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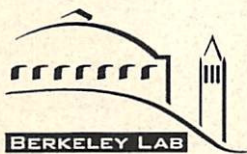
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UNIVERSITY OF CALIFORNIA

**SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT
ADDENDUM
FOR THE PROPOSED EXTENSION
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



**ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY**



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**University of California, Ernest Orlando Lawrence Berkeley National Laboratory
Supplemental Environmental Impact Report Addendum**

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I BACKGROUND AND SUMMARY

Introduction

Background

Analytical Approach

Addendum Organization

Summary

Review and Approval Process

I. BACKGROUND AND SUMMARY

A. INTRODUCTION

This Addendum was prepared pursuant to the California Environmental Quality Act (CEQA) (Public Resources Code, section 21000 et seq.) to evaluate whether any environmental consequences of the proposed modification and extension of the contract between the United States Department of Energy (DOE) and the University of California (University) for operation and management of the Ernest Orlando Lawrence Berkeley National Laboratory (Berkeley Lab) would require preparation of a subsequent Environmental Impact Report (EIR). The operating contract between the University and the DOE provides the framework within which DOE funds and oversees, and the University manages, the activities, facilities and development at Berkeley Lab. The contract includes general provisions relating to the role and responsibilities of the University and DOE, but does not identify or implement specific development projects or plans for research facilities or activities.

The University/DOE operating contracts have historically been renewed for five year terms. The proposed contract extension period would be 5 years, from the year 1997 through the year 2002, with an option to extend an additional 5 years, to 2007. The Board of Regents of the University of California (The Regents) are anticipated to consider approval of the contract extension at The Regents' September 1997 meeting. For purposes of this environmental analysis, it is assumed that the contract will extend until 2007 and that during the contract term Berkeley Lab may be developed to buildout as projected in the Lab's 1987 Long Range Development Plan (LRDP) to occur sometime after the year 2000 (denoted herein as "20xx").

Background on CEQA process

In 1987, in conjunction with the University's consideration of the existing operating contract, Berkeley Lab completed a comprehensive, long-term institutional site planning process. The Lab's LRDP and the accompanying programmatic Site Development Plan EIR (referred to in the text as the LRDP EIR) were approved by The Regents in September 1987 and continue to guide the siting and development of facilities at the Lab. In 1992, when The Regents reviewed and considered renewal of the contract for an additional five years (1992 through 1997), a supplemental Environmental Impact Report (referred to in the text as the SEIR) was prepared to inform The Regents of any new significant environmental impacts that might be caused by The Regents' approval of the contract renewal and that were not previously identified and mitigated to a less than significant level in the LRDP EIR. (Both the LRDP EIR and the SEIR are incorporated by reference into this Addendum.)

In November 1992, The Regents certified the program-level SEIR, which evaluated comprehensively the potential environmental impacts associated with the University's operation and management of the Laboratory that were reasonably foreseeable at that time.

The analysis in the SEIR was based on the University's continued implementation of the LRDP during the period from October 1, 1992 through September 30, 1997. The SEIR assumed that the Lab would continue to implement its major programs as identified in the LRDP, that the total Laboratory population (at the main hill site and off-site locations) would increase to 4,390, and that facility development would total 2.24 million gross square feet by the year 1997.

The SEIR analyzed potential environmental impacts from continued Laboratory operations in fourteen environmental topic areas. Impacts in the following categories were determined to be significant without mitigation but were reduced to less than significant levels by incorporating mitigation measures: geology, soils and seismicity; hydrology and water quality; biological resources; visual quality; land use; traffic, circulation, and parking; air quality; noise; and hazardous materials. Because the Bay Area had not attained federal and state ambient air quality standards for ozone, and the continued operation of the Laboratory would result in small long-term increases in ozone-related air emissions, significant impacts related to this air quality impact could not be fully mitigated and remained significant. In addition, because any regional measures intended to reduce emissions of toxic air contaminants (TACs) were not within the jurisdiction of Berkeley Lab's management to implement, the cumulative air quality impacts of TAC increases were considered to be significant and unavoidable.

In accordance with Section 21166 of CEQA and Sections 15162 through 15164 of the CEQA Guidelines, this Addendum presents changes to the 1992 SEIR resulting from proposed changes in the DOE contract, changed circumstances, or new information since certification of the 1992 SEIR. As noted earlier, no specific projects that affect the physical environment are contemplated or committed to by the contract. In fact, each new project requires separate approval and funding. Although the contract itself merely establishes a mechanism for funding and a management structure between the parties, this Addendum analysis brings up to date the current and projected status of the LRDP approved by The Regents in September 1987, which will continue to be implemented during the contract extension period defined above. Based on the analysis contained herein and substantial evidence in the record, the University has determined that an addendum to the SEIR provides the appropriate level of additional environmental review for the proposed contract extension because no substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts.

B. BACKGROUND

Project Location

Berkeley Lab is situated on the ridges and draws of Blackberry Canyon, which forms the central part of the site, and Strawberry Canyon, which generally forms the southern boundary. The area to the south, owned by the University, is maintained largely in a natural state and includes the University of California, Berkeley (UCB) recreational facilities and the University Botanical Garden (see LBL Vicinity Map, SEIR, pg. II-5). Above and to the east of Berkeley Lab on Centennial Drive are the University's Lawrence Hall of Science, the Space Sciences Institute, and the Mathematical Sciences Research Institute. Berkeley Lab is bordered on the north by predominantly single-family homes and on the west by multi-unit dwellings, student residence halls, and private homes. The area to the west of the Lab is urbanized. The eastern portion of the Lab site is located in the northeast corner of the City of Oakland. This area is undeveloped and includes botanical gardens, a regional park, and open space.

In May 1996 the University and the Lab entered into a formal agreement transferring management responsibility for 70 acres of the University's land, located along the Lab's perimeter, to Berkeley Lab as part of a mutual effort to manage the risk of fire in the East Bay hills (Figure I-1). Transfer of maintenance responsibility for the 70 acres is discussed further in Section III-G, Land Use.

