of the McMillan Road grade, most likely the result of shuttle bus traffic on the hill.[8] Less frequent but more noisy activity includes operation of a nearby two-megawatt diesel emergency power generator, located approximately 200 feet northwest of Building 51 and abutting the tree line. This generator is tested monthly for intervals of four hours or more, at which time it creates noise of up to 85 decibels at a distance of 50 feet. In addition, regular vegetation management is conducted in and around the trees near Building 51. This vegetation management includes use of equipment such as weed-whackers, leaf blowers, chippers, and chain saws.

As stated in Section 5.1.7, Noise, noise levels associated with typical construction and demolition equipment, other than a hoe-ram impact hammer, range from 74 to 77 dBA. The noise levels associated with simultaneous operation of multiple pieces of equipment other than this hammer is expected to reach 80 dBA, as measured at a distance of 50 feet from the source. With use of the hoe-ram hammer, which would be employed only during the removal of the foundation and substructure (a period expected to last for nine or 10 months), construction noise levels could be as high as 96 dBA at 50 feet. While much of the available research on noise effects on wildlife focuses on longer-term effects related to disturbance from recreational users and military operations (e.g., snowmobiles in national parks, military aircraft overflights in wilderness areas), this analysis conservatively assumes that disturbances from construction and demolition noise could potentially result in the abandonment of special-status bird nests, eggs, or fledglings present in the trees adjacent to the site.[9] On one hand, one source reports, in terms of effects of continuous noise on bird communities, "An increase of 10 dBA above background noise is probably acceptable in most situations" (Nicholoff, 2003). On the other hand, a 10 dBA increase in noise level is perceived by the human ear as a doubling in loudness, potentially causing an adverse response. Wildlife perception of noise appears to be generally more sensitive than that of humans; therefore, it is assumed for the purposes of this EA that a 10 dBA increase in noise (a

7 Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements; Leq represents the constant sound level which would contain the same acoustic energy as the varying sound level.

8 All noise readings were based on measurements 15 minutes in duration.

9 In Ellis (1981), the observers recorded "noticeably alarmed" responses in raptors to sounds within the 82-114 dBA range. At comparable levels (72-89 dBA) seabirds flushed off nests (Jehl and Cooper 1980); at 115 dBA seabirds were absent for as long as 10 minutes (Stewart 1982). Though these studies did not always establish nest failure, the thresholds for a single stimulus event clearly had an effect. This information is indicative that nesting disruption may occur if the noises would persist over a longer period of time. More recent research has found certain types of unnatural noise to be disruptive to bird life at a much lower level. For example, Delaney et al. (1999) found that spotted owl flush rates in response to chain saws became undetectable only when noise levels dropped below 46 dBA.

doubling of loudness) over the existing maximum levels should be considered to be material for birds, as well as other wild animals. Therefore, even assuming that the 83 dBA noise level (generated just south of Building 51, atop the hill inside the LBNL Blackberry Canyon entrance) is representative of typical intermittent bus and truck noise on McMillan Road, demolition-generated noise generated at 96 dBA from use of the hoe-ram impact hammer would represent a material increase over the highest existing noise levels in the area of the Building 51 site, and might be sufficient to cause an impact on nesting special-status birds. However, assuming that simultaneous operation of multiple pieces of more standard equipment (trucks, backhoes, graders, cranes, and the like, and not including the hoe-ram impact hammer) would not exceed 80 dBA and would not be continuous (i.e., an individual piece of construction equipment frequently operates for several minutes to an hour or two before stopping while equipment is repositioned, haul trucks depart, and so forth), such activities would not be sufficient to cause a substantial impact on nesting special-status birds – that is, for most of the Proposed Action timeframe, these potential noise impacts would be negligible even without the incorporation of mitigation measures. Activities undertaken for the Proposed Action would have the potential to cause an important adverse noise or vibration impact to wildlife only during the demolition of the foundation and substructure stage, when the hoe-ram impact hammer would be used.

In addition to the above impacts, any removal or destruction of active nests and any killing of migratory birds would violate the federal Migratory Bird Treaty Act, which prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior.

Regardless of the noise and demolition activity levels on the Building 51 site, there would be no adverse effect, and therefore no substantial impact, if the Proposed Action would not interfere with the successful nesting of raptors and other special-status birds. Demolition activities, including ground clearing and grading that would occur during the non-breeding season (August 1 through January 31), would have no potential effect. For activities that would commence during the breeding season (February 1 through July 31), the conduct of the avian surveys and the subsequent preventive actions would eliminate the potential for adverse effects to nesting special-status birds, as identified in the following mitigation measure.

> **Mitigation:** To address potential indirect adverse effects on nesting special-status birds, the following mitigation measure would be adopted:
>
> *Pre-Demolition Special-Status Avian Survey and Subsequent Actions.* No more than two weeks in advance of any demolition activity involving concrete breaking or similarly noisy or intrusive activities that commencing during the breeding season (February 1 through July 31), a qualified wildlife biologist shall conduct pre-demolition surveys of all potential special-status bird nesting habitat in the vicinity of the Building 51 site and, depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on nesting special-status nesting birds:
>
> 1. If active nests of special-status birds are found during the surveys, a no-disturbance buffer zone will be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them will be determined

through consultation with the CDFG, taking into account factors such as the following:

a. Noise and human disturbance levels at the Building 51 site and the nesting site at the time of the survey and the noise and disturbance expected during the construction activity;

b. Distance and amount of vegetation or other screening between the Building 51 site and the nest; and

c. Sensitivity of individual nesting species and behaviors of the nesting birds.

2. If pre-demolition surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required.

3. Pre-demolition surveys are not required for demolition activities scheduled to occur during the non-breeding season (August 1 through January 31).

4. Noisy demolition activities as described above (or activities producing similar noise and activity levels in the vicinity) commencing during the non-breeding season and continuing into the breeding season do not require surveys (as it is assumed that any breeding birds taking up nests would be acclimated to demolition-related activities already under way). However, if trees and shrubs are to be removed during the breeding season, the trees and shrubs will be surveyed for nests prior to their removal, according to the survey and protective action guidelines 1a through 1c, above.

5. Nests initiated during demolition activities are presumed to be unaffected by the activity, and a buffer is not necessary.

6. Destruction of active nests of special-status birds and overt interference with nesting activities of special-status birds shall be prohibited.

7. The noise control procedures for maximum noise, equipment, and operations identified in Section 5.1.7, Noise, of this EA shall be implemented.

8. Shrubs that have been determined to be unoccupied by special-status birds may be removed as long as they are located outside of any buffer zones established for active nests.

Special-status bats that may occur in the Building 51 vicinity include fringed myotis and long-eared myotis. Special-status bats may use crevices in exfoliating tree bark, as found in eucalyptus, and/or hollow cavities in trees, such the oaks and pines located in the vicinity of the proposed Building 51 site, as well as abandoned buildings. Myotis bats may use the oak woodland across Lawrence Road from the Building 51 site, the oak and bay woodlands at the head of the north fork of Strawberry Creek, or the various conifers, oaks, and eucalyptus located between Building 51 and McMillan and Lawrence roads. As discussed above for birds, particularly noisy activity associated with one stage of demolition could result in noise levels sufficiently high to cause adverse impacts on maternal roosts of special-status bat species. During other stages, assuming that simultaneous operation of multiple pieces of less noisy equipment would not exceed 80 dBA

and would not be continuous, such activities would not be considered sufficient to cause a substantial impact on nesting special-status bats.

Regardless, there would be no adverse effect, if the Proposed Action would not interfere with the successful roosting of the bats. Demolition activities that would occur during the non-breeding season (September 1 through February 28) would have no potential effect. For those demolition activities that would commence during the breeding season (March l through August 31), the conduct of bat surveys and the subsequent preventive actions would eliminate the adverse effects of the Proposed Action.

Mitigation: To address potential indirect adverse effects on roosting special-status bats, the following mitigation measure would be adopted:

Pre-Demolition Special-Status Bat Survey and Subsequent Actions. No more than two weeks in advance of any demolition activity involving concrete breaking or similarly noisy or intrusive activities, commencing during the breeding season (March 1 through August 31), a qualified bat biologist, acceptable to the CDFG, shall conduct pre-demolition surveys, utilizing techniques acceptable to the CDFG, of all potential special-status bat breeding habitat in the vicinity of the Building 51 site.

Under such surveys, potentially suitable habitat shall be located visually. Bat emergence counts shall be made at dusk as the bats depart from any suitable habitat. In addition, an acoustic detector shall be used to determine any areas of bat activity. At least four nighttime emergence counts shall be undertaken on nights that are warm enough for bats to be active, as determined by a qualified bat biologist.

Depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on breeding special-status bats:

1. If active roosts are identified during pre-demolition surveys, a no-disturbance buffer will be created, in consultation with the CDFG, around active roosts during the breeding season. The size of the buffer will take into account factors such as the following:

    a. Noise and human disturbance levels at the Building 51 site and the roost site at the time of the survey and the noise and disturbance expected during the construction activity;

    b. Distance and amount of vegetation or other screening between the Building 51 site and the roost; and

    c. Sensitivity of individual nesting species and the behaviors of the bats.

2. If pre-demolition surveys indicate that no roosts of special-status bats are present, or that roosts are inactive or potential habitat is unoccupied, no further mitigation is required.

3. Pre-demolition surveys are not required for demolition activities scheduled to occur during the non-breeding season (September 1 through February 28).

4. Noisy demolition activities as described above (or activities producing similar noise and activity levels in the vicinity) commencing during the non-breeding season and

continuing into the breeding season do not require surveys (as it is assumed that any bats taking up roosts would be acclimated to demolition-related activities already under way). However, if trees are to be removed during the breeding season, the trees would be surveyed for roosts prior to their removal, according to the survey and protective action guidelines 1a through 1c, above.

5. Bat roosts initiated during demolition activities are presumed to be unaffected by the activity, and a buffer is not necessary.

6. Destruction of roosts of special-status bats and overt interference with roosting activities of special-status bats shall be prohibited.

7. The noise control procedures for maximum noise, equipment, and operations identified in Section 5.1.7, Noise, of this EA shall be implemented.

8. Shrubs that have been determined to be unoccupied by special-status bats and that are located outside the no-disturbance buffer for active roosts may be removed.

Activities undertaken for the Proposed Action could disturb common wildlife species that exist within the proposed Building 51 area, including black-tailed deer, raccoon, striped skunk, and gopher snakes. Animals within these habitats, such as small mammals and reptiles, could be subjected to noise and other human disturbances, as well as to direct mortality. However, mortality of common wildlife is not considered an important impact, nor is it expected to occur, particularly with regard to larger and more mobile species. It is expected that no habitat for common wildlife will be lost as a result of the Proposed Action. In fact, revegetation of the site after demolition will result in a short-term slight increase of open space and habitat for common wildlife. The Proposed Action would therefore result in a negligible impact on common wildlife species.

As noted in Section 4.4.2, Biological Resources Setting, the potential for special-status plant species to occur on the Building 51 site is considered low. Therefore, the Proposed Action would not result in an important impact on special-status plants.

5.1.3 Cultural Resources

Demolition and Excavation/Grading

Archival research, field work elsewhere at LBNL, and the nature of the Building 51 site itself all indicate that there is only a low potential for Native American sites to exist at the location of the proposed action. Similarly, there is no indication that the site has been used for burial purposes in the recent or distant past. Thus, encountering human remains at the site during demolition activities would be unlikely.

However, should cultural resources or human remains be encountered during the demolition and excavation phases of the proposed action, the LBNL Facilities Design and Construction Procedures Manual (Procedures Manual) specifies procedures to be followed. This document requires that if an archaeological artifact is discovered on site during construction, all activities within a 50 foot radius shall be halted and a qualified archaeologist shall be summoned within

24 hours to inspect the site. If the find is determined to be significant and to merit formal recording or data collection, adequate time and funding shall be devoted to salvage the material. Any archaeologically important data recovered during monitoring shall be cleaned, cataloged, and analyzed, with the results presented in a report of finding that meets professional standards.

The Procedures Manual also requires that in the event that human skeletal remains are uncovered during construction or ground-breaking activities, all work within a 50 foot radius shall immediately halt, and LBNL Security shall be contacted. LBNL Security shall contact the University of California Police Department to evaluate the remains to determine that no investigation of the cause of death is required. The Native American Heritage Commission (NAHC) will be contacted within 24 hours if it is determined that the remains are Native American. The NAHC will then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to LBNL for the appropriate means of treating or disposing of the human remains and any grave goods. (LBNL, 2005a). Adherence to the Procedures Manual would mitigate any impacts associated with accidental discovery of cultural resources or human remains.

In accordance with 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act (NHPA), the DOE Oakland Operations Office (DOE-OAK) consulted with the California State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) in order to take into account the effect of demolition of Building 51.

As part of the Section 106 consultation process, a Memorandum of Agreement (MOA; Appendix C) was signed in 1997 among DOE, the California SHPO, and the ACHP regarding the demolition of Building 51. The MOA stated that the demolition of the Bevatron Building/Building 51 and Building 51A Complex will affect a property eligible for inclusion on the National Register of Historic Places. The stipulations of the MOA required that the building be documented in accordance with the National Park Service's Historic American Engineering Record (HAER) requirements. In September 1997, LBNL staff prepared the HAER documentation which included a written historical and architectural description of the building and accelerator, and extensive photographic recordation in accordance with the MOA's stipulations. The HAER documentation was submitted to and accepted by the US Department of Interior National Park Service (NPS) in March 1998.