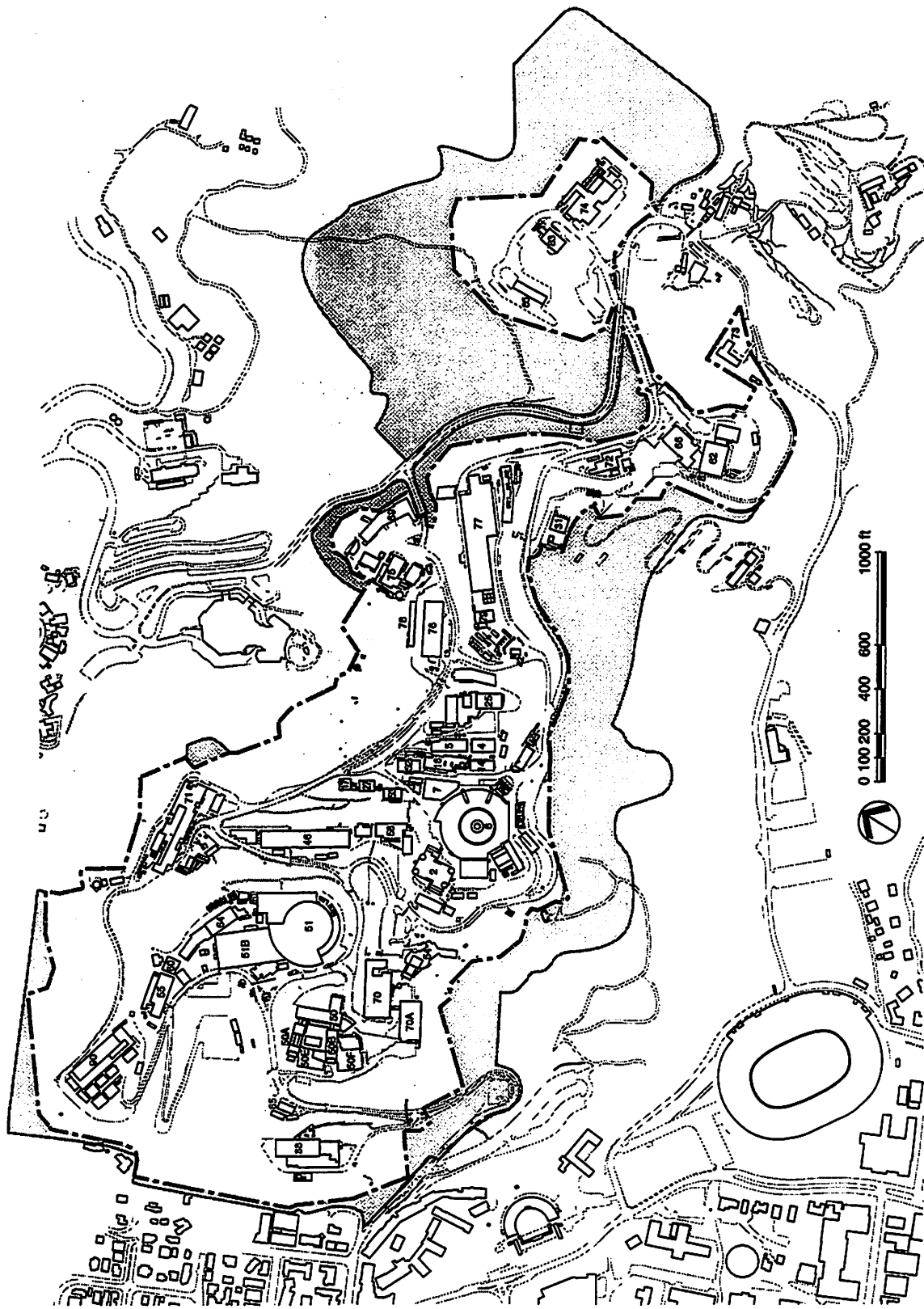


Figure I-1
AREA TRANSFERRED TO BERKELEY LAB MANAGEMENT

In addition to the 134-acre main hill site and the new 70-acre management area, Berkeley Lab also occupies 0.11 million square feet of laboratory research space on the UCB campus and at the UCB Richmond Field Station, and leases an additional 0.26 million square feet of office, laboratory, and storage space in Berkeley, Walnut Creek, and Livermore, California and in Washington D.C.

C. ANALYTICAL APPROACH

The proposed action of The Regents is the modification and extension of the existing contract between the DOE and University for continued operation and management of Berkeley Lab. As explained earlier, for purposes of this environmental analysis, the proposed contract is assumed to extend from October 1997 through September 2007, and during the contract term it is assumed that Berkeley Lab may be developed to buildout as projected in the Lab's LRDP to occur sometime after the year 2000 (20xx).

In evaluating the proposed project, the University has, in accordance with Section 15162 of the CEQA Guidelines, analyzed the proposed contract extension in relation to the existing DOE contract and 1992 SEIR to determine whether one or more of the following circumstances exist or are anticipated:

- **Project changes:** Will substantial changes associated with the proposed extension of the DOE contract require major revisions of the 1992 SEIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects?
- **Changed circumstances:** Have there been substantial changes with respect to the circumstances under which the DOE contract is being undertaken that will require major revisions of the 1992 SEIR due to the involvement of new significant effects or a substantial increase in the severity of previously identified significant effects?
- **New Information:** Is there new information of substantial importance that was not known and could not have been known with the exercise of reasonable diligence at the time the previous 1992 SEIR was certified which shows that:
 - (1) The extended DOE contract will involve one or more significant impacts not discussed in, or substantially more severe than shown in, the 1992 SEIR;
 - (2) Mitigation measures or alternatives previously found infeasible would be feasible and would substantially reduce one or more significant effects on the environment, but the University declines to adopt them; or
 - (3) Mitigation measures or alternatives that are considerably different from those analyzed in the previous SEIR would substantially reduce one or more significant effects on the environment, but the University declines to adopt them.

D. ADDENDUM ORGANIZATION

This Addendum is organized, for ease of cross-reference, following the format of the SEIR. Therefore, section headings are the same as in the SEIR, and the same subheadings are used wherever possible. For example, Section III-J of the SEIR and the Addendum both address air quality.

The Addendum addresses only those issue areas involving a project change, changed circumstance, or new information related to the proposed contract extension (which could not have been known with the exercise of reasonable diligence at the time of the SEIR). For example, the Lab's institutional goals that are described in the SEIR (pgs. II-1 to II-2) are unchanged and therefore are not discussed in the Addendum; however, there have been changes in the Lab's population and built space since the SEIR and the changes are addressed in this Addendum.

In the cases where a change is identified, the Addendum presents a summary of the SEIR analysis in that issue area, describes the change, and analyzes the potential impacts from the change and whether it involves any of the circumstances defined in Section C, above.

E. SUMMARY

The Addendum shows that continued operation of Berkeley Lab, including continued implementation of the LRDP, during the proposed contract extension period would result in no new significant impacts or significant impacts that are substantially more severe than identified in the SEIR. The potentially significant impacts associated with the proposed project are in the areas of 1) geology, soils, and seismicity; 2) hydrology and water quality; 3) biological resources; 4) visual quality; 5) traffic, circulation, and parking; 6) air quality; 7) noise; and 8) hazardous materials. These impacts would be reduced to less than significant levels by continued implementation of the SEIR mitigation measures. Consistent with the SEIR, because the Bay Area is a non-attainment area for ozone under the State Clean Air Act¹, project-related increases in ozone-related emissions are considered significant and unavoidable. Also consistent with the SEIR, the Lab's contribution to cumulative emissions of TACs in the region are considered significant and unavoidable because implementation of regional emission control measures is not within the jurisdiction of the UC Regents. A Statement of Overriding Considerations for these significant and unavoidable cumulative air quality impacts was adopted by The Regents in connection with approval of the project and certification of the SEIR.

F. REVIEW AND APPROVAL PROCESS

This Addendum, along with the SEIR, will be reviewed by The Regents in considering the decision to extend the contract to continue to manage and operate the Berkeley Lab.

Although CEQA (CEQA Guidelines section 15164(c)) does not require that agencies circulate an addendum for public review, copies of this Addendum are on file at the following locations for purposes of public and agency information:

Central Berkeley Public Library
2090 Kittredge Street
Berkeley, CA 94704

City of Oakland Main Library
125 14th Street
Oakland, CA 94612

¹ At the time of the SEIR, the Bay Area was also a non-attainment zone for ozone under the Federal Clean Air Act.

Ernest Orlando Lawrence Berkeley National Laboratory
Main Library, Bldg. 50, Room 134
One Cyclotron Road
Berkeley, CA 94720

Office of Planning & Design
300 Lakeside Drive, 10th Floor
University of California
Oakland, CA 94612

II. PROJECT DESCRIPTION - RELEVANT CHANGES SINCE CERTIFICATION OF THE SEIR

Project Objectives and Institutional Goals

Background and Description of Berkeley Lab

Overview of the Berkeley Lab Mission and Programs

Program Projections and Requirements

Implementation Status of the 1987 LRDP and 1987 LRDP EIR

Site Planning

**Summary of Changes Since SEIR with Potential
to Impact the Environment**

II. PROJECT DESCRIPTION - RELEVANT CHANGES SINCE CERTIFICATION OF THE SEIR

This section discusses changes in the Lab's management and operations that have occurred since certification of the 1992 SEIR by The Regents, as well as changes that are anticipated over the proposed contract extension period. Discussions in this section include the project objectives and institutional goals, the background and description of Berkeley Lab, the Lab mission and programs, program projections and requirements, implementation status of the 1987 LRDP and the 1992 SEIR, the objectives of site planning, and a summary of changes since the SEIR.

The proposed project involves extension of the contract between the University of California (University) and the United States Department of Energy (DOE) to manage and operate the Ernest Orlando Lawrence Berkeley National Laboratory (Berkeley Lab). The proposed contract extension, as defined for purposes of this document, would be from October 1997 through September 2007, and during the contract term it is assumed that Berkeley Lab may be developed to full buildout as projected in the Lab's 1987 Long Range Development Plan (LRDP) to occur sometime after the year 2000 (20xx).

A. PROJECT OBJECTIVE AND INSTITUTIONAL GOALS

The project objectives and institutional goals that are described in the SEIR (pgs. II-1 to II-2) are unchanged and, therefore, are not discussed further in this Addendum.

B. BACKGROUND AND DESCRIPTION OF BERKELEY LAB

Since 1992, changes have occurred in the Lab's location, public utility suppliers, and facilities development, as described below. The land use and topography, and transportation systems are the same as described in the SEIR.

1. Location: In May 1996 an agreement was entered into between the University of California and Berkeley Lab that provides for the Lab's assuming management responsibility for an additional 70 acres of adjacent University land (see Figure I-1: Background and Summary Section). The intent of the agreement is to assist both entities to manage the risk of fire, restore vitality of declining and senescent plantings, and to ensure safe and orderly use of Regents' property in the East Bay hills. The Lab has adopted and is implementing a landscape maintenance plan to manage vegetation at the Lab Site and in the 70 acres. The 70 acres will continue to be managed in accordance with the UCB LRDP, until such time as a new or revised Berkeley Lab LRDP is proposed and approved by The Regents that further defines land use of that acreage.

2. Public Utilities and Community Services: Since 1992, Berkeley Lab has changed natural gas suppliers. Gas is now provided by the Defense Fuel Supply Center from Oregon. The gas is delivered by Pacific Gas and Electric (PG&E) in its delivery system, and the same basic distribution system is used on the Lab site. Additionally, the Lab's electrical power supplier has changed. The Lab now receives an 11-megawatt (MW) supply from Western Area Power Administration (WAPA). When demand exceeds 11 MW, PG&E provides additional electricity without limits, but at higher cost rates.

Additionally, Berkeley Lab no longer maintains a protective services department separate from the UCB campus. Under a memorandum of understanding with the UCB police services, protection services are now provided to Berkeley Lab by the UCB Police Department.

3. Facilities: Since 1992, the Lab has continued to implement the LRDP. Specifically, the planned construction in the Life Sciences Research Area is in progress and improvements are being made in the condition of substandard buildings in accordance with the Lab's long-range rehabilitation and modernization program. For example, Building 74B has been demolished and numerous trailers have been removed.

In the future, the Lab will continue to develop the site as provided for in the LRDP, including continued implementation of the rehabilitation and modernization program. Major work still to be accomplished in this area is the rehabilitation of the central area of the site and the replacement of single-story buildings with multi-story buildings.

Currently, research and support activities are conducted in structures totaling 1.99 million gross square feet (gsf). This includes 76 permanent buildings and 113 trailers and temporary structures on the main Lab site, encompassing 1.69 million gsf (see Appendix A), 0.11 million gsf on the UC Berkeley Campus and the Richmond Field Station, and 0.26 million gsf of leased space in the East Bay and Washington D.C. Development of the Lab's main hill site is occurring at a slower rate than anticipated in the SEIR (see Table II-3, below).

Over the proposed contract extension period, the Lab would continue to develop facilities up to the 2 million gsf provided for in the LRDP, and would continue to occupy campus facilities and lease off-site space as needed.

C. OVERVIEW OF THE BERKELEY LAB MISSION AND PROGRAMS

1. History and Stewardship: In 1996, the Lawrence Berkeley Laboratory was renamed the Ernest Orlando Lawrence Berkeley National Laboratory in recognition of its founder, Ernest Orlando Lawrence, and to better reflect the Lab's role as a research facility of national importance. The Lab continues to receive its major funding from the DOE.

2. National Laboratory: As a national laboratory, Berkeley Lab continues to develop and house a number of large internationally important facilities and their support functions. Since 1992, construction of the Advanced Light Source was completed and is in operation, the Bevalac was shut down, and the 88-inch cyclotron was upgraded, with installation of the Gammasphere, an instrument that is essential to helping understand the physics of nuclear structure. The National Energy Research Scientific Computing Center moved into existing renovated buildings. Further upgrades and improvements to these facilities will continue as needed to meet the needs of the research community.

3. Relationship to UC: The Berkeley Lab continues its close relationship with the University's academic campuses and provides research opportunities to a large number of science and engineering students. Approximately 400 resident graduate students are supported at the Lab, and many more continue to use Lab facilities or perform collaborative research.

D. PROGRAM PROJECTIONS AND REQUIREMENTS

1. Program Projections: Berkeley Lab's research and operational support trends are described in the Berkeley Lab *FY1998-2002 Institutional Plan*. Specific projects are not included in the contract. Each year the Lab's Federal programs are authorized and appropriated by Congress. The following trends reflect current, anticipated, and proposed research activity. The major programs implementing the Lab's mission continue to be developed in response to DOE's national programs in the basic energy sciences, high energy and nuclear physics, biological and environmental research, computational and

technology research, energy efficiency and renewables, and environmental management among other programs as analyzed in the 1992 SEIR. These research activities are organized into the Lab's energy sciences, general sciences, biosciences, and computing sciences divisions.

2. Projected Trends: The most likely research trends include several initiatives, primarily in DOE's Office of Energy Research. These initiatives would be within the Basic Energy Sciences, Computational and Technology Research, High-Energy and Nuclear Physics, Biological and Environmental Research, and Fusion Energy. Other initiatives are in Energy Efficiency and Renewables, Environmental Management, Civilian Radioactive Waste Management, and Defense Programs. Examples of some of the initiatives within these program areas are given in Table II-1, and described briefly below.