With the acceptance of the HAER report by NPS, DOE may demolish Building 51 provided that DOE contacts the Historic American Building Survey (HABS) division of NPS to determine what level and kind of recordation is required for the buildings, and that such documentation is completed and accepted by HABS prior to demolition. LBNL has consulted with NPS. The latter determined that an addendum to the HAER report would meet HABS requirements. The HAER addendum has been completed and was accepted by NPS in August 2006. For NEPA purposes, with the signed MOA, completion of the HAER documentation, and approval of the HABS addendum by NPS, LBNL has adequately mitigated for the potential loss of Building 51. As an additional measure, LBNL plans to commemorate the scientific achievements attributed to the Bevatron with a monument and/or display listing the historic discoveries that occurred there.

5.1.4 Geology and Soils

Backfilling, grading, and other demolition activities associated with the project would require the removal of the shallow below-grade concrete foundation, and replacement of a portion of a retaining wall. In addition, there may be a need to excavate subsurface contaminated soil, although this quantity is anticipated to be small (approximately 200 cubic yards). The media cleanup standards and impact analysis would be consistent with those stated in the Environmental Assessment and Corrective Measures Study Report for Remediating Contamination at LBNL Regulated under the Resources Conservation and Recovery Act (DOE/EA-1527). This soil would be removed from the Laboratory, and hauled to an appropriate off-site location for disposal. Clean backfill would be used to restore the site to the current grade. The backfill would be compacted and hydro-seeded.

The Proposed Action proposes no excavation on sloped areas. If excavation is necessary, it would occur in localized areas and generate minimal quantities of soil, as noted above. A site- and project-specific erosion control plan would be included as part of the project design process and implemented as a condition for approval. This plan would include, as part of the proposed project, measures from the 1987 LRDP EIR, as amended (see Appendix A), and development of a site-specific Stormwater Pollution Prevention Plan (see Section 5.1.6, Hydrology and Water Quality). This Plan would include, as feasible, the covering of excavated materials, installation of silt traps, fencing, and use of filter fabric as measures to control erosion and sedimentation as required by the California Construction General Permit. Landscaping would then begin as soon as surface disturbances were finished for each relevant area.

The Proposed Action would therefore not have a substantial impact on geology and soils.

5.1.5 Hazards and Human Health

Project-related activities that include removal of lead dust or asbestos building materials, cutting or removal of equipment or structural materials, or the processing and removal of concrete shielding blocks or slabs would involve substances that could be a hazard to workers, the public or the environment. Various types of hazardous materials would be encountered during demolition activities. About half of the truck trips that would transport materials for disposal off-site would carry non-hazardous construction debris and solid waste, and about half would carry some type of hazardous waste, low-level radioactive waste, or mixed waste. As described in Section 5.1.9, Public Utilities, of the truckloads carrying radioactive waste, the great majority would be of low activity, volume-contaminated items.

The project would incorporate activities and programs to ensure compliance with regulatory and LBNL-specific requirements. Because some equipment and building surfaces in Building 51 are contaminated with hazardous materials at levels that could pose potential hazards to demolition workers, the project would include thorough surveys for all suspected materials, and, if necessary, cleanup of surface contamination on the equipment to be removed and building surfaces to be demolished. This process of removing and disposal of surface contamination from hazardous materials would follow standard LBNL policies and procedures, which are designed to remove or

seal and dispose of these contaminants without hazard to workers, the public, or the environment in accordance with regulatory requirements. Once the surface contaminants have been properly abated, general demolition activities would proceed.

Asbestos abatement would be conducted under the LBNL Asbestos Management Program. Before demolition activities proceed, a screening survey would identify ACMs and a sampling program would be used to assess and quantify ACMs for removal. A licensed and certified asbestos abatement contractor would remove ACMs following regulatory requirements. Asbestos-Certified LBNL personnel would oversee the ACM abatement.

Levels of crystalline silica dust would be controlled at the emission source to limit worker exposure. These controls would also help maintain compliance with air quality emissions standards, keeping dust concentrations at off-site receptors to negligible levels.

Materials that LBNL has reason to suspect might contain radioactivity would be characterized according to DOE-approved protocols and disposed appropriately, as described above. Due to the low levels of radioactivity present in the concrete that would be subjected to jackhammering or otherwise broken up, as well as the protective measures (e.g., applying water for dust suppression), it is expected that no detectable radioactivity would be contained in the dust generated by the project.

The project would include off-site disposal of items containing low levels of radiological activity to a certified disposal facility. The low levels of such activity, coupled with the employment of appropriate safety measures in accordance with LBNL operational procedures (e.g., as set in LBNL PUB-3000; LBNL, 2005c), would ensure that any exposure resulting from the shipment of these items to LBNL employees and contractors (e.g., truck drivers), and to the general public (e.g., pedestrians, or passengers in a car idling in traffic next to a truck containing such items), would be far below applicable regulatory limits.[10] The shipments with the highest levels of radioactivity, and the only shipments that could create a measurable dose, would be two or three shipments of depleted uranium. The estimated dose to a hypothetical passenger sitting for one hour in a car positioned two meters (about six-and-a-half feet) from a truck carrying depleted

[10] For transport workers, the applicable DOT regulatory limit is 2 mrem per hour. (49 CFR 173.441(b)(4)). For LBNL employees, the annual occupational exposure to general employees at DOE facilities such as the Laboratory is not to exceed a total effective dose equivalent of 5 rem (1 rem = 1,000 mrem) (10 CFR 835.202(a)(1)). Lesser annual exposure limits are set for employees who are pregnant women (500 mrem to the embryo/fetus from the period of conception to birth), and for minors who are occupationally exposed to radiation and/or radioactive materials (100 mrem) (10 CFR 835.206, 207). The LBNL Radiation Protection Program, which implements 10 CFR 835 at the Laboratory, also sets two administrative levels that can be exceeded only with the approval of relevant authorities:

- A Department of Energy Administrative Control Level for workers of 2 rem whole body exposure per year per person is established for all DOE activities. Approval by the DOE Program Secretarial Official or designee is required prior to allowing a person to exceed this level.
- LBNL itself has set an Administrative Control Level of 1 rem per year for whole body exposure. Approval by the Deputy Laboratory Director is required prior to allowing a person to exceed this level.

The exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an effective dose equivalent greater than 100 mrem (DOE Order 5400.5). This standard includes exposure to both airborne radionuclides and penetrating radiation. As mentioned earlier in the text, EPA established a limit of 10 mrem/year for airborne emissions for the general public (40 CFR 61).

uranium would be 0.2 mrem. For a hypothetical pedestrian standing for 15 minutes at a distance of two meters from such a shipment, the estimated dose would be 0.05 mrem. These are conservative assumptions, as it is unlikely that any individual member of the public would be within this distance of these shipments for these lengths of time. Even under these circumstances, the resulting exposures would be hundreds of times below the DOE regulatory limit applicable to members of the public, and below the standards set out earlier. Exposures would be less at greater distances and lesser durations.[11] For LBNL workers and contractors, the largest reasonably foreseeable exposure would be to truck drivers transporting depleted uranium blocks. A driver would receive a maximum dose of about 0.03 mrem per hour. This estimate, which does not factor in the likely lessening of the dose due to attenuation as radiation passes through the truck cab, also is far below the applicable regulatory limit and below the applicable standards. See Section 5.1.10, Traffic and Circulation, for a discussion of the potential for accidents during the transportation of materials that would be generated by the proposed project.

As a result of the above factors, the potential impacts of hazardous materials, hazardous waste, and other hazards discussed in this section would be reduced to negligible levels.

Grading, filling, and minor excavation to remove contaminated soil would occur during demolition of the building and foundations and tunnels. Since the concrete slab that surrounds Building 51 would remain in place, this grading, filling, and minor excavation would occur within the Building 51 footprint. Although substantial efforts have been made to locate and sample potentially contaminated environmental media under the building, additional areas of contamination could potentially be discovered during demolition activities, which could potentially result in exposures to demolition workers and/or the environment. Thus, in response to the discovery of conditions that indicate potential contamination, testing would be conducted in these areas prior to allowing work to proceed. Should contamination be present, LBNL would implement necessary measures to protect people and the environment from exposure, in accordance with the regulatory frameworks, and policies and procedures, described earlier in this section. These measures would be contained in a site-specific work plan and a site-specific safety plan, and would be consistent with those required under federal and state hazardous materials regulations and guidelines.

Dewatering may be necessary during project activities because groundwater can be as shallow as 15 feet below ground surface in the vicinity of the site. It is not yet known whether the excavation would intersect the existing groundwater plumes, which are located adjacent to the Building 51 site. As a prudent practice, however, the project would consider all soil and groundwater collected during these activities as potentially contaminated. In accordance with existing LBNL policies, any groundwater extracted during demolition activities would be appropriately contained and tested prior to determining the appropriate disposal option.

Prior to the start of excavation, the project management team would obtain information on known residual soil and groundwater contamination in the project area. The project management team

[11] For example, the exposure to an individual standing for an hour at three meters (about 10 feet) distance from a depleted uranium shipment would be 0.12 mrem. At six meters the dose would be one-fourth of that dose at three meters, and at 12 meters it would be one-fourth of the exposure at six meters.

would be responsible for ensuring that bid specifications disclose known locations and concentrations of hazardous chemicals in soil and groundwater that could be encountered by contractors. Any intrusive work in areas where contaminants are present would be performed by properly trained contractors with oversight by the project management team and assistance from the EH&S Division (e.g., for soil, water, or air monitoring or auditing). Residual chemical or radiological contamination, if any, would be addressed by the EH&S Division in consultation with the appropriate regulatory agency. Newly discovered environmental releases of hazardous constituents will meet the notification and corrective action requirements in LBNL's Hazardous Waste Facility Permit (EPA ID. no. CA 4890008986), section IV.B. "Newly Identified Releases." Cleanup standards and methods will be consistent with LBNL's Environmental Assessment and Corrective Measures Study Report for Remediating Contamination at LBNL Regulated under the Resources Conservation and Recovery Act (DOE/EA-1527).

Project activities would likely involve the use of hazardous materials such as solvents and petroleum products. The use of hazardous materials best management practices (BMPs) during demolition would be required as part of the proposed project under a project-specific Stormwater Pollution Prevention Plan, as described below in Section 5.1.6, Hydrology and Water Quality. Common BMPs include following manufacturers' instructions and securely storing hazardous materials at an appropriate distance from surface water bodies. In addition, as in all phases of the project, excavation and grading activities would comply with applicable state and federal regulations, as well as LBNL-specific policies, that govern hazardous materials exposure of workers, the public, and the environment. Potential exposure of workers, the public, and the environment to hazardous materials would be minimized through development of the site-specific work and safety plans in accordance with LBNL standard operating procedures, and proper handling, storage, and disposal of contaminated soil and groundwater. This would reduce impacts, including the potential for spills of hazardous materials, to negligible levels.

As it would remove a structure and persons associated with it, the project would decrease current exposure to wildland fire hazards. Areas currently occupied by the Building 51 structures would be replanted in accordance with LBNL's Integrated Landscape Management Program, using drought-tolerant native grasses. Landscaping details would include ground cover for erosion control. The proposed project would implement existing design guidelines, as described in the 1987 LRDP, and would be generally consistent with this document. The proposed project would not interfere with implementation of LBNL's emergency response or evacuation plans, because access roads would not be blocked.

5.1.6 Hydrology and Water Quality

As with many large construction projects, the Proposed Action would require the management of water generated from dust suppression activities, rainfall, and, because of the seasonally shallow groundwater, excavation dewatering. Management of the surface water is necessary to avoid entrainment of pollutants such as asbestos, lead, and silica in concrete dust. Also, construction equipment used on-site may release small quantities of petroleum products including diesel, gasoline, and grease that could be combined in the wastewater. The Proposed Action would also

involve the management of some materials that have induced or surface radioactivity (see Section 5.1.5, Hazards and Human Health).

Water generated during the project that comes into contact with the site is referred to in this analysis as “demolition contact wastewater.” The actual quantity of demolition contact wastewater that would be generated by the proposed project activities is not known; however, for the purposes of this impact analysis, it is assumed that small quantities of wastewater would be generated at the site on each day of demolition activities. Amounts of groundwater that may be generated are difficult to estimate. However, LBNL estimates that approximately 350 gallons of groundwater per day flow beneath the project area during the September dry season and up to approximately 4,750 gallons of groundwater per day flow through the same area during the December wet season. The upper end of this range is conservatively doubled for planning purposes to a range of 350 to 9,500 gallons of groundwater per day on the site throughout the year. Some portion of this daily groundwater flow would be considered demolition contact wastewater.

The actual quantities of water generated would depend on such variables as the type of equipment used to break concrete, the amount of water discharged from excavations, the amount of rainfall, and the elevation of the groundwater levels. This analysis assumes that demolition activities would continue through the winter and that stormwater management techniques would be used to reduce the contact of stormwater with residual contaminants at the demolition site.