Table II-1
Examples of Berkeley Lab Program Initiatives

-
- 1. Basic Energy Sciences**
Advanced Light Source Roadmap
Molecular Environmental Science
Nanostructured Materials Program
National Spallation Neutron Source
 - 2. Computational and Technology Research**
Computationally Intensive Science at DOE
 - 3. High-Energy and Nuclear Physics**
High-Energy and Nuclear Physics Computing
Large-Scale Neutrino Detector
GRETA (Gamma-Ray Energy Tracking Array)
 - 4. Biological and Environmental Research**
Joint Genome Institute
Boron-Neutron Capture Therapy
 - 5. Fusion Energy**
Heavy-Ion Fusion Science Facility
 - 6. Energy Efficiency and Renewables**
Energy Technologies
 - 7. Environmental Management**
Environmental Management Science Program
 - 8. Civilian Radioactive Waste Management**
Yucca Mountain Percolation Flux
 - 9. Defense Programs**
Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility
-

Source: Ernest Orlando Lawrence Berkeley National Laboratory Institutional Plan, FY1998-2002, July 1997, pgs. 4-1 to 4-2.

In the Basic Energy Sciences, the Advanced Light Source would continue to be developed to provide full instrumentation as described in the 1992 SEIR. Materials science would continue to develop and apply approaches for designing materials and devices, and research ways in which environment-friendly chemicals and biochemical processes can be developed to reduce existing polluting reactions and processes. In addition, the Lab would participate in a multi-laboratory collaboration formed by the DOE's Oak Ridge National Laboratory, to design, build, and commission the National Spallation Neutron Source. Berkeley Lab would design and produce the "front end" of the source, which includes the H-ion source, the Low-Energy Beam Transport system, Radio-Frequency Quadrupole accelerator, and the Medium-Energy Beam Transport system.

Computational and Technology Research would focus on helping to define and exploit the vast increase in the utility and efficacy of computationally intensive theory that will accompany the maturing of computational technology over the next decade. The program would focus the support for computation in critical science areas, such as computational biology, chemical sciences in environmental problems, climate prediction, and fusion energy. These efforts would require the development of tools from Computer Science, Applied Mathematics, and Computational Science that significantly enhance the ability of scientists to use computers for discovery.

In High Energy and Nuclear Physics the Lab would apply its development work on integrated circuits and simulation codes to assist in the development of a prototype km-scale detector for high-energy neutrino astrophysics. The Lab also would develop an improved gamma-ray energy tracking array (GRETA) from the experience gained with the Lab's Gammaphase, with the goal of developing a gamma-ray array with a resolving power 1000 times higher than that of current arrays. The High-Energy and Nuclear Physics Computing Initiative would apply the advanced computing, simulation, and remote-access capabilities at the Lab's National Energy Research Scientific Computing Center to develop and apply forefront computing and networking to the kinds of data analysis and simulation requirements that will be created from the next generation of large nuclear and high-energy physics experiments.

In Biological and Environmental Research, the ongoing work in genome sequencing would continue. Berkeley Lab's accelerator expertise, surplus equipment from the decommissioned Bevalac accelerator, and collaboration with medical centers would be used to conduct research, development, and treatment for cancer using a treatment approach called Boron-Neutron Capture Therapy.

In the area of Fusion Energy, the Heavy-Ion Fusion Science Facility initiative would take advantage of the lab's focus on numerical science to simulate existing and proposed accelerator systems and eventually would lead to the development of a multi-kilojoule accelerator. The accelerator would be used to support a variety of experiments that would provide data to be used in concert with data developed at other DOE facilities to determine the feasibility of inertial fusion energy production.

In the area of Energy Efficiency and Renewables, the Lab would focus on the development of a next generation of energy technologies based on research that shows promise of leading to energy-efficient products. Two prime targets would be alternatives to the incandescent lamp, which is the least efficient of commonly-used light sources, and stationary gas turbines used for generating electricity, and often, for co-generation applications, that generate undesirable levels of nitrogen oxide emissions. Additional

opportunities for energy efficiency gains in industry and buildings through technology research and development would be assessed.

In the area of Environmental Management, the Lab would conduct studies to assist in DOE's environmental remediation efforts. Key areas of Lab studies would include waste characterization, remediation technology, fractures in the subsurface, geophysics, and characterization and remediation strategies.

In the area of Civilian Radioactive Waste Management, the Lab would continue to research percolation flux to help determine the suitability of Yucca Mountain for long-term storage of the nation's nuclear waste.

Under DOE's Defense Program, the Lab will design and fabricate an electron injector and induction linear accelerator for a portion of the Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility that is being constructed at Los Alamos National laboratory as part of the national-science-based stockpile stewardship program. The DARHT Facility mission is to perform x-ray radiography of dense metal objects being tested which will yield information on stability of surfaces and interface behavior.

These trends indicate the continued development of Berkeley Lab as a DOE multiprogram energy research laboratory with complementary research programs and supporting infrastructure. The support that the Lab would provide to DOE's Defense Program represents a continuation of the induction linear accelerator research that the Lab currently conducts to support DOE's Office of Fusion Energy Science.

3. Berkeley Lab Support: Berkeley Lab programs continue to be primarily supported by the funding sources listed in the 1992 SEIR, pg. II-14.

4. Current Laboratory Population: The Laboratory's current (FY1996) employee population consists of 3,531 full- and part-time employees and guests at the main site, 527 at UC Berkeley Campus, and 264 at other off-site locations, for a total population of 4,304. This is 86 persons less than projected in the SEIR for 1997 (Table II-2).

The spatial distribution of the population, however, is somewhat different than envisioned in the LRDP and SEIR. While both the main site population and population occupying UC Berkeley campus buildings are slightly lower than projected, the population occupying off-site leased space is higher than projected.

5. Population Projection: During the proposed contract extension period, the total population at all locations may reach 4,750, which is consistent with population projection made in the LRDP and SEIR for total Lab buildout (20xx). It is anticipated that the population distribution between the main site, UC Berkeley Campus, and off-site lease space will readjust over time in general accordance with SEIR buildout projections (Table II-2).

E. IMPLEMENTATION STATUS OF 1987 LRDP AND 1987 LRDP EIR

1. 1987 LRDP: The 1992 SEIR states that the implementation status of the 1987 LRDP EIR is updated annually in a Lab Site Development Plan. As of 1995, the Lab discontinued publication of an annual Site Development Plan in response to DOE's discontinuance of the DOE Order requiring preparation of such plans. The Lab's annual Institutional Plan now serves as the mechanism to track the implementation status of the 1987 LRDP EIR. The Institutional Plan is a management report for integration with the DOE's mission and programs and is an element of DOE's strategic management planning

activities, developed through an annual planning process. The plan provides an overview of the Lab's mission, strategic plan, core business areas, critical success factors, and the resource requirements to fulfill its mission. It is available for review in the Central Berkeley Public Library, and on the Worldwide Web (<http://www.lbl.gov/Publications/Institutional-Plan/>).

Table II-2
Berkeley Lab Population

Location	Time Period	
	1997 (SEIR Projections ^a)	1996 (Actual ^b)
Main Site (Hill Area)	3,590	3,531
UC Berkeley Campus	700	527
Other ^c	100	264
TOTAL	4,390	4,304

Notes:

a = As projected in SEIR, pgs. II-15 to II-16.

b = Actual, Berkeley Lab's Human Resources Department Population Database 1996 and Berkeley Lab's 1998-2002 Institutional Plan, pg. 6-11.

c = The LRDP indicates that offsite space may be utilized for warehouse, office, and other functions as appropriate.

During the proposed contract extension period, the total Laboratory population may grow to the full buildout population of 4,750 persons as envisioned in the LRDP. This growth would be consistent with program directions, national needs, and supporting infrastructure, and would support the types of initiatives shown in Table II-1, above. New and replacement facilities would be developed as planned for in the LRDP.

2. Potential Development and Land Use: The LRDP allows for a total of 1,996,200 gsf of built space at the Lab's main site at buildout in 20xx. The current built space at the Lab is 1,690,000 gsf.

As described in the SEIR, the LRDP emphasizes utility rehabilitation, improved parking and circulation, and respect for nine buffer-zone landscape planning areas that unify the site and enhance compatibility with the surrounding hillside. The major site development proposals were removal of 208,800 gsf of buildings and renovation of 788,500 gsf of building space. Building sites were reserved or planned in redeveloped areas for 613,600 gsf of new construction. Many of these redevelopment projects were planned for the Light Source Research and Engineering Area, although some projects were to be undertaken in all the functional areas, as shown on the Long Range Development Plan Map, LRDP Figure 5-3.

Since the SEIR, the Lab has made progress on LRDP implementation, including utility rehabilitation, such as upgrades to fire and safety systems, mechanical utilities, and electrical systems, and has made seismic safety improvements to some buildings. Site-wide roadway improvements, slope stabilization, sanitary sewer restoration, and parking and landscape improvements have begun. All new and upgraded facilities continue to be designed in accordance with the design guidelines identified in the LRDP, including maintaining the values of the nine buffer areas. The planned expansion of the Life Sciences Research Area is underway, with construction of the Human Genome Laboratory and completion of the replacement Hazardous Waste Handling Facility. Several trailers have been removed from the Lab.

During the proposed contract extension period these programs would continue. The focus of site development would be in the Lab's Light Source and Research and Engineering area where obsolete buildings would be eliminated and open space would be enhanced. Trailers would continue to be eliminated as new construction funds are available for replacement buildings. The Lab is also developing or has developed several small projects not specifically described in the LRDP or SEIR. These are described in Section III-F-3: Visual Resources of this Addendum.

3. Built Space: Berkeley Lab research and support activities are conducted in structures totaling 2.14 million gross square feet (gsf). This includes 77 permanent buildings and 113 trailers and temporary structures on the main Lab site encompassing 1.69 million gsf (see Appendix A), 0.19 million gsf on the UC Berkeley Campus, and 0.26 million gsf leased in the East Bay and Washington D.C. As shown in Table II-3, the current 2.14 million gsf of built space used for Lab activities is below the 1997 figure estimated in the SEIR.

Table II-3
Berkeley Lab Space (In Millions of Square Feet)

Location	Time Period			
	1992 ^a	1997 ^b	1997 ^c	20xx ^c
Main Site (Hill Area)	1.62	1.69	1.81	2.00
UC Berkeley Campus and Richmond Field Station	0.26	0.19	0.30	0.30
Other	<u>0.14</u>	<u>0.26</u>	<u>0.10</u>	<u>0.10</u>
TOTAL	2.08	2.14	2.24	2.40

Notes:

a = Actual as presented in the SEIR, pg. II-18.

b = Actual (Berkeley Lab Facilities Planning Dept).

c = As projected in the SEIR, pg. II-18.

As shown in Table II-3, if during the contract extension period the full capability of the Lab as envisioned in the 1987 LRDP were developed, a net increase of 0.31 million gsf of structures and buildings would be developed at the main site between 1997 and buildout

(20xx). Table II-4 shows the construction activities planned for the main site over the next 5 year period. Other on-site facilities would be constructed within the development limits of approximately 2.0 million gsf as provided for in the 1987 LRDP.

The Lab's use of UCB Campus space is less than the amount of space used in 1992, and is also under the 1997 projection. The use of other space (off-site leased space) is above the amount projected for 1997 and for buildout. This increase in leased space is a result of reduced availability of DOE funding for construction of new buildings or major modifications of existing buildings to house administrative support and laboratory functions. It is anticipated that the distribution of space use between the main site, UCB Campus, and off-site lease space will readjust over time in accordance with SEIR buildout projections.

Table II-4
Examples of Potential Construction Projects (FY1998 - 2002) - Main Site

Project Name	Estimated (GSF)	Net Increase (GSF)
<u>Program Related:</u>		
ALS Roadmap	20,200	0
<u>Multiprogram Energy Laboratory Facilities Support:</u>		
Electrical Systems Rehabilitation	NA	0
Mechanical Systems Upgrade	NA	0
Rehabilitate Building Operating Systems-B74	NA	0
Rehabilitate Structural Support and Operating Systems - B77	NA	0
Rehabilitate Building Operating Systems - B62	NA	0
Rehabilitate Building Operating Systems - B70 Complex	NA	0
Rehabilitate Building Operating Systems - B50 Complex	NA	0
Replace B75A (for use as office space)	35,600	31,600
Rehabilitate Building Operating Systems - B83	NA	0
Water Utility Upgrade	NA	0
Upgrade Low Conductivity Water System	NA	0
Replace B29 (Electronic Instrumentation)	21,000	0
<u>Other Development and Reserve for Potential Growth</u>		
Research, Multipurpose, and Shop Space, as described in the 1987 LRDP	278,400	278,400

Source: Berkeley Lab Institutional Plan, FY1998-2002.

F. SITE PLANNING

The site planning objectives and concepts, design guidelines, functional areas, and planning and programming that are described in the SEIR (pgs. II-19 to II-24) are unchanged; therefore, no further discussion is required in this Addendum. Progress made by the Lab in facilities development and infrastructure improvements since 1992 and future plans are discussed below.

1. Facility and Land Requirements: The SEIR stated that building utilization on the main Lab site was 65 percent net-to-gross area efficiency, and was not projected to change significantly, but the efficiency of land use was expected to improve with the replacement of obsolete single- and two-story buildings with three- to five-story structures.

Currently, building utilization is at a net-to-gross area efficiency of 73 percent, and progress has been made in land use efficiency as a result of such activities as trailer removal and building demolition (for example, demolition of single-story Building 74B to provide space for the 3-story Human Genome Laboratory.)

2. Future Land Uses: Currently, the 134-acre developed area of the main site is comprised of approximately 22 acres of structures and sites, 15 acres of roads, 19 acres of parking and paved areas, and 78 acres of landscape and open space. Over the proposed contract extension period, the Lab would be developed to full buildout as described in the LRDP. Several small projects not specifically described in the LRDP or SEIR might be developed as presented in detail in Section III-F: Visual Quality. These projects would not exceed the development ceiling established in the LRDP. Current and planned development is consistent with the SEIR which indicated that if all projects identified in the Site Development Plan were completed and consolidation proposed in the plan were implemented, the developed area of the 134-acre main site would be comprised of approximately 22 acres of structures and sites, 16 acres of roads, 18 acres of parking, and 78 acres of landscape and open space.