Stormwater that could be contaminated by construction activity would be controlled by LBNL’s Best Management Practices (BMPs). The BMPs used by LBNL are described in its 2006 sitewide Stormwater Pollution Prevention Plan (SWPPP). The specific details of the demolition process and the most effective BMPs for controlling surface runoff, preventing erosion, and maintaining adequate drainage at the Building 51 site will be developed by LBNL staff and contractors in project-specific SWPPPs as the specifics of the demolition activities are further defined. As required by the statewide General Construction Permit, the preparation and implementation of SWPPPs will ensure that pollutants would not enter the environment through uncontrolled runoff. On-going groundwater monitoring would not be disturbed.

The project-specific SWPPPs would address each aspect or phase of the demolition project and describe the BMPs necessary to remedy potential stormwater management issues. LBNL would require each subcontractor operating on the Building 51 site to develop and be accountable to a SWPPP, which would define procedures and BMPs necessary to manage and discharge wastewater generated during the phases of deconstruction. The subcontractor would be responsible for preparing and implementing the SWPPP, while LBNL would oversee acceptable implementation through regular inspection of the BMPs.

Each SWPPP would address in detail the particular wastewater management issues and procedures that are unique to the individual demolition phase or activity. For example, contractors involved in aboveground concrete demolition would develop the necessary BMPs for management of water used for concrete dust suppression; contractors working in subgrade areas or excavations would use BMPs designed to address seepage of groundwater or water

accumulated on the subgrade floor of Building 51. The development of the specific procedures would rely on the fact that the building site and pad site are paved, so water on the site could be controlled in a relatively straightforward and reliable manner.

Examples of BMPs that LBNL could require as part of the project, all but the last from the LBNL 2006 facility-wide SWPPP, include the following:

- Any excavated soil that is stockpiled would be covered with weighted plastic during rain events.
- Storm drains would be protected from soil or other materials by placement of a cover, filter fabric, or other measure during demolition activities.
- Good housekeeping practices requiring orderly storage of materials and proper clean-up would be implemented throughout the demolition site.
- Hazardous materials would be stored in closed containers and away from storm drain locations.
- Water from concrete cutting activities or other concrete breaking or sawing would be contained and immediately vacuumed up.
- When new concrete is placed, specific on-site locations would be designated if necessary for concrete dust washing. Concrete residue would be allowed to harden and then would be disposed of as trash, avoiding discharge to storm drains.
- Site winterization would employ LBNL's BMPs and would include covering open tanks and lined ponds that hold demolition contact water, if these are present (such water usually would be stored in already-covered tanks); routing water away from areas that may contain residual construction waste material and petroleum; and inspecting storm drains to ensure that on-site flooding does not occur or waste materials are not flushed with clean stormwater.
- All demolition contact water generated during deconstruction operations would be contained in tanks or lined ponds and tested to determine final disposal method. Testing to determine disposal pathway would follow applicable state and federal guidelines for characterizing and profiling waste material.
- During mud-producing activities, a self-contained station would be set up where truck wheels would be cleaned to prevent dirt from leaving the site by this route. Water would be captured and recycled in this system. This station would use as little water as possible incorporating dry cleaning methods, high-pressure sprayers, and a positive shutoff valve. The station would be located away from storm drain inlets and drainages. Discharge water would be collected and disposed of in accordance with all applicable laws and regulations.

Enforcement of SWPPPs and the required BMPs would be the responsibility of LBNL site monitors who would be on-site during all demolition operations to ensure that contractors comply with the stormwater/wastewater management plans. These monitors would have the ability to authorize contractors to immediately correct non-compliant conditions or order work to stop until such conditions were corrected.

Demolition contact water would be managed by BMPs as specified in SWPPPs required by LBNL for each subcontractor. These SWPPPs and the BMPs they require would be in compliance with state and federal regulations and subject to regular inspection by LBNL staff. The management and disposal of all demolition contact wastewater and stormwater, and regular inspection of wastewater management procedures, would ensure that impacts from the generation of contact wastewater would be negligible. It is anticipated that groundwater determined to be clean can be discharged to the storm drain. Groundwater that is found to be contaminated would be treated to an acceptable level and discharged under permit to the sanitary sewer system.

Stormwater runoff from the proposed site is currently discharged to the North Fork of Strawberry Creek. This condition would not change under the post-Building 51 site configuration. Following the demolition and removal of Building 51 and its foundation, the demolition zone would be converted to vacant space and hydro-seeded with native grasses. This would allow varying amounts of surface water to percolate into the ground rather than flow along the surface, especially early in the rainy season when soil conditions are not yet saturated. The percolation of surface water into the ground would slightly reduce the overall quantity of surface water runoff. Because the Proposed Action would cause stormwater runoff on the subject site either to be slightly reduced or to remain the same as under existing conditions, the impact on runoff rates and volumes discharged to the North Fork of Strawberry Creek would be negligible. In addition, BMPs followed by the contractors would maintain the quality of re-water discharged to the North Fork of Strawberry Creek to acceptable levels.

5.1.7 Noise

All work related to disassembly and removal of the internal structures (i.e., the concrete shielding blocks and the Bevatron apparatus) would occur while the exterior structure of Building 51 is in place. The exterior structure would then be demolished. After demolition of the building, the slab and foundation structure would be demolished. Final tasks would include excavating contaminated soils, if necessary, followed by backfilling of the site. Demolition work would be performed approximately 40 hours per week, Monday through Friday; normal work hours would be between 7:00 a.m. and 3:30 p.m. It is possible that some truck loading and departure would take place on Saturdays and/or Sundays, although this would be infrequent.

The degree to which noise generated by the project would affect sensitive receptor areas depends upon the noise level generated by the equipment used, the distance between noise sources and the nearest noise-sensitive uses, and the existing noise levels at those locations. Demolition noise levels fluctuate depending on the particular type, number, and duration of use of various types of equipment.

To determine the potential noise impacts on sensitive receptors, noise tests and calculations were conducted to measure sound propagation from Building 51 to the nearest sensitive receptor areas. The tests used an artificial noise source producing a noise level of 95 dBA at 50 feet. This artificial noise source served as a surrogate for noise levels associated with the loudest stage of

demolition described above (i.e., the second stage).[12] The noise level generated was measured at the six receptor locations described in Section 4.1.7, Noise Setting, to account for the acoustical effects of the terrain, building structures, and atmospheric conditions. The resulting noise levels, based on measured noise plus background noise, were then compared to the maximum noise levels set by the Berkeley Noise Ordinance as well as the average measured existing noise levels in each of these areas. These results are shown in **Table 3**.

[12] Noise levels associated with demolition of the foundation and substructure would be 1 dBA louder than the artificial noise source used in this analysis. As mentioned earlier, except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived. Therefore, for this analysis, it was assumed that the noise levels measured as part of the noise tests conducted using the artificial noise source would serve as a reasonable substitute for the noise levels generated by the loudest stage of demolition.

TABLE 3
MEASURED NOISE LEVELS AT SENSITIVE RECEPTOR LOCATIONS WITH DEMOLITION

Measurement Location (see Figure 7)	Demolition Noise Level at Sensitive Receptor Locations (dBA)	Maximum Allowable Noise Level (Weekday/Weekend) (dBA)	Average Background Noise Level (dBA)
Area 1			
Site 1 (zoned R4)	54	65/55	54
Site 2 (zoned R4)	46	65/55	46
Site 3 (zoned R1)	44	60/50	44
Area 2			
Site 4 (zoned R1)	up to 57	60/50	54
Site 5 (zoned R1)	up to 53	60/50	52
Area 3			
Site 6 (at wall) (zoned R5)	up to 60	65/55	54
Site 6 (15 ft. from wall) (zoned R5)	not audible	65/55	53

SOURCE: Parsons (2003)

As indicated in **Table 3**, the noise levels associated with the loudest phase of demolition would not be audible at most adjacent sensitive receptor locations, and would not exceed applicable weekday noise limits set by the Berkeley Noise Ordinance.[13] Weekend truck loading and departure activities would generate noise levels that would not exceed Berkeley's weekend noise standard at any sensitive receptor sites. At the same time, on-site receptors, such as occupants of LBNL buildings adjacent to the Building 51 site, would experience temporary noise increases during demolition. Although such receptors are not generally considered noise-sensitive, implementation of mitigation measures identified in the 1987 LRDP EIR, as amended, would lessen noise impact to a negligible level (see Appendix A). Moreover, as part of project contract specifications, LBNL would require its subcontractors to employ the following noise control procedures:

- Maximum noise: Contractors will use equipment and methods during the course of this work that minimize disruption to adjacent offices and residences. Noise levels for trenchers, graders, and trucks will not exceed 80 dBA at 50 feet as measured under the noisiest operating conditions.

[13] If demolition work were to occur on weekends, associated noise levels would exceed Berkeley's weekend noise standard (City of Berkeley, 2005) at Site 4 and at the wall at Site 6. At Site 4, the combination of background and demolition noise would result in a noise level of up to 57 dBA, which represents an approximately 3-dBA increase over background noise. A 3-dBA change is considered a just-perceivable difference in noise level. Therefore, this increase in noise level would result in a negligible impact. The majority of LHS activities occur away from the wall at Site 6, in areas where there is no line-of-sight to the Building 51 area (a partial line-of-sight is available at the wall, as well as at the north parking area). Given that most LHS visitors would remain in the area behind this wall and that LHS itself is well behind this wall, LHS activities and visitors would not be exposed to demolition noise levels in excess of the weekend standard.

- Equipment: Contractors will use jack hammers equipped with exhaust mufflers and steel muffling sleeves. Diesel equipment will have exhaust muffled. Air compressors will be of a quiet type such as a "whisperized" compressor.

- Operations: Machines will not be left idling. Electric power will be used in lieu of internal combustion engine power whenever possible. Equipment will be maintained to reduce noise from vibration, faulty mufflers, or other sources.

- Scheduling: Noisy operations will be identified in the project schedule. Such operations will be scheduled so as to minimize their impact on occupied areas and their duration at any given location.

Demolition-induced vibration attenuates more or less rapidly at distance from the source, depending largely on soil conditions. Given the distance between the demolition site and any off-site buildings and residences, it is reasonable to assume that there would be no off-site impacts from groundborne vibration regardless of soil conditions. People working in LBNL buildings in the immediate vicinity of Building 51 may notice groundborne vibrations associated with demolition of the building. This impact would be negligible because it would be temporary and intermittent and would not adversely affect any off-site receptors.

Lastly, truck traffic associated with the hauling of materials to and from the site could potentially elevate noise levels along haul routes for the duration of demolition activities. The project would result in a maximum of 34 daily one-way truck trips. Trucks would be directed to routes on roads and freeways that are already heavily traveled. Therefore, given the limited number of project trips and the volume of existing traffic on the affected roadways, the general increases in noise levels along haul routes would not be perceptible.

While the Proposed Action is consistent with the City of Berkeley's Noise Ordinance, the additional measures incorporated as part of the Proposed Action would assure that the Proposed Action would not expose sensitive receptors to excessive noise levels.

5.1.8 Public Services

The Proposed Action would not introduce any additional long-term population or employment into the area. Thus, it would not result in any additional long-term demand for police or fire services or the need for new or altered facilities.

The demolition activities may require temporary roadway lane closures and detours, but these temporary changes would not substantially affect response times to the Building 51 site and its vicinity. No complete road closures are anticipated during the demolition period. Demolition activities would be overseen so as to comply with applicable safety requirements, including but not limited to LBNL-specific requirements and those of the DOE and the federal OSHA. Fire, emergency medical, and police services would be appropriately informed of relevant aspects of the project.

The Proposed Action would result in a maximum of approximately 34 one-way truck trips per day, and 4,700 total one-way truck trips on Berkeley city streets and public highways over a

period of four to seven years. These project-related truck trips, along with other, non-project-related truck trips, would cause wear on those streets, roads, and highways. Large trucks are used routinely on local streets designated as truck routes within Berkeley and also used on public highways and freeways. Such public roadways are designed and constructed to sustain regular use by heavy trucks. While most of the project truck shipments are anticipated to fall within the normal truck weight limits, about five percent would be overweight, and therefore their routes would be specified to preclude damage to bridges along the way. All project-related trucks would use approved truck routes, and therefore no damage to roadways is expected beyond that which would be considered normal wear and tear.

5.1.9 Public Utilities

Project demolition activities would generate waste and debris. Some items would be contaminated with radioactivity or have other hazardous characteristics. These waste types and their disposition options are discussed in Section 5.1.5, Hazards and Human Health. About half of the materials that would be removed would consist of non-hazardous construction debris and other solid waste. Categories of the latter include reinforced concrete shielding blocks, concrete from the building slab and foundation, glass, wood and metals. In the Bevatron accelerator itself, the most prevalent material is steel, with significant amounts of copper, aluminum, and other metals also present. In addition, there would be incidental quantities of other materials in the Bevatron apparatus, such as rubber, epoxy, and plastic.

The Proposed Action would use contractors to remove the various types of construction debris that would be generated. The project would seek to reuse or recycle non-hazardous waste where feasible. For example, uncontaminated metals might go to scrap dealers. Items that could not be salvaged would be sent to appropriate municipal landfills, such as the Altamont Landfill in Livermore, California.