The 70 acres of adjacent UC land that are now managed by the Lab are being managed in conformance with the Lab's 1996 Maintenance Program for a Fire-safe Sustainable Landscape and the UCB LRDP.

3. Future Facility Locations and Functional Areas: The Lab continues to plan facilities in the seven identified functional areas to encourage efficiency and effectiveness in the conduct of research and support activities. The Lab's functional areas are shown on SEIR pg. III-J-38.

4. Utilities Systems: Since certification of the SEIR in 1992, the Lab's electrical power and natural gas suppliers have changed. In February 1994, the Lab began receiving its electrical power supply from Western Area Power Administration (WAPA), a non-profit utility operated by DOE for its facilities. When demand exceeds the 11-megawatt (MW) supply from WAPA, PG&E provides additional electricity. Natural gas is now provided by the Defense Fuel Supply Center for Oregon, and delivered in the PG&E delivery system, using the same basic distribution system within the Lab as previously.

The Lab's water distribution system remains as described in the SEIR. An additional water storage tank to be used as an additional backup supply of potable water or supplementary supply for fire fighting purposes may be added to the site in the future. The other mechanical utilities (storm drain system, sanitary sewer system, cooling water, compressed-air, and vacuum systems) described in the SEIR have continued to be upgraded as planned in the LRDP and described in the SEIR. Upgrades would continue as needed over the proposed contract extension period.

a. Infrastructure Improvements: Since 1992, the Lab has continued to improve the safety and supply service infrastructure and to improve general-purpose mechanical and electrical systems. During the proposed contract extension period, the Lab would continue to make progress in improving building safety and mechanical and utility upgrades (ref. Table II-4, above) and to conduct activities to correct existing conditions where needed within the framework outlined in the LRDP (LRDP, pgs. 72 and 73).

b. Programmatic Facilities: During the proposed contract extension period, research facilities, offices, shops, and multi-purpose buildings could be developed on the main site as described in the Lab's LRDP to a total of 1,996,200 gsf¹ of space. These facilities would support the programs that continue to be developed in response to DOE's national programs in the basic energy sciences, health and environmental research, high energy and nuclear physics, and conservation and renewable energy, as described in the LRDP and SEIR. Program activity areas would continue in the energy sciences, general sciences, biosciences, and computing sciences.

G. SUMMARY OF CHANGES SINCE SEIR WITH POTENTIAL TO IMPACT THE ENVIRONMENT

This Addendum addresses changes in the project that would occur under the proposed contract extension, any substantial changes in the circumstances under which Lab operations are conducted, and any new information of substantial importance which could result in new or more severe impacts than shown in the 1992 SEIR.

This section contains a list of the changes by issue area that are addressed in the subsequent pages of this Addendum. In some cases, two or more related changes are grouped together under a single item.

GEOLOGY, SOILS, AND SEISMICITY

- Small rotational landslide
- Revisions to California's Building Code
- Prediction of probability of RM7 earthquake
- Confirmation of inactivity of Wildcat fault
- Increased potential for erosion due to topsoil disturbance

HYDROLOGY AND WATER QUALITY

- Creation of additional impervious surfaces

BIOLOGICAL RESOURCES

- Implementation of Landscape Maintenance Program and Additional Acreage
- Updated biological survey results
- New development projects

HISTORICAL AND ARCHAEOLOGICAL RESOURCES

- Initiation of historic building inventory program and results

VISUAL QUALITY

- Implementation of Landscape Maintenance Program
- New development projects

LAND USE

- Implementation of Landscape Maintenance Program
- New development projects

POPULATION, EMPLOYMENT, AND HOUSING

- Changes in staff population
- Distribution of employees' city of residence

¹ In the SEIR, this total was rounded up to 2 million gsf.

TRAFFIC, CIRCULATION, AND PARKING

- Change in traffic volumes
- Implementation of Commuter Check Parking Cashout Program
- Change in ratio of Lab population to parking spaces

AIR QUALITY

- Redesignation of Bay Area as federal ozone attainment area
- New thresholds of significance for air quality impacts issued by BAAQMD
- Implementation of corrective actions to bring the Lab's National Emissions Standards for Hazardous Air Pollutants (NESHAPS) program into full compliance
- Reductions in Lab usage of ozone-depleting substances
- Modifications in local and federal regulations and orders pertaining to air quality
- Projected changes in Lab emissions of criteria air pollutants, toxic air contaminants, and radionuclides

NOISE

- Current L_{50} noise levels

PUBLIC SERVICES

- Changes in fire fighting staff and equipment
- Responsibility for police protection services at the Lab

UTILITIES

- Potential new water storage tank
- Current and projected water consumption
- Change in utility suppliers and distribution systems
- Change in solid waste collection and disposal
- Current and projected solid waste generation
- Implementation of a Waste Minimization and Pollution Prevention Awareness Plan
- Change in sanitary sewage flows

ENERGY

- Projected increase in energy demand from new facilities
- Change in energy conservation planning mechanism

HAZARDOUS MATERIALS

- Completion of all corrective action tasks identified in the Tiger Team Corrective Action Plan
- Implementation of DOE's "Work Smart Standards" Program
- Procurement of new lease space for use as the Lab's main chemical receiving facility
- Certification of the Cities of Oakland and Berkeley as Certified Uniform Program Agencies (CUPAs)
- Completion of safety documentation for various Lab facilities
- Changes in chemical and radioactive materials inventories
- Changes in hazardous, radioactive, mixed, and biomedical waste generation volumes or activity levels
- Reactivation and upgrade of an inactive wastewater pretreatment system
- Authorization received from Cal-EPA to operate five wastewater pretreatment systems
- General Industrial Activities Stormwater Permit issued to the Lab

- Site Treatment Plan approved by DTSC
- Update on notices of violation issued to Berkeley Lab by regulatory agencies
- Status of Berkeley Lab shipments of wastes to the DOE facility in Hanford, Washington
- Changes in DTSC permits for existing and replacement hazardous waste handling facilities
- Changes in waste minimization requirements
- Status of the Lab's transformers (PCBs)
- Changes in Lab Environment, Health, and Safety Division staffing
- Change in emergency spill response contractor and in emergency command
- Update on Lab's RCRA Corrective Action Program activities
- Update of sampling results from Lab environmental monitoring

III. ENVIRONMENTAL ANALYSIS

Introduction and Overview of Analytical Approach

Geology, Soils, and Seismicity

Hydrology and Water Quality

Biological Resources

Historical and Archaeological Resources

Visual Quality

Land Use

Population, Employment, and Housing

Traffic, Circulation, and Parking

Air Quality

Noise

Public Services

Utilities

Energy

III. ENVIRONMENTAL ANALYSIS

A. INTRODUCTION AND OVERVIEW OF ANALYTICAL APPROACH

The purpose of this Addendum is to inform The Regents of any new significant environmental impacts or substantially more severe impacts that may be caused by The Regents' approval of the proposed contract extension and that were not previously identified and mitigated to a less-than-significant level in the 1992 SEIR. Accordingly, the environmental analysis included in the SEIR is used as a basis for determining whether the contract extension would have any significant new impacts or substantially more severe impacts than previously identified. The 1987 LRDP EIR is also incorporated by reference into this Addendum.

This section describes any substantial changes in the project that would occur under the contract extension, any substantial changes in the circumstances under which Lab operations are conducted, and any new information of substantial importance which could result in new or substantially more severe impacts than shown in the SEIR. The standards for measuring the significance of project impacts are the same as those presented in the SEIR. The table summarizing potential environmental impacts and associated mitigation measures that was presented in the SEIR is included in this Addendum as Appendix B.

The proposed project would be subject to all the relevant mitigation measures discussed in the 1992 SEIR (the SEIR restated the mitigation measures identified in the 1987 LRDP EIR that pertained to the uses proposed in the 1992 SEIR, and identified additional mitigation measures). Mitigation measures in the text of the SEIR are discussed in SEIR Sections III and IV and pertain to geology, soils and seismicity; biological resources; historical and archaeological resources; visual quality; land use; traffic, circulation, and parking; air quality; noise; utilities; energy; and hazardous materials.

In addition, a mitigation monitoring program has been adopted for the 1992 SEIR. The Mitigation Monitoring Plan dated September 1992 is designed to ensure that the adopted mitigation measures are implemented in a timely manner and in accordance with the terms of project approval. The proposed project will be required to comply with the appropriate adopted mitigation measures for the 1992 SEIR, as ensured by the Mitigation Monitoring Plan. These include measures to mitigate specific impacts of development associated with the project.

As discussed in this section, the proposed project will not involve new significant environmental effects, or a substantial increase in the severity of previously identified significant effects, which would require consideration of adoption of mitigation measures other than those already analyzed in the 1992 SEIR.

B. GEOLOGY, SOILS, AND SEISMICITY

1. Setting Update

a. Landslide Hazards

The SEIR stated that unstable soil deposits are present in several locations within the Berkeley Lab site, and that construction work could cause a landslide, adversely affecting the stability of Berkeley Lab buildings. This was identified as a significant impact that would be reduced to less than significant with implementation of mitigation measures (SEIR Impact III-B-2, and Mitigations III-B-2a through 2d).

No landslides adversely affecting the stability of Berkeley Lab buildings have occurred; however, in the winter of 1994/95 a small rotational landslide occurred along the access road to the replacement Hazardous Waste Handling Facility (HWHF). The slide was located more than 150 feet east of the site of the facility and therefore did not pose a threat to the facility itself. The slide was approximately 50 feet long by 100 feet wide. It occurred in the ancient slide deposits previously identified in the EIR for Construction of the HWHF¹, and was a result of cutting into the slope for the access road. The geotechnical engineering firm Harza/Kaldveer investigated the slide in 1995 and made recommendations for repairing and stabilizing the slope. Berkeley Lab has repaired the slide and stabilized the slope in accordance with the recommendations.

b. Building Codes

The SEIR stated that development of new structures must be undertaken in conformance with the provisions of all applicable laws, including current building codes, to ensure seismic safety.

Subsequent to the SEIR, there have been revisions to California's Building Code (CBC). Some of these revisions have been a result of lessons learned from the 1994 Northridge earthquake in southern California. These include a requirement to test special moment resisting joints in new steel structures, and changes in base shear standards, detailing requirements, and force levels that some structural members have to resist, among other changes. These changes will affect new building construction, and will require the Lab to incorporate specific engineering systems when adding stories onto existing buildings.

c. Earthquake Probability

The SEIR described the regional earthquake fault system and stated that of all the known faults in the region, a Richter magnitude 7.5 earthquake on the Hayward Fault has the potential to produce the most intense ground shaking at the Lab site. The SEIR did not state the probability of this occurrence.

In 1990, the United States Geological Survey (USGS) released a study stating that there was a 67 percent chance of a magnitude 7.0 or larger earthquake occurring in the Bay Area within the next 30 years. Since certification of the SEIR, USGS has carried out studies that suggest an increase in the probability that such an earthquake will occur. USGS

¹ EIP Associates, *Final Environmental Impact Report, Construction of Replacement Hazardous Waste Handling Facility, Lawrence Berkeley Laboratory* (SCH# 89040416), May, 1990.

expects to issue a new probability estimate in 1999. The increase in earthquake probability stems primarily from the inclusion of more faults in the probability analysis.²

d. Wildcat Fault

The SEIR discussed the Wildcat Fault, stating that traces of the fault underlie the Lab's Building 74. The Lab retained the firm of Harding-Lawson Associates in 1979 to dig trenches across the fault and conduct a fault investigation. Based on an analysis of the materials found in the trenches, Harding-Lawson concluded that the fault was inactive.

Since certification of the SEIR, a fault study of the replacement HWHF site, which is located near Building 74, was conducted by GeoResource Consultants, Inc. and Berkeley Lab geologists in 1994.³ The study, which investigated various hypothetical fault alignments within the site, confirmed the presence of a fault, but concluded it was inactive. This fault is probably a splay off of the Wildcat Fault, which was determined to be inactive by Harding-Lawson in 1979.

In 1995, the Wildcat Fault was extensively exposed during grading activities for the Human Genome Laboratory, which is located in the same vicinity as Building 74 and the replacement HWHF site. Berkeley Lab geologists used this opportunity to examine the fault and observed features which confirmed Harding-Lawson's prior finding of inactivity.

e. Soil Erosion

The SEIR stated that soil erosion, sedimentation, and landsliding caused by construction work could adversely affect the stability of Berkeley Lab buildings placed on the site (Impact III-B-2). Such impacts would be considered significant if the project proposed facilities that would increase erosion or sedimentation or where landsliding could result in slope failure (pgs. III-B-5 and III-C-3).

Under the Lab's 1996 Maintenance Program for a Fire-safe Sustainable Landscape, the Lab is removing pine trees, eucalyptus trees, and eucalyptus resprout trunks to thin overly-dense stands, remove unhealthy specimens, provide clearings around buildings, and reestablish natural grasslands. These activities, which have the potential to increase erosion and sedimentation, are taking place within the Lab's 134-acre main site and within the adjacent 70-acre management area described in Section III-D: Biological Resources, below.

2. Impacts

a. Impact Analysis, Landslide Hazards

The potential for landslides at the Lab site was identified in the SEIR. The winter 1994/95 landslide along the HWHF access road has been repaired following the recommendations of the geotechnical engineer, in accordance with the mitigation measures identified in the SEIR. No new or substantially more severe impacts are anticipated in this area.

² Pat Jorgenson, Director of Public Affairs, U.S. Geological Survey, Menlo Park, California, personal communication, August 6, 1996 and July 28, 1997.