Metals not subject to the DOE Metals Release Suspension would be eligible for unrestricted (“free”) release. For concrete shielding blocks, reuse options include shielding at other accelerators, and soil stabilization. Prior to release for shipment off-site, these materials would be screened in accordance with the LBNL EH&S Protocol for Survey and Release of Bevatron Materials (LBNL, 2005b). Such materials can be sent off-site and reused or recycled by government agencies and private sector parties without restrictions. If reuse or recycling is not feasible, non-radioactive concrete blocks, concrete from the other sources, and other non-hazardous materials can be sent to landfills that accept these types of materials.

Another recycling option for concrete with no hazardous characteristics is to send it to commercially operated off-site locations that break concrete into rubble. The resulting rubble could be released for such uses as fill for construction projects and road building, or it could be sent to landfills.

It is assumed that approximately half of the clean fill needed for backfilling the foundation void would be purchased and brought on-site, and the other half would be supplied by clean fill from LBNL, possibly including a small amount of recovered rubble from the slab and foundations.

Table 4 provides a summary of the principal categories, amounts, and destinations of hazardous and non-hazardous waste that would be generated.

TABLE 4
DEMOLITION WASTE: ESTIMATED AMOUNTS AND DESTINATIONS

Material	Local Class 3[a] Landfill	Local Class 2[b] or Class 3 Hazardous Waste Facility	Reuse/ Recycle	Low Level Radioactive Waste Disposal Site[e]
Asbestos Containing Material		26 truckloads		
Concrete Shielding Blocks				
Volume contamination				3,200 tons
Eligible for unrestricted release	10,300 [c] tons			
Miscellaneous Radioactive Waste Items				250 tons
Bevatron Accelerator				12,360 tons[d]
Building Steel from Accelerator Zone	180 tons[d]			
Building Steel from Outside Accelerator Zone			900 tons	
California Hazardous Materials		40 tons		
Slab and Foundation Debris				
Hazardous materials-contaminated		800 cubic yards		200 cubic yards
Volume contamination				
Non-radioactive			10,500 cubic yards	
Contaminated Soil		200 cubic yards		
Beam Line Components with Internal Surface Contamination				80 tons
Lead				5 tons
Depleted Uranium Shielding				43 tons
Other Non-Hazardous Demolition Waste	750 tons[c]			
TOTALS	**11,230 tons**	**40 tons, 1,000 cubic yards, and 26 truckloads**	**900 tons and 10,500 cubic yards**	**15,938 tons and 200 cubic yards**

[a] A Class 3 Landfill is for disposal of ordinary municipal solid waste.

[b] A Class 2 Landfill is for "designated waste." Designated waste is defined by California Water Code Section 13173 as (a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code and (b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan. Designated wastes typically include such materials as non-friable asbestos, sewage sludge (biosolids), bag house waste, grit, street sweepings, petroleum contaminated soil, triple-rinsed pesticide containers, etc.

[c] Some of this waste may be reused or recycled, lowering the amount that would be sent to landfills.

[d] Subject to DOE Metals Suspension. If not radioactive, some of this waste may be sent to landfills subject to an agreement not to recycle (i.e., "free release").

[e] Envirocare, Nevada Test Site, or other authorized facility.

As part of its standard operating procedures, LBNL consults with landfills prior to the start of demolition activities to ensure that there is sufficient capacity to accept the amount of waste generated by such projects, and has done so for the proposed project. No problems are anticipated in disposing of the various types of waste that would be generated.

The Proposed Action would result in a negligible impact on public utilities.

5.1.10 Traffic and Circulation

The Proposed Action would result in temporary and intermittent increases in traffic volumes on area roadways. Those increases would be associated with commute trips by demolition workers and the movement of equipment used for demolishing Building 51 and the Bevatron, removing materials, and backfilling and grading the Building 51 site. The intensity and nature of these activities would vary over the multi-year period of the project, and the range of adverse impacts on traffic flow and parking conditions would similarly vary. Potential adverse project-related transportation impacts would primarily relate to temporary increases in traffic volumes on area roadways outside the Lab site, in the City of Berkeley.

Truck Destinations and Routes

The Proposed Action would generate truck trips for a variety of purposes, including equipment and material deliveries and removals, demolition, excavation, and backfilling. The Proposed Action would seek to reuse or recycle materials (e.g., uncontaminated metals and concrete) where feasible. Items contaminated with non-radioactive hazardous materials would be sent to treatment and disposal facilities or landfills permitted to receive such items.

Berkeley Laboratory routinely informs its construction subcontractors that truck routing be directed toward University Avenue, Oxford Street between Hearst and University Avenues, Hearst east of Shattuck Avenue, Shattuck Avenue, Adeline Street, and Ashby Avenue, and that trucks avoid the Warring/Derby/Belrose/Claremont corridor. As part of the Proposed Action, contract specifications would include requirements that truck shipments would follow a subset of these routes: in general, shipments from the site would proceed down Cyclotron Road to Hearst Avenue and then proceed west on Hearst Avenue, south on Oxford Street, and west on University Avenue to I-80. Shipments to the site would reverse these directions. This is also the route designated for radioactive and mixed waste in a 1996 agreement between LBNL and the City of Berkeley. The location of the receiving facilities would dictate what direction on I-80 the trucks would travel.

No roads would be permanently closed as a result of the Proposed Action, and no new roads, road extensions, or improvements would be required. As stated above, LBNL’s Facilities Master Specifications would require flaggers for all work that may affect the use of roads by the University and, in accordance with LBNL’s Health and Safety Manual, traffic disruptions and temporary road closures would be managed through the use of signs, cones, barricades, flaggers, and clearly identified traffic detours. Additionally, security and the local fire and police departments would be notified of any temporary road closures.

Number and Timing of Trips

An estimated maximum of about 4,700 one-way truck trips would be required over the four- to seven-year term of the Proposed Action.[14] Most of the trips would be one of two types: 1) inbound trips with empty trucks and outbound trips with trucks hauling away material for appropriate disposal, or 2) inbound trips delivering clean backfill and outbound empty trucks. Other trips would be for the delivery of demolition equipment and miscellaneous supplies.

Demolition work would be performed approximately 40 hours per week, Monday through Friday; normal work hours would be between 7:00 a.m. and 3:30 p.m.. It is possible that some work, including truck loading and departure, would take place on Saturdays and/or Sundays, although this would be infrequent.[15]

The highest level of truck travel would occur during the final months of the proposed activities, when backfilling is underway. It is estimated that the number of daily truck trips at that time would be about 18 to 34 one-way trips (i.e., up to 17 loaded trucks and 17 empty trucks); during the other periods of demolition activity, the number of truck trips per day would be no more than about 10 one-way trips.[16] Because these truck trips would be spread over the course of a work day, the up to 34 daily one-way trips would generate an average of about four one-way trips per hour (i.e., one truck every 15 minutes). However, the actual number of shipments could be greater at particular times.

The number of workers and associated trips would vary over the multi-year demolition period, but is estimated to be about 20 to 25 workers on average per day, with a maximum of up to about 50 workers. Contractor personnel not taking public transportation or LBNL-provided bus transit would park near the Building 51 site or elsewhere at LBNL. An estimate of the number of daily trips by workers is based upon a conservative assumption that all of the workers would be driving alone (i.e., no carpooling assumed) to and from the site during the peak hour, even though public transportation and Laboratory shuttles are available in the Building 51 area. In addition, it was assumed that because of the presence of an on-site cafeteria, no more than about 25 percent of the demolition workers would travel off-site during the lunch period. The number of trips generated by workers would therefore be up to 50 inbound trips in the morning, 24 mid-day trips (12 inbound, 12 outbound), and 50 outbound afternoon trips for a total of approximately 124 daily trips during the peak demolition activity periods. The worker-generated trips would be dispersed over the various roadways used between the Building 51 site and the worker's trip origin/destination.

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14 A schedule variant of the project could reduce the minimum duration of the project from four years to three and a half years, but for the reasons discussed here, this reduction in schedule would not increase the maximum haul truck traffic generation rates and therefore would not change the resulting traffic impacts and mitigation measures. See Appendix G.

15 An alternative-sequence project variant that would demolish Building 51 before the disassembly and removal of the Bevatron itself would, for the reasons discussed here, not increase the maximum haul truck traffic generation rates and therefore would not alter traffic and traffic-related impacts and their mitigation measures. Analysis of the alternative-sequence project variant is included in Appendix G.

16 For comparison, existing daily traffic entering and exiting LBNL is approximately 5,700 vehicles per weekday.

Effects on Roads and Intersections

The estimated increase in traffic volumes caused by haul truck traffic for the Proposed Action would not be substantial relative to background traffic conditions, and would fall within the daily fluctuations of traffic volumes for area roadways, which would not be noticeable to the average motorist. As noted in Section 4.1.10, Traffic and Circulation Setting, the intersections of University Avenue / Sixth Street and University Avenue / San Pablo Avenue operate at LOS F during both peak hours. The remaining 20 study intersections operate at LOS D or better. The Proposed Action's contribution to the two intersections operating at LOS F would represent an increase of no more than about 0.9 percent above the a.m. and p.m. peak hour traffic volumes. These truck trips would be spread over the course of a work day, therefore, the highest level of truck traffic would generate an average of about one truck every 15 minutes. This short-term increase in vehicle trips would not substantially affect level of service and traffic flow on roadways. The primary impacts from demolition truck traffic would include a temporary and intermittent reduction of roadway capacities due to the slower movements compared to passenger vehicles. As stated above, at particular times, the actual number of truck trips could be greater than the average estimated herein. However, with the incorporation of the mitigation measure described below, the number of demolition-generated vehicle trips would not result in any adverse change in traffic levels of service.

The Proposed Action would neither alter the physical configuration of the existing roadway network serving the area, nor introduce unsafe design features. The physical and traffic characteristics of area roadways (e.g., traffic signal and stop-sign control, pedestrian crosswalks and crossing signals) would safely accommodate traffic generated by the Proposed Action. The Proposed Action's effect on general and emergency access, pedestrians and bicyclists, and safety related to roadway design, would be negligible.

Transportation of equipment or demolition materials exceeding the load size and weight limits of any roadways would require special permits. There are established procedures and processes for obtaining such permits through agencies governing the use of the roadway and highway system. Compliance with applicable regulatory requirements is expected to result in negligible impacts.

> **Mitigation:** To address potential temporary and intermittent adverse effects to transportation and traffic, the following mitigation measure would be adopted:
>
> The frequency of truck trips (loaded or empty) shall be no greater than (a) one every 10 minutes (six truck trips per hour) during the a.m. and p.m. peak commute hours, and (b) one every five minutes (12 truck trips per hour) during periods other than the a.m. and p.m. peak commute hours.
>
> Under this limitation, the projected level of truck traffic would have minimal effects on traffic flow, even if those trucks were to travel through the congested intersections on University Avenue at San Pablo Avenue and Sixth Street during the peak commute hours. Hourly truck

trips would represent an increase of no more than about 0.9 percent above the a.m. and p.m. peak-hour traffic volumes, respectively, at the above-cited congested intersections.[17]

Demolition workers would require parking areas for their vehicles. Adequate parking is available in the Building 51 staging area to meet parking needs of the Proposed Action, and as part of the Proposed Action, demolition workers driving vehicles to LBNL would be directed to park within that area.

Transport of Demolition Materials

The Proposed Action would require the off-site shipment of hazardous waste, low-level radioactive waste, and mixed waste. Transport of hazardous and radioactive materials is addressed below, and additional information on the handling of these materials is provided in Section 5.1.5, Hazards and Human Health.

Transport of Radioactive Waste

Radioactive waste would consist of waste that contains induced and/or surface radioactivity, the presence of which would be determined by instrument surveys or swipe samples, depending on the items involved. While Berkeley Lab is subject to DOE requirements for the on-site management of radioactive waste, it is subject to a different set of requirements for the transport of such waste, mandated by the U.S. Department of Transportation (DOT), as follows:

- As described in Section 5.1.5, for volume contamination from induced radioactivity, the DOE-approved detection limit for radioactivity is 2 picoCuries/gram (pCi/g). The DOT definition of radioactive waste differs from that of DOE. Items with induced activity are not managed under DOT regulations as radioactive where the sum of the radioactivity of all of the isotopes in an item expected to be encountered during the Proposed Action is 270 pCi/g or less. Thus, items with radioactivity between 2 pCi/g and 270 pCi/g would be classified as "radioactive" by DOE, but not by DOT. Only items with an induced activity above DOT isotope-specific activity thresholds are required to be managed as a DOT hazardous material for shipment to a disposal facility.

- The number of surface contaminated items is expected to be small enough that one shipment would suffice. It is possible that these items would be grouped and shipped with other radioactive waste produced by other programs at LBNL. Shipments would be labeled and transported in accordance with DOT requirements.

- All or most of the concrete blocks containing uranium above background levels, and all of the depleted uranium blocks, would be transported as DOT radioactive material, and labeled and transported in accordance with DOT requirements. Some metals from the Bevatron may also be shipped as DOT radioactive material.

As stated in a 1996 agreement between LBNL and the City of Berkeley, the Laboratory:

[17] The maximum 0.9-percent increase was calculated using six one-way truck trips (one every 10 minutes), a passenger-car-equivalence of three cars per one truck, and existing a.m. peak-hour traffic volumes on University Avenue. The percent increase with any other combination of values (e.g., four one-way truck trips, or existing p.m. peak-hour volumes, or total intersection volumes, or cumulative volumes) would be less than 0.9 percent.

> "will target shipments [of radioactive and mixed waste] for the morning hours of 9 a.m. - 11 a.m. and pledge[s] to avoid where possible, shipments during peak 'rush hour' traffic (6 a.m. - 9 a.m. and 3 p.m. - 8 p.m.). However, we must state that when this target cannot be met, the Laboratory reserves the right to allow the transporter to depart at other times, confident that the standard we meet for packaging and shipping such waste provides every reasonable assurance for protection of the environment and public health."

As described earlier, radioactive waste would be sent to an approved disposal site. Prior to beginning shipments of items determined to be radioactive waste, LBNL would make a voluntary annual advance notification to designated City of Berkeley agencies. This notification would summarize the general types of waste being shipped, the typical radioisotope content of each waste type, and the anticipated shipping frequency.

Employees and contractors at Berkeley Lab who handle and transport radioactive materials must comply with the requirements of the Laboratory's DOE-approved Radiation Protection Program. Any shipments or transfers of radioactive materials from the Laboratory would be reviewed and approved by the Environment, Health and Safety (EH&S) Division to ensure that the materials would be properly contained for shipment pursuant to applicable DOT and DOE regulations and requirements, and would not present a hazard to the public during transport. As described in Section 5.1.5, any radiological dose to LBNL employees and contractors, or to the general public, would be far below applicable regulatory limits.

Transport of Hazardous Waste

The EH&S Division is responsible for ensuring compliance with hazardous waste regulations and for determining the Berkeley Lab Hazardous Waste Handling Facility's management requirements, selecting a disposal site, and manifesting and maintaining disposal records. Hazardous waste, and transite and other asbestos-containing material, would be packaged, labeled, and transported as per EPA and DOT regulatory requirements. Any residual soil or groundwater contamination that is encountered during demolition would be managed in accordance with applicable DOE and Berkeley Lab policies, and state and federal regulations regarding hazardous waste transport. These regulations are specifically designed to reduce the potential risk of any adverse affects to human health to negligible levels.

Transport of DOT Non-Regulated Materials

In general, due to the absence of hazardous characteristics, the DOT non-regulated materials that would be shipped off-site as a result of the Proposed Action would not require sealed containers. Items would have been vacuumed or otherwise cleaned prior to shipment, and the trucks would not release radioactive or hazardous dust products. However, some items likely would be shipped in sealed containers because of certain physical characteristics (e.g., small items that otherwise would be difficult to hold down or surface contaminated objects that may contain dispersible radioactivity).

Accident Potential

Accident data for collisions involving trucks over a three-year period (2002 through 2004) were obtained from the Department of California Highway Patrol for roadways that truck trips generated by the Proposed Action would likely use between the Building 51 site and the I-80 freeway (CHP, 2005). **Table 5** shows the name of the road, the length of the road segment in question, the total number of collisions involving trucks in the three-year period, the average number of accidents per year, and the number of accidents that were the fault of the truck driver in the opinion of the reporting officer. As shown in the table, the number of accidents per year involving trucks has not been high, and has been less so if one considers only those for which fault was assigned to the truck driver.

TABLE 5
COLLISIONS INVOLVING TRUCKS ON LIKELY TRUCK ROUTES (2002-2004)

Roadway	Length of Segment	All Accidents		Fault of Truck Driver	
		Total	Per Year	Total	Per Year
University Avenue (Oxford Street to I-80)	2.19 miles	17	5.7	10	3.3
Oxford Street (University Ave. to Hearst Ave.)	0.12 mile	1	0.3	1	0.3
Hearst Avenue (Shattuck Ave. to Highland Pl.)	0.72 mile	1	0.3	1	0.3
Shattuck Avenue (Hearst Ave. to Ashby Ave.)	1.31 mile	5	1.7	2	0.7
Adeline Street (Shattuck Ave. to Ashby Ave.)	0.39 mile	3	1.0	3	1.0
Ashby Avenue (Shattuck Avenue to I-880)	1.66 mile	9	3.0	4	1.3

SOURCE: CHP (2004)

The Proposed Action would neither change the physical characteristics of the street network serving the site, nor generate traffic that is incompatible with existing traffic patterns. It would be unlikely that the rate of motor vehicle accidents (i.e., accidents per number of vehicles) would increase as a result of the Proposed Action. There would be no reasonably foreseeable substantial risks to health and safety from transporting project demolition material.

The Proposed Action would result in a negligible impact on traffic, circulation, and parking at the Building 51 site and in the vicinity.

5.1.11 Visual Quality

Demolition activities would create a temporary adverse effect on the visual quality of the proposed site and its surroundings. The visual environment during the demolition project, which would last between four years and seven years, would include the presence of elements typical of a demolition site such as cranes, excavators, loaders, trucks, compactors, stockpiled materiel, and

temporary fencing, as well as the truck trips necessary to bring materials to and from the site. After demolition activities have been completed, the site would be backfilled, compacted, and hydroseeded. While future reuse of the site is contemplated by LBNL, no specific project has been identified to date, and for the purpose of this analysis, no buildings would exist on the site after the demolition project is completed.

In accordance with 1987 LRDP EIR, as amended, disturbed areas would be revegetated using native shrubs, trees, and/or grasses (see Appendix A). All vegetation placed by the proposed project would be irrigated as necessary and would conform to the 1987 LRDP Design Guidelines.

Views of the site and of demolition activities would be primarily available from locations immediately surrounding the building, on LBNL property, with some portions of the site visible from the Lawrence Hall of Science when looking west. The visual environment created during demolition activities would be temporary and therefore its impact on views would be negligible. Further, no long-range views of the project site would be altered, as the site is generally not visible from longer distances within the City of Berkeley.

Removal of the Bevatron and Building 51 would alter the character of the site by replacing a large building complex with an open, revegetated area of about 2.25 acres in size; however, this alteration would not create an adverse aesthetic impact.

If nighttime demolition activities were to occur, temporary lighting would be required that could affect views by increasing the amount of light and glare emitted from the project site. Work would be performed approximately 40 hours per week, Monday through Friday. Normal work hours would be between 7:00 a.m. and 3:30 p.m. However, if it would be necessary to perform some work activity after sunset or before sunrise, such as truck loading and departure, or to complete a critical phase of work that would not cause high levels of noise or other impacts, the Lab would install night shields on all outdoor fixtures used during demolition activities to minimize potential light and glare spillover impacts. This nighttime lighting would not be a substantial new source of light or glare visible to off-site urban areas.

The Proposed Action would therefore not have an important impact on the visual quality of the site, or the visual quality of areas in the vicinity of the site.

5.1.12 Environmental Resources Not Affected

Environmental resource topics in which no impact would occur include the following:

- **Floodplains/ Wetlands.** The Proposed Action would not take place within a 100-year floodplain or in the vicinity of wetlands.

- **Seiche, Tsunami, and Mudflows.** Removal of the structures eliminates structural hazards associated with mudflows, seiches, and tsunamis.

- **Agriculture/Mineral Resources.** There are no agricultural land uses on or near the project site that would be affected by the demolition of Building 51. The California Department of

Conservation, Geological Survey (CGS, formerly Division of Mines and Geology) has mapped the project site as a MRZ-4, which is an area containing no known mineral occurrences where geologic information does not rule out either the presence or absence of significant mineral resources (Kohler, 1996). There are no mineral resource sites that would be affected by the demolition of Building 51.

- **Odors.** The demolition process would include no activities or sources capable of creating any objectionable odors.

- **Riparian/Sensitive Habitats.** The site is currently developed and does not contain riparian habitat or support sensitive natural communities. The demolition of the structures would not affect these habitats as they do not exist on the site. There are no marshes, vernal pools, or wetlands on the site. No impact would occur as these resources are not present.

- **Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP).** The site is not located within the boundaries of a HCP or NCCP area. Therefore, the Proposed Action would not conflict with a HCP or NCCP.

- **Air Traffic.** The site is not located within two miles of a public or private airstrip. Therefore, there are no potential impacts associated with safety and noise hazards related to air traffic. The demolition project would have no effect on air traffic patterns.

- **Permanent Noise.** The Proposed Action would not result in permanent increases in noise levels in the project vicinity. Once demolition is complete there would be no further noise generated.

- **Septic Systems.** No septic systems exist on the site. Existing wastewater disposal systems would remain intact.

- **Water and Wastewater.** No new wastewater would result from the demolition of Building 51. If water is needed to reduce dust during demolition, wastewater would not be generated as only enough water to moisten the active area would be used and no runoff would occur. With such small quantities, wastewater treatment would not be affected by dust suppression watering. Therefore, no impact to wastewater treatment would result.

  Water consumption would be maintained at roughly the current rate as a result of the demolition and relocation of employees on-site, and sufficient water supply is currently available. A limited amount of water would be required for demolition-related activities, such as dust suppression and site housekeeping; however, the amount required would not result in the need for additional water facilities or entitlements to serve the proposed demolition activities. The Proposed Action would not result in an increase in long-term demand, but would maintain existing demand levels. No new water or wastewater treatment facilities would be required.

- **Energy.** The Proposed Action would require short-term use of energy, including electrical power and fossil fuels to operate equipment. Long-term energy use would be maintained at the current rate as a result of the relocation of employees on-site. The Proposed Action would not result in a long-term increase in energy demand, and no new electricity-generating equipment or facilities would be required.

- **Community Division.** Demolition would not divide the community, as it would merely result in the removal of existing structures no longer used on the site.

- **Population Growth/Housing Displacement.** No new homes, employment, or infrastructure would be created as a result of the demolition of Building 51. As a result, no increases in population levels are anticipated. There are no existing housing structures associated with Building 51. No homes would be demolished as a result of this Proposed Action. No replacement housing is needed.

- **Recreation.** No population increase would occur as a result of the Proposed Action; therefore, the existing level of use of neighborhood parks and regional facilities would not increase or change. Since the use of such facilities would not increase, deterioration of recreational opportunities would not be accelerated. The same levels of use and wear that are currently experienced would continue under this Proposed Action. No recreational facilities would be constructed, nor would demand exceed the availability of recreational facilities. This Proposed Action would not construct or require the off-site construction of recreational facilities.

- **Land Use.** The Proposed Action would take place on an area that is adjacent to Lawrence Road (from which vehicles enter and leave the site) and McMillan Road within Berkeley Lab. Laboratory, office, engineering, and computing functions occupy the LBNL buildings immediately to the west of Building 51. Open space or landscaped areas border the site immediately to the east and north. The Proposed Action would not conflict with LBNL planning documents, including its Long Range Development Plan. The area has been previously identified as a location of a future laboratory building in LBNL planning documents. A brief, supporting analysis of Land Use is included in Appendix B.

- **Socioeconomics.** Federal funding for the Proposed Action would be from national sources and would not represent an important commitment of local resources. Employment for the demolition would draw upon local populations and would not be perceptible in any particular employment or housing market.

- **Environmental Justice.** Due to the low incidence of localized, off-site impacts from the Proposed Action, as well as to the demographics of populations living nearest the project site, there would be no disproportionately high or adverse human health or environmental effects on minority or low-income populations from the demolition.

5.2 Analysis of Abnormal Events and Accident Scenarios

Routine accidents and injuries (e.g., slips, trips, and falls) are common occurrences at demolition sites and are not considered abnormal events. Nevertheless, worker safety issues are addressed in this document and would be further minimized by implementation of applicable federal, state, OSHA, and LBNL regulations and practices, including those identified in Appendix A of this document.

Vehicle accidents related to trucking are discussed under Accident Potential in Section 5.1.10, Traffic and Circulation.

Abnormal accidents would include serious equipment malfunction or major structural or land stability failures due to faulty engineering or construction practices. Again, these issues have been addressed and would not be reasonably foreseeable given the inclusion of various precautionary elements of the Proposed Action, including those identified in Appendix A of this document.

5.3 Environmental Consequences of the Proposed Alternatives

5.3.1 No Action Alternative

Under the No Action Alternative, the induced radioactivity contained in the concrete and other material of the Bevatron would remain on site and continue to decay over time.[18] The facility would remain a long-term maintenance and financial drain on LBNL, and would not address the multiple legacy hazards on site. Because of the problems with the building, all present occupants are slated for relocation during 2005-2006.

The No Action Alternative would not achieve any of the goals of the Proposed Action.

Because the No Action Alternative would involve no on-site demolition activities or off-site removal of debris, the visual quality, air quality, biological resources, geology and soils, hazards and human health, hydrology and water quality, noise, public services, transportation, public utilities effects related to the demolition or to the transportation of debris would not occur.

However, the No Action Alternative would not avoid long-term cultural resources impacts, because the deterioration of Building 51 and the Bevatron would continue and eventually, the value of the historic physical resource would be lost. Lastly, the No Action Alternative would not include hazard abatement or seismic upgrade activities, and therefore, long-term on-site risks to worker or public health could be greater than under the Proposed Action.

5.3.2 Preservation

Under the Preservation Alternative, the entire site would be dedicated to non-LBNL uses and could be managed by another public agency, such as the National Park Service, with the intention of actively preserving Building 51 and the Bevatron equipment within it. The public agency would maintain and preserve the building in accordance with the *Secretary of the Interior's Standards for Preservation*, and would allow limited public access for interpretive/educational purposes.

The Preservation Action alternative would not achieve most of the goals of the Proposed Action.

[18] This alternative is also a decay-in-place alternative. The nuclei of radioactive atoms are unstable. Over time, the nuclei will eventually decay by emitting a particle and/or radiation, which transforms the nucleus into another nucleus, or into a lower energy state. The chain of decays continues until the resulting nucleus is stable. Decay for an interval of 10 half-lives would reduce the radioactivity to roughly 1/1000 of the original. Thus, for Co-60, which has a half-life of 5.2 years; decay for 52 years would reduce the Co-60 radioactivity to roughly 1/1000 of its present value.

Under the Preservation Action, the facility would still require long-term maintenance and a substantial financial investment for clean-up and refurbishment. This would include such things as re-roofing and exterior waterproofing. Reinforcement would be required to strengthen the structure to make it seismically safe. New roll-up doors would also be required to replace those that were either removed or are inoperable. The facility would have to be patrolled periodically to prevent unauthorized uses, due to the continuing presence of hazardous materials, and, as would be the case for any unoccupied building, to ensure that it did not become occupied by unwanted animals or pests.

The Preservation Alternative would involve on-site repair activities and related off-site trucking, as well as long term operations, that would result in aesthetics, air quality, biological resources, cultural resources, hazards and human health, noise, public services, transportation, and public utilities impacts that would be smaller than the Proposed Action's impacts.

The Preservation Alternative would result in substantially less site activity and demolition, so would have a lower potential for wastewater and runoff impacts than under the Proposed Action. Under this alternative, impervious surfaces would not be removed; therefore, the Proposed Action's beneficial impact to water quality would not occur, because impervious surfaces would remain in their existing condition at the site.

The Preservation Alternative could result in a potential seismic safety impact, because it would expose more people to potential injury as a result of seismic induced hazards. However, unless the building was occupied on a regular basis, this impact would likely be negligible.

5.3.3 On-Site Rubbling

Under the On-Site Rubbling Alternative, most of the Proposed Action's activities would remain the same with the exception of activities related to processing and disposal of concrete. Under this alternative, most of the concrete from the building structure (i.e., walls and floors), foundation, and many of the concrete blocks shielding the Bevatron would be rubbled on-site. Metal (e.g., rebar) in the debris would be separated and disposed of separately. Only concrete that contains no detectable added (i.e., non-naturally occurring) radioactivity and otherwise clear of contaminants would be rubbled. The rubbled material and segregated reinforcing steel would be recycled if public or private sector demand were available at the time of production. If not, it would be disposed of at a landfill. LBNL could use the rubble as aggregate or fill material if the need for such materials coincided with its production; however, this is speculative.

The On-Site Rubbling Alternative would achieve the goals of the Proposed Action.

On-Site Rubbling would require open areas for staging the broken but not yet rubbled concrete, maneuvering large heavy equipment to transfer broken concrete into the first crushing machine, and stockpiling the initially crushed material. In addition, a separate area would be required for the collection and consolidation of reinforcing steel. Sufficient space adjacent to Building 51 does not currently exist for such an operation, and a site or sites would have to be made available elsewhere at LBNL, at a sufficient distance from off-site sensitive receptors to avoid nuisance

impacts. The On-Site Rubbling Alternative's requirement for such space could result in some minimal impacts to land use, whereas the Proposed Action would not affect land use.

Crushing of demolished materials for reuse as aggregate would greatly increase the amount of dust (PM_{10}) generated as compared to the proposed project. However, the amount of dust produced during crushing activities could be reduced by regularly watering the crushing operations to keep dust levels low. In addition, as compared with the proposed project, there would be additional heavy equipment, such as the concrete crushing machines themselves, which would produce additional diesel emissions. As would be the case for the proposed project, LBNL policies require subcontractors to comply with an array of federal and state requirements, including BAAQMD regulations and *BAAQMD CEQA Guidelines*, as well as OSHA regulations. These would ensure that impacts to air quality would be negligible. Long-term non-construction impacts would be the same as those of the proposed project.

Noise produced under this alternative would not exceed local noise limits. The noise generated would be greater than that under the proposed project if the concrete crushing equipment operated at the same time as other heavy demolition equipment. However, the incremental additional noise that would be created by this concrete crushing equipment would not be important. Noise created by the hoe ram hammer, which would be used during demolition for both the proposed project and this alternative, is greater than the noise created by other project equipment, to the extent that the combined noise level of the activity is based predominantly on the use of the hoe ram hammer. The noise produced by the concrete crusher operating together with the hoe ram hammer would not result in substantial noise increases over the level of the hoe ram hammer alone. Therefore, the noise levels would remain essentially the same for this alternative as for the proposed project.

Impacts to biological resources could be greater than under the Proposed Action because the on-site rubbling machinery and activities would have a larger potential to result in impacts to nesting raptors and other special-status nesting birds, special-status bats, and other biological resources, due to increased noise generated by the operation of the rubbling equipment.

The On-Site Rubbling Alternative's impacts to cultural resources, geology and soils, hazards and human health, hydrology and water quality, public services, traffic, and public utilities would be the same as would occur under the Proposed Action.

5.4 Cumulative Impacts

5.4.1 Projects in Vicinity of Proposed Action

Planned, pending, and/or reasonably foreseeable projects in the area of the Proposed Action include the following:

- The Rehabilitation of Buildings 77 and 77A project has already been approved to replace the roof of Building 77; upgrade various utility systems in both buildings; add an interior

crane to Building 77A; and construct a small nearby building to house chillers, a cooling tower, boilers, and associated equipment.

- As described in Section 4.3.5, as a condition of the Hazardous Waste Facility Permit issued by the Department of Toxic Substances Control (DTSC), LBNL has been required to investigate and address historical releases of hazardous wastes and materials that may have occurred at the site. Cleanup activities have already been conducted in some areas as part of Interim Corrective Measures that were implemented to protect human health or the environment. The final step of the cleanup process is to determine the best way to clean the remaining contamination and to begin the final clean up. The document evaluating possible cleanup methods and recommending which cleanup methods to implement, called the Corrective Measures Study Report, or CMS Report, was made available to the public and other agencies for their review and comment, and was approved by DTSC effective October 2005. The selected cleanup measures of the CMS Report are being put in place as part of the Corrective Measures Implementation phase of the RCRA Corrective Action Plan process.

- User Support Building – This approved three-story, approximately 30,000-gross-square-foot building, would consist of assembly space, support laboratories, and offices in support of the Advanced Light Source user facility at LBNL. This building will be constructed on the site previously occupied by Building 10 which was demolished during the summer of 2007. Construction is scheduled from mid 2008 to mid-2010.

- The Animal Care Facility (ACF) is an approximately 5,005 gross square foot (gsf) one-story building located on the eastern side of Berkeley Lab, northwest of Building 83. The ACF will replace the nearby existing 8,500 gsf animal care unit in Building 74, which is nearing obsolescence due to aging and unreliable mechanical equipment, and potential seismic inadequacy. If seismic upgrades are made to Building 74, the vacated space in that building likely would be converted to wet and dry laboratories and used for the same types of research activities, some of which already take place at Building 74 and others of which take place at other buildings at LBNL. The new ACF building has been completed, and is anticipated to be occupied in early 2008.

- An approximately 140' x 20' section of Cyclotron Road, the main road leading into Berkeley Lab from Hearst Avenue in Berkeley, California, would be widened to provide a visitor processing lane. The action would also include removing the existing guard kiosk and installing up to three new guard kiosks. The project was completed in 2006.

- The University of California is in the planning stage for the construction and operation of a new Guest House to serve visiting scientists, faculty and students. Many of the visitors using the Lab's facilities - the Advanced Light Source, National Center for Electron Microscopy, 88" Cyclotron, and the Molecular Foundry - are from outside the Bay Area and must obtain short-term housing. This proposed three-story, approximately 25,000-gross-square-foot building would hold up to 120 beds for visiting researchers and other guests of LBNL. An Initial Study/Negative Declaration was prepared and circulated in early 2007. The project was approved and construction will begin in 2008. The Guest House would be constructed near the Advanced Light Source, the Lab's largest user facility. The site designated for the Guest House is near the center of the Laboratory, west and southwest of Building 2 and on the site of the demolished Building 29 and Trailer 29D, and existing Trailers 29A, 29B, and 29C. It would use existing utilities infrastructure in the vicinity.

- The UC Berkeley 2020 LRDP and LRDP EIR project population increases of up to 12 percent (approximately 5,320 "heads") and built space increases of up to 18 percent (approximately 2.2 million gsf) by the year 2020. The Regents approved the UC Berkeley 2020 LRDP and certified the LRDP's EIR on January 20, 2005.

- The Computational Research and Theory (CRT) Building would be a UC-funded, five-story, approximately 140,000 gross square foot computer and office building constructed near the Blackberry Gate entrance to the Lab's main site. It would provide high-end computing floor space and accompanying office space to support the Lab's National Energy Research Scientific Computing (NERSC) Center, which is currently operating within an off-site leased building. Construction would take place from approximately 2008 to 2011.

- The Helios Research Facility, a UCB project, would be a four-story, 160,000 gross square foot building constructed immediately south of LBNL buildings 66 and 62. The goal of the Helios Project is to accelerate the development of renewable and sustainable energy sources using sunlight. This would be achieved by developing fundamentally new and optimized materials for use in collectors, and by creating more efficient processing steps and energy handling. Construction would take place from approximately 2008 to 2011.

- The environmental analyses assumed no more than one million gsf of construction would be underway at any one time within the Campus Park, Adjacent Blocks, Southside and Hill Campus land use zones, which are approximately equal to the maximum level of construction that was underway at the time the Existing Setting data were collected in 2002 and 2003. Thus, the aggregate effects of the maximum level of construction foreseen under the UC Berkeley 2020 LRDP are already reflected in the existing setting.

  The UC Berkeley 2020 LRDP EIR also included a project-level analysis of the Chang-Lin Tien Center for East Asian Studies. The proposed Center includes two buildings: Phase 1, a four-story building of approximately 67,500 gsf, and Phase 2, a building planned to accommodate up to 43,000 gsf. At this point in time, Phase 1 is the only project that has received funding to proceed. Construction for Phase 1 is underway (Shaff, 2006).

- UC Berkeley plans to implement seven projects, referred to as the Southeast Campus Integrated Projects (SCIP). SCIP includes seismic and program improvements at the California Memorial Stadium, including a 158,000-gsf athletic training center and 102,000 gsf of additional new academic and support space at the stadium. The SCIP Final EIR, which was tiered from the UC Berkeley 2020 LRDP and LRDP EIR, was completed in October 2006. The SCIP EIR identified significant, unavoidable impacts in the areas of aesthetics (effects on the character of Gayley Road and on views from Panoramic Hill); cultural resources (changes to Memorial Stadium, demolition of several structures, and alterations to buildings and landscape along Piedmont Avenue); geology (earthquake risk); noise (due to construction and demolition and due to the potential for additional events at the stadium); traffic (effects at the Durant/Piedmont and Bancroft/Piedmont intersections[19]); and utilities and service systems (increased demand on wastewater facilities) (UC Berkeley, 2006). Project construction for all of the projects is not definite at this time, but is expected to begin in 2008 and be completed in 2012 (UC Berkeley, 2005c).

[19] These impacts could be mitigated with the implementation of mitigation measures from the UC Berkeley 2020 LRDP EIR but are identified as significant and unavoidable because they are outside the jurisdiction of The Regents and could only be implemented at the discretion of the City of Berkeley.

- UC Berkeley proposes to construct and operate an Early Childhood Education Center, serving up to 78 children, on the north side of Haste Street, mid-block between Dana and Ellsworth Streets, in Berkeley, California. The 17,880 square foot project site is adjacent to a large campus parking lot. The project site itself is presently used as a surface parking lot with 53 marked vehicle spaces (UC Berkeley, 2005a). Construction of this facility is underway. (Shaff, 2006).

- As part of UC Berkeley's Northeast Quadrant Science and Safety (NEQSS) Projects, demolition of the former Stanley Hall took place in Spring 2003. The new Stanley Hall is currently under construction and was completed in 2007. The new facility is located at the East Gate of the campus next to the Hearst Memorial Mining Building and is eight stories above ground with three basement levels, and measures approximately 285,000 gsf (UC Berkeley, 2005b).

- The Center for Information Technology Research in the Interest of Society (CITRIS) Headquarters project is part of UC Berkeley's NEQSS projects. The demolition of Davis Hall North, located in the north east section of the Berkeley campus near the intersection of Hearst and LeRoy Avenues, began at the end of August 2004 to make way for a replacement facility that will provide the headquarters for CITRIS and is designed to contain about 79,420 assignable square feet within a total area of 142,000 gsf. Construction of the new CITRIS Headquarters facility is underway and scheduled to continue through 2009 (UC Berkeley, 2005b; UCOP, 2002; Shaff 2006).

- UC Berkeley plans to retrofit the Bancroft Library, which is located in the central portion of the campus to the north of Wheeler Hall between South Hall Road and Sather Road. The project will also include some program improvements. Construction for this project is underway and expected to continue through 2008 (Shaff, 2006).

- UC Berkeley plans to construct an Americans with Disabilities Act-compliant pedestrian bridge to connect the north and south components of the Foothill housing project. As currently proposed, the pedestrian bridge would be constructed over Hearst Avenue, just east of Gayley Road, connecting the two sides of the Foothill dormitories and would provide access between the dormitories and campus. The Foothill Bridge was completed in September 2007.

- Development in the surrounding area includes growth and development within the city of Berkeley as envisioned in the 2001 City of Berkeley General Plan (City of Berkeley, 2001) and EIR. The 2001 City of Berkeley General Plan allows for steady growth and development, but, given a lack of substantial undeveloped space in the City, this would take place at a relatively even pace with an emphasis on infill development. Projections include a population increase of approximately 7,000 people (a roughly six percent increase), approximately 3,300 new household units (a roughly eight percent increase), and approximately 3,700 new jobs (a roughly five percent increase) by the year 2020.

5.4.2 Cumulative Impact Areas

Areas where there would be no reasonably foreseeable substantial cumulative impacts include: Land Use; Socioeconomics; and Environmental Justice.

Development of the site is likely at some point in the future, although there are no firm plans for such development that have reached the level of a proposed or reasonably foreseeable action. Given the absence of a development proposal, and given that the new LBNL LRDP and LRDP

EIR now under preparation are not anticipated to include any specific development proposal for the Building 51 site, it would be speculative at this time to provide detailed analysis. However, it is anticipated that future development would be consistent with the 1987 LRDP and 1987 LRDP EIR, as amended, or, depending on when development would be proposed, with the new LRDP and LRDP EIR. Future development would be evaluated and documented in accordance with NEPA and CEQA requirements, and would incorporate applicable mitigation measures.[20] A future project also would comply with applicable governmental requirements that result in the avoidance or reduction of potential environmental impacts. Any such project would be required to be consistent with the governing LRDP absent an LRDP amendment. Similarly, development at UC Berkeley and other locations in the vicinity also is anticipated to comply with applicable requirements (e.g., in the case of UC Berkeley, with its own 2020 LRDP and LRDP EIR, issued in 2005). Thus, a future project at the Building 51 site would not be expected to contribute considerably to any cumulative impact.

Air Quality

The Proposed Action would generate air emissions only from temporary demolition-related activity and traffic. Given that the project-level air quality impacts would be negligible, the cumulative effect also can be based on a determination of the consistency of this project with the LRDP and the consistency of the LRDP with the regional CAP.

Because the Proposed Action is consistent with the LRDP and, in turn, because the LRDP has been determined to be consistent with the CAP, the contribution of these emissions to cumulative regional air quality would not be considered to be cumulatively considerable. The cumulative impact would be negligible.

Biological Resources

The Proposed Action would result in a minor net benefit for biological resources, although this benefit is not expected to be permanent. Project impacts on biological resources are expected to be relatively minor and all impacts would be mitigated to negligible levels. There are currently no specific projects planned for the site and the project calls for revegetation after demolition is complete. Thus the project would result in a small increase of open space and potential wildlife habitat at LBNL. Other projects considered at LBNL and the UC Berkeley campus, as well as development under the Berkeley and Oakland General Plans within the geographic context

[20] For example, mitigation measures relevant to aesthetics in the 1987 LRDP EIR as amended, include:

III-F-1a: Buildings will occupy as limited a footprint as feasible. They will incorporate features that enhance flexibility and future versatility.

III-F-1b: Buildings will be planned to blend with their surroundings and be appropriately landscaped. Planning objectives will be for new buildings to retain and enhance long distance view corridors and not to compromise views from existing buildings. New buildings will generally be of low rise construction.

III-F-2: Any new facilities will not use reflective exterior wall materials or reflective glass, to mitigate the potential impacts of light and glare.

III-D-2a: Revegetation of disturbed areas, including slope stabilization sites, using native shrubs, trees, and grasses will be included as part of all new projects.

outlined above, and anticipated but uncertain future development that might occur at the project site, would cumulatively combine to reduce open space and available habitat. However, open space currently comprises a substantial portion of the geographic context described above and the fractional amount of vacant space developed would be relatively small.

The magnitude of cumulative effects of development on biological resources is in large part determined by the extent to which resources are protected in plans and during specific project implementation. The 1987 LBNL LRDP and the 2020 UC Berkeley LRDP, as well as the East Bay Regional Park District Master Plan (EBMUD, 1996) and the City of Berkeley General Plan, all contain policies and/or guidelines for protecting natural resources, including special-status species, sensitive natural communities, and jurisdictional waters. The Proposed Action and all development under the LBNL LRDP, the UC Berkeley LRDP and projects tiered from the UC Berkeley LRDP, the City of Berkeley General Plan, and the East Bay Regional Park District Master Plan would also take place in a regulatory context of federal, state, and local laws designed to avoid and minimize impacts to special-status species, sensitive natural communities, jurisdictional waters, and wildlife migratory corridors and nurseries. The cumulative impacts of all development anticipated under these plans would not result in a substantial reduction in open space or wildlife habitat. Similarly, the Proposed Action would not make a considerable contribution to that overall cumulative biological impact.

Cultural Resources

LBNL has retained Pacific Northwest National Laboratory (PNNL) to complete a series of reports to identify, survey, and evaluate approximately 245 buildings and structures at the LBNL site for potential eligibility for listing in the National Register. These studies have been undertaken pursuant to Section 110 of the National Historic Preservation Act, which requires that federal agencies such as DOE survey the lands under their control and evaluate all historic properties (including buildings and the equipment contained therein) for eligibility for listing in the National Register.

The PNNL series of reports is not yet complete, nor have the reports been submitted to the State Historic Preservation Officer for concurrence. Preliminary findings of the surveys and research conducted by PNNL suggest that Buildings 71 and 88 possibly are eligible for listing in the National Register (PNNL, no date). However, there are no current plans to alter Buildings 71 and 88. No other buildings or structures at LBNL have been identified as potentially eligible for listing in the National Register as part of this survey effort.

There are no projects planned as part of the UC Berkeley 2020 LRDP, or City of Berkeley projects that would damage or destroy known archaeological or historical resources. The proposed undertaking and all development under the LBNL and UC Berkeley LRDPs, and the City of Berkeley General Plan, would take place in a regulatory context of federal, state, and local laws designed to avoid and minimize impacts to cultural resources. As a result, these projects would not combine with the loss of Building 51 to create an important cumulative impact on cultural resources.

UC Berkeley's Final EIR for the Southeast Campus Integrated Projects (SCIP) (SCIP; see Chapter VI of the DEIR) identifies a number of historic resources that could be affected by that project. These include the Cheney House and Cheney Cottage at 2241 and 2243 College Avenue, the Piedmont Avenue Houses at 2222, 2224, 2232, 2234 and 2240 Piedmont Avenue, and California Memorial Stadium. A CEQA EIR was prepared to confirm the historic status of these buildings and to identify potential impacts to them resulting from the SCIP. The EIR identified significant impacts to these buildings and also identified mitigation measures to eliminate or reduce the severity of such impacts to the extent feasible. Impacts resulting from SCIP would not combine with the proposed undertaking to form a substantial cumulative impact to historic resources, due to the vastly different building types involved (i.e., residential structures and a sports stadium compared with a building that houses a particle accelerator), as well as differing architectural styles and dates of construction. To the extent they might adversely affect historic resources, the projects involved would not be "closely related" (CEQA Guidelines Sec. 15355(b)) enough to contribute to any cumulative impact, because of, by virtue of the substantially different historic resources involved, to contribute to any cumulative impact

While the Proposed Action would not combine with other nearby projects to result in a substantial cumulative impact on local historic resources, the buildings that house particle accelerators are of a rare type by virtue of their unique scientific requirements and construction expense. Particle accelerators of this size exist in only three locations in the state: LBNL, UC Davis, and the Stanford Linear Accelerator Center.

There are approximately 75 particle accelerators currently operating worldwide, of which 25 are located in North America (Bonn University, 2006). Aside from the 88-inch Cyclotron at LBNL (Building 88), there are two other operating particle accelerator facilities located in California. They are the Stanford Linear Accelerator Center (SLAC) at Stanford University in Palo Alto, California, and the Crocker Nuclear Laboratory at UC Davis in Davis, California. The architectural design and historical status of these particle accelerator facilities are discussed and compared with the Bevatron, below.

Stanford Linear Accelerator Center. SLAC was founded in 1962 on Stanford University land near Palo Alto, California. The facility began operating in 1966, with numerous additions in the 1970s and 1990s. SLAC is a collection of many structures housing many operating elements, including the Linac/NLC (Next Linear Collider), the Positron Electron Project (PEP), the asymmetric B Factory (PEP-II), the SLAC Linear Electron Positron Collider, the Stanford Positron Electron Asymmetric Ring (SPEAR), and the Stanford Synchrotron Radiation Laboratory (SSRL) (SLAC, 2006a). Three Nobel prizes in physics have been awarded to researchers at SLAC, one each in 1976, 1990, and 1995 (SLAC, 2006b). The buildings in which the accelerators are housed are of a modern/industrial architectural design, dictated by the basic linear form of the accelerator to be a sprawling, multi-structure facility housing many different pieces of equipment,

None of the SLAC facilities are listed (nor are they known to be eligible to be listed) on federal, state, or local registers of historical resources. In the future, if SLAC were to be determined to be a historic resource, measures to protect it from demolition or substantial alteration would include

those required by CEQA and/or NEPA. However, SLAC is currently operational, and is not threatened with demolition or substantial alteration.

While both Building 51 and SLAC contain particle accelerators, the architectural design of SLAC is defined by the basic linear form of the accelerator to be a sprawling, multi-structure facility, whereas Building 51 is a smaller and more contained structure housing the single, circular-form Bevatron accelerator.

Crocker Nuclear Laboratory. The 76-inch Isochronous Cyclotron at Crocker Nuclear Laboratory began operating in 1966 at UC Davis. The accelerator is one of the few of this design remaining in productive operation, although another Isochronous Cyclotron is also in use at Oak Ridge National Laboratory (U.C. Davis, 2006). The building in which the accelerator is housed is of a mid-1960s modern architectural design, and is not listed on federal, state, or local registers of historical resources. In the future, if this facility were to be determined to be a historic resource, measures to protect it from demolition or substantial alteration would include those required by CEQA and/or NEPA.

Both the Bevatron and the Crocker facility accelerator are cyclotron accelerators, however, the Crocker accelerator is currently operational, and is not threatened with demolition or substantial alteration. Although the two share the same compact form, the Crocker ~~Nuclear Laboratory~~ accelerator is contained within a mid-1960s modern, four-story office/classroom/laboratory building which bears no architectural resemblance to Building 51, which has a more industrial aesthetic.

The Bevatron and the other particle accelerators in California do not physically exist together as a group, as do buildings in a historic district, where the architecture of each building contributes to the overall physical and historic entity. Rather, particle accelerators are related only in an abstract way. The historic importance of the Bevatron, a scientific research device, and Building 51, the building that houses it, lies in the contributions to physics and knowledge in general that were made using the Bevatron; the importance of these activities to LBNL in furthering its overall research programs; and the Bevatron as an important milestone in the on-going development of particle accelerators for basic research. The other known accelerators in the state are currently operational, do not appear to be slated for potential demolition, and will continue to exist in other forms across the state. As such, the demolition of Building 51 would not contribute to an important cumulative effect on historic resources.

Thus, the demolition of the Bevatron and Building 51 would not contribute to the loss of a physical historic group or entity, and therefore, the demolition would not result in a cumulatively considerable impact on historic resources.

Geology and Soils

The 1987 LRDP EIR, as amended, found that no significant adverse cumulative impacts upon people or property are anticipated in or in the vicinity of LBNL as a result of geologic and/or soils hazards. Compared with the existing population, greater numbers of people would be exposed to

earthquake hazards as a result of growth anticipated in the 1987 LRDP EIR, as amended; growth anticipated in the LRDP EIR currently being prepared, including an unknown structure that may be built at the Building 51 site at some unknown future date; and other growth in the region. However, new structures would be built to current seismic design standards and would, in general, be safer than existing structures. The proposed demolition of Building 51 would therefore reduce overall potential cumulative earthquake hazard. The project does not contain a development component and the end result of the project would be an open area. As stated above, there would be no substantial impacts from this project and it would not contribute to a cumulative impact.

Hazards and Human Health

The Proposed Action, together with the implementation of RCRA corrective measures, would have a cumulative beneficial impact on soil and groundwater contamination at the Lab by removing hazardous materials and waste. The project would result in an overall decrease of hazardous materials at the project site through demolition, removal and off-site disposal in accordance with all applicable regulations. There were no important potential impacts identified for the handling, transportation, or disposal of the hazardous materials. Therefore, the project would not combine with the other projects listed in Section 6.1 to create a substantial cumulative increase in exposure to hazards or hazardous materials.

Hydrology and Water Quality

This cumulative impact analysis considers changes in drainage and water quality within the Strawberry Creek watershed and the impact that the Proposed Action would have on that watershed. Because Strawberry Creek and its tributaries drain through LBNL, UC Berkeley, and the city of Berkeley, the analysis considers development in those areas and not exclusively at LBNL. During project implementation, stormwater runoff and demolition contact water would be managed, controlled, and treated as outlined in the sitewide SWPPP and in SWPPPs prepared for each particular phase of the project to address stormwater management issues and assign BMPs. Through compliance with NPDES construction activity permit regulations, thorough implementation of SWPPPs, and regular monitoring of BMP efficiency by LBNL, the Proposed Action would not cause increased stormwater flows or discharges of polluted runoff that would be capable of altering drainage or degrading water quality within Strawberry Creek. Since the project would not alter natural hydrology or discharge pollutants to Strawberry Creek, the incremental contribution of the Proposed Action to cumulative hydrology and water quality impacts would not be cumulatively considerable.

Following project completion, the former Building 51 site would be converted to vacant space suitable for future, though undetermined, development. Such a conversion would result in no additional stormwater runoff from the site and could decrease flows under certain storm events. As with the short-term project conditions, since there would be no increase in runoff from the site under post-project conditions, the long-term effect would not be cumulatively important.

The project would not generate additional stormwater or pollution that would degrade water quality in Strawberry Creek. The 1987 LRDP EIR, as amended, considered the effects of stormwater quality and quantity resulting from constructing and operating all buildings in the entire LBNL site. The area occupied by the development considered in the 1987 LRDP EIR, as amended, would have greater square footage and more total impervious area than current conditions, or conditions after the completion of the Proposed Action. Therefore, the effects on the quantity and quality of stormwater from the Proposed Action are well within those considered in the 1987 LRDP EIR and have already been accounted for in LBNL's site-wide stormwater management planning.

Most other on-site LBNL development would have some water quality and stormwater drainage demand impacts that correspond to converting pervious surfaces into impervious surfaces. However, LBNL projects would be required to comply with LBNL’s NPDES permit and associated SWPPP and SWMP, and this project will in general reduce impervious surfaces. Other projects occurring on the UC Berkeley campus and in the city of Berkeley would generally occur incrementally, and most often within already developed (and impervious) areas. Potential cumulative hydrology and water quality impacts associated with the Proposed Action would not result in an important cumulative impact.

Noise

The 1987 LRDP EIR, as amended, considered the intermittent and short-term effects of equipment and truck noise resulting from the construction of a larger facility than now exists at LBNL. Noise from all project demolition activities would fall well within the total construction noise levels that were considered in that EIR and for which the mitigation measures listed earlier were adopted. Moreover, as is evident from discussion under Section 5.1.5 regarding the limited effects of project noise on ambient noise at the nearest residences, new development on the UC Berkeley campus and in the city of Berkeley would be too distant and of insufficient noise energy to have a combined adverse effect on ambient noise at these sensitive receptor areas. For these reasons, the project’s contribution to cumulative noise impacts from development in the surrounding area, including projects identified in the city of Berkeley and the UC Berkeley campus, would be considered unimportant.

Public Services

While the Proposed Action would employ workers for demolition activities, it would not result in any permanent new on-site employees. The approximately 50 people who worked at Building 51 have been relocated to other LBNL facilities, and do not add to future demand for public services. Any temporary increase in public services demand that would result from the demolition activities would be well within levels anticipated and accommodated in the existing LRDP and 1987 LRDP EIR, as amended. Although projected City of Berkeley and UC Berkeley campus projects would be expected to gradually increase demand for off-site services over time, the project-related demand for off-site services would be negligible and temporary, so the project’s contribution to a cumulative public services impact would not be substantial.

Public Utilities

In the long term, the Proposed Action would result in reduced utility usage at LBNL, since Building 51 would no longer exist and would not continue to generate demand for utilities, and no new permanent employees would be added to LBNL as a result of the Proposed Action. Any project-specific demand for utilities from demolition activities would be within the anticipated demand expected and analyzed under the 1987 LRDP EIR, as amended. Although development at LBNL and in the surrounding area would be expected to increase demand for regional utilities and energy provision, the project's contribution to that combined demand would be negligible and would not cause any substantial increase in demand on regional providers. Moreover, regional utilities are managed to accommodate region-wide growth and demand increase; these projects would be expected to fit within this long-term planning. In addition, LBNL, UC Berkeley, and the City of Berkeley all encourage or mandate water and energy-saving devices and practices.

Traffic and Circulation

The Proposed Action would generate no new operational (long-term) vehicle trips and would have a negligible effect on long-term traffic conditions. Under cumulative conditions, traffic volumes would increase on area roadways and at study intersections due to the potential development cited above. Recent (2004) estimates of increases in roadway and intersection traffic volumes were presented in the University of California at Berkeley's *2020 Long Range Development Plan & Chang-Lin Tien Center for East Asian Studies Final EIR*.

The intersections in the project area cited under "Setting" above would continue to operate at acceptable levels of service (LOS D or better) during the a.m. and p.m. peak hours, except for the University Avenue/San Pablo Avenue, University Avenue/Sixth Street, and Gayley Road/Stadium Rim Way intersections, where delays within LOS F would increase. The project would generate a short-term increase in traffic volumes on area roadways that would fall within the daily fluctuation of traffic, which would not be noticeable to the average motorist. The trips generated by the Proposed Action would add negligible traffic to long-term cumulative conditions. Demolition traffic would be short-term and incremental, and, with the exception of the Lab's Guest House and projects in the SCIP, it is not likely that the Proposed Action's peak daily trip generation (trucks and worker vehicles), during the project's final phase, would coincide with the projects identified in this EA to the extent that a substantial disruption of traffic on surrounding streets would occur.

The approved User Support Building would not contribute to peak-hour AM and PM traffic conditions, as construction trips would be limited to off-peak hours. The latter 11 months of the proposed Guest House construction could coincide with the initial activity phase of the Bevatron project. This would not be cumulatively considerable, as the later construction phases of the moderately-sized Guest House would include relatively few truck trips, as most of the building material would be transported during the earlier phases. The CRT and Helios Buildings would likely coincide with the first two years of the Bevatron project, however it is not expected that new cumulatively considerable impacts would result. Those projects will be tiered from the new 2006 LRDP and EIR, which impose restrictions and management practices on new construction

projects to avoid and minimize cumulative construction traffic from LBNL during peak commute hours.

It is anticipated that construction of the Guest House would overlap with the Proposed Action. Mitigation measures applicable to construction traffic included as part of the Proposed Action would also apply to construction of the Guest House, and would reduce the likelihood of important cumulative effects.

With respect to the potential cumulative traffic effects of UC Berkeley's proposed SCIP, construction and thus construction-related traffic from the SCIP Memorial Stadium renovation and the other six projects (including a parking structure, a new Law/Business school building, and renovations to existing law school, business school, and student residential buildings) would overlap with the Proposed Action. The projects would be within the growth envelope analyzed in UC Berkeley's 2020 LRDP EIR, and would result in space and population levels below levels anticipated in UC Berkeley's 2020 LRDP. The Final EIR for SCIP finds that cumulative transportation impacts would be consistent with the transportation impacts identified in the UC Berkeley 2020 LRDP EIR (UC Berkeley, 2006). Because those impacts are assumed as part of the cumulative development assumptions incorporated into this section, no additional cumulative transportation impacts would result from the proposed Building 51 project in combination with cumulative development.

In any case, the incorporation of mitigation included as part of the Proposed Action (please see the Executive Summary, page 6), would ensure that traffic-generating activities associated with concurrent projects would not have an important effect on traffic conditions. In addition, the potential impact of exposure to hazardous materials during transportation to off-site facilities would be negligible, and the Proposed Action would not result in a substantial cumulative impact, because the Proposed Action would not combine with other projects to create a substantial risk due to transport of hazardous materials.

Visual Quality

The temporary visual effects of the Proposed Action would make no cumulatively considerable contribution to adverse visual impacts at LBNL or in Berkeley. The project's temporary visual effects would be within the scope of the 1987 LRDP EIR, as amended, which concluded that the overall development of approximately two million gross square feet of facilities at LBNL would not adversely affect the visual quality of the area.

5.5 Summary of Alternatives and Consequences

The Proposed Action and Alternatives are summarized in **Table 6** on the following pages.

TABLE 6
SUMMARY OF PROPOSED ACTION ALTERNATIVES AND IMPACTS

	Proposed Action	No Action	Preservation Alternative	On-Site Rubbling
ACTION DESCRIPTION				
Site Location	West-central area of LBNL.	Same.	Same.	Same.
Site Size (approx)	2.25 acres (Building 51 footprint)	Same.	Same.	Larger work site required.
Number of Occupants	None	Same.	TBD, but more than 0.	Same.
Number of New Truck Trips	4,700 total truck trips.	None	Much fewer than 4,700 truck trips.	Same.
Number of New Auto Trips	No long-term auto increase.	Same.	Small long-term auto increase.	Same.
ACTION IMPACTS				
Geology, Soils, and Seismicity	Demolition including earthmoving activities could result in small amount of soil erosion or loss of topsoil.	No impact.	Increased impact. Exposure of persons to seismic induced hazards.	Same.
Hydrology and Water Quality	Minimal amount of wastewater and runoff could become contaminated and enter the stormwater system or the adjacent environment.	No impact.	Decreased impact. On-site repair activities could generate lesser construction runoff.	Same.
Biological Resources	Proposed Action may indirectly disturb nesting special-status birds, special-status bats. (Unlikely, but mitigation planned to make sure no disturbance occurs)	No impact.	Decreased impact. On-site repair activities would not impact biological resources.	Same. (Unlikely, but mitigation planned to make sure no disturbance occurs)
Historic and Archaeological Resources	Would demolish historic structure. (Mitigation includes documentation of site structure and installation of marker commemorating work performed there)	No impact.	Decreased impact. On-site repair activities would maintain historic building.	Same.
	Could disturb archaeological resources, though none are expected on this site.			Same.
Visual Quality	Would have demolition equipment on the site and remove building.	No impact.	Decreased impact. On-site repair activities would maintain building.)	Same.
Traffic and Circulation	Would temporarily and intermittently increase traffic. Would generate truck trips carrying hazardous materials.	No impact.	Decreased impact. Alternative would generate vehicle trips from visitors and construction workers conducting on-site repairs.	Same.
Air Quality	Would create short-term emissions of criteria pollutants and possibly asbestos-containing materials.	No impact.	Decreased impact. On-site repair would create lesser short-term construction emissions.	Same.
Noise	Would create demolition noise.	No impact.	Decreased impact. Alternative would create noise associated with building improvements.	Slightly increased impact. Alternative would create demolition noise.

TABLE 6 (Continued)
SUMMARY OF PROPOSED ACTION ALTERNATIVES AND IMPACTS

	Proposed Action	No Action	Preservation Alternative	On-Site Rubbling
ACTION IMPACTS (cont.)				
Public Services	Could temporarily affect fire and police response times. Demolition truck trips would cause wear and tear on public roads and highways.	No impact.	Slightly increased impact. On-site repair would allow public use of the building and use police, fire, and emergency medical services.	Similar impact. Alternative could temporarily affect fire and police response times.
Public Utilities	Would generate demolition waste.	No impact.	Decreased impact. Alternative would use water and would generate waste and wastewater, but would not generate demolition waste.	Same.
Hazards and Human Health	Activities could include removal of hazardous materials. Could expose construction workers or the environment to hazardous materials.	No impact.	Decreased impact. Alternative would use small amounts of hazardous materials.	Same
Land Use	No impact.	No impact.	Alternative would increase development in area	Slightly increased impact. Alternative would have temporary on-site rubbling.
Environmental Justice	No impact.	No impact.	No impact.	No impact.
Cumulative Impacts	No substantial cumulative contributions. Small or negligible contribution to cumulative impacts.	No impact.	Same	Same

NOTES: "Same" denotes a characteristic or effect that is the same under the Proposed Action.
"gsf" is "gross square feet."

CHAPTER 6.0
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CHAPTER 7.0
Persons and Agencies Consulted

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CHAPTER 8.0
Acronyms

ABAG	Association of Bay Area Governments
ACM	Asbestos-containing materials
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BMPs	Best Management Practices
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Department of Conservation, Geological Survey
CHP	California Highway Patrol
CMI	Corrective Measures Implementation
CNDDB	California Natural Diversity Database
CY	Calendar year
dB	Decibels
dBA	A-weighted decibels
DCE	1,1-dichloroethene
DOE	United States Department of Energy
DOT	United States Department of Transportation

DPM	Diesel particulate matter
DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EH&S	Environment, Health, and Safety (Division)
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
gsf	Gross square feet
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HEPA filter	High Efficiency Particulate Air filters
HWHF	Hazardous Waste Handing Facility
ICM	Interim Corrective Measures
Leq	Energy-Equivalent Noise Level
LBL/LBNL	Lawrence Berkeley Laboratory/Lawrence Berkeley National Laboratory
LHS	UC Berkeley Lawrence Hall of Science Museum
LOS	Level of Service
LRDP	Long Range Development Plan
MM	Modified Mercalli
MOA	Memorandum of Agreement
MRZ	Mineral Resource Zones
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Airborne Pollutants
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NOP	Notice of Preparation

NOx	Nitrogen oxide
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OSHA	Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
$PM_{2.5}$	Particulate Matter – 2.5 microns or smaller
PM_{10}	Particulate Matter – 10 microns or smaller
PNNL	Pacific Northwest National Laboratory
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
ROG	Reactive Organic Gas
SHPO	State Historical Preservation Officer
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TAC	Toxic Air Contaminant
TCE	Trichloroethene
TSCA	Toxic Substances Control Act
UC	University of California
UCPD	UC Berkeley Police Department
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile organic compound
$\mu g/m^3$	Micrograms per cubic meter