³ Geo/Resource Consultants, Inc., *Fault Investigation, Building 85 Hazardous Waste Handling Facility, Lawrence Berkeley Laboratory, Berkeley, California*, March 1994.

b. Impact Analysis, Building Codes

Berkeley Lab has always constructed its buildings in accordance with the requirements contained in the CBC, and will continue to do so. The Lab also has its own Lab-specific engineering standards, which in some cases, such as those pertaining to base shear, are more rigorous than those contained in the CBC. The Lab's implementation of the CBC revisions and continued compliance with its own engineering standards would result in no new impacts nor would any previously identified impacts be made substantially more severe.

c. Impact Analysis, Earthquake Probability

The additional earthquake faults that have been identified by the USGS to update the probability analysis are situated at a greater distance from Berkeley Lab than is the Hayward Fault, and would cause much lower levels of shaking at the site than would an event on the Hayward Fault. Consequently, the identification of these additional faults would not make substantially more severe a previously identified significant impact because there is no indication that seismic shaking at Berkeley Lab would be worse than previously estimated. In addition, the increase in the probability estimate for an earthquake does not change the significance of the impacts from such an event.

d. Impact Analysis, Wildcat Fault

Recent information about the Wildcat Fault does not indicate that there would be any new significant impacts or any substantially more severe previously identified significant impacts related to a seismic event.

e. Impact Analysis, Soil Erosion

Potential Maintenance Program soil erosion impacts are consistent with those described and mitigated in the SEIR. Where topsoil is disturbed, creating a potential for erosion, erosion control measures are being employed as part of the Maintenance Program in accordance with mitigation measures described in the SEIR (Mitigations III-B-2a and III-B-2d). These mitigation measures are also being employed in the 70 acres of adjacent University land discussed in detail in Section IIIG: Land Use. The measures are consistent with those specified in the Association of Bay Area Government's *Manual of Standards for Erosion and Sediment Control Measures* (2nd ed., May 1995) and other guidelines recognized by state and federal agencies. Measures could include erosion control blankets, blown-in covers, temporary runoff control, silt fences, straw bale dikes, and/or temporary sediment traps, as appropriate. Laboratory activities through the contract extension period would, therefore, result in no new soil erosion impacts, nor would previously identified impacts be made substantially more severe.

3. Summary Conclusion

Project impacts in the area of geology, soils, and seismicity would be similar to those described in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to geology, soils, or seismicity. Geology, soils, and seismicity effects do not require further analysis.

C. HYDROLOGY AND WATER QUALITY

1. Setting Update

The SEIR stated that development in that portion of the Lab located in the Upper Strawberry Creek Watershed would add up to four acres of impervious surfaces to the watershed between 1987 and Lab buildout (20xx). Although this could produce increased surface and storm runoff, the increase would be slight and would not significantly affect downstream runoff or substantially degrade surface or groundwater quality (Impacts III-C-1 and III-C-2).

The SEIR further stated that development in those portions of the Lab located in the North Fork, Chicken Creek, and Stadium Hill watersheds would likely consist of replacement of existing obsolete installations, which would not add significantly to the existing impervious area (SEIR, pgs. III-C-4 to III-C-5).

As described in greater detail in Section III-F: Visual Quality of this Addendum, the Lab is in the process of developing, or has constructed, several small new projects which are consistent with the LRDP land use guidelines and space development ceiling, but are not specifically described in the LRDP or the SEIR. These projects have created or would create the following approximate acreage of impervious surfaces: the Building 29 parking area created approximately 0.5 acre of impervious surfaces in the 92-acre Stadium Hill watershed; the Building 85 trailer site, Life Sciences Research Area parking area, and the Building 74 modular create approximately 0.3 acre of impervious surfaces in the 502-acre Upper Strawberry Creek watershed; and the Poultry Husbandry storage/construction laydown area would create less than 0.7 acre⁴ of impervious surfaces in the 57-acre Chicken Creek watershed (see Figure III-F-1).

2. Impacts

The addition of approximately 0.5 acre of impervious surfaces in the Stadium Hill watershed, 0.3 acre of impervious surfaces in the Upper Strawberry Creek watershed, and less than 0.7 acre of impervious surfaces in the Chicken Creek watershed would not create new significant impacts or make substantially more severe previously identified significant impacts. The addition of less than one acre of impervious surfaces in each of these three watersheds would not interfere substantially with groundwater recharge, and the potential increase in surface runoff would not degrade surface or groundwater substantially. In addition, a portion of the area in which the Building 85 trailer site is being developed was previously planned for development as an addition to Building 83, and was part of the four acres of impervious surfaces projected by the SEIR to be developed in the Upper Strawberry Creek watershed.

3. Summary Conclusion

No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial increase in the severity of previously identified significant impacts related to hydrology and water quality.

⁴ The Poultry Husbandry area project in its entirety would encompass 0.7 acre. The extent of impervious surfaces that will be created is unknown at this time, but would be a small portion of the total project area.

D. BIOLOGICAL RESOURCES

1. Setting Update

The SEIR description of the biological resources setting noted that outside the centrally developed portion of the main site, Berkeley Lab's natural vegetation is in a transitional state of plant succession, generally moving (in the absence of natural fire and grazing effects) from late *Baccharis* brushland to early oak-bay woodland. In general, the site supports habitats and associated wildlife typical of disturbed portions of the Berkeley-Oakland hills.

The most significant habitats occur in Blackberry Canyon. The lower portion of Blackberry Canyon supports a small habitat of relatively intact oak-bay woodland. No rare, endangered, or threatened plant or animal species have been located or are expected to appear on the site (SEIR, pg. III-D-4).

Since certification of the SEIR in November 1992, the Lab has performed additional biological surveys and has conducted, or may in the future conduct, certain activities that were not specifically described in the SEIR or the Lab's LRDP that have the potential to affect biological resources. These activities are described below.

a. Landscape Maintenance Program and Additional Acreage

Since certification of the SEIR, additional acreage has been added to the Lab's site perimeter, and the Maintenance Program for a Fire-safe Sustainable Landscape⁵ has been formalized. The Maintenance Program is a vegetation management plan designed to formalize maintenance planning, restore vitality of declining and senescent plantings, and reduce the fire hazard in vegetation on and around the Lab's main site. As part of the plan, in May 1996 Berkeley Lab assumed management responsibility for 70 acres of the University's undeveloped lands located along the perimeter of the Lab site (see Figure I-1: Background and Summary section). In the added acreage, as with the rest of the main site, Berkeley Lab is responsible for deferred and regular vegetation maintenance in order to reduce the risk of fire in proximity to the Lab and create a defensible space for fire suppression.

The UCB LRDP designates much of the land along Berkeley Lab's perimeter as Ecological Study Areas (see Figure III-G-1: Land Use section)⁶ for the purpose of conservation of natural resources for research and instruction. Most of the additional perimeter acreage now managed by Berkeley Lab falls into this designation and will be managed in conformance with the Lab's Maintenance Program for a Fire-safe Sustainable Landscape, and the UCB LRDP (until such time as the Berkeley Lab LRDP is updated).

The East Bay Hills Vegetation Management Consortium (VMC), an inter-agency regional planning group formed in the aftermath of the 1991 Oakland Hills fire, developed a database to identify, and a variety of treatments to reduce, fire hazard in the urban/wildland interface. The VMC created a Fire Hazard Program and Fuel Management Plan for the East Bay Hills which includes vegetation classifications, large-scale mapping, hazard assessments, and mitigation strategies.⁷ For purposes of consistency, Berkeley Lab used

⁵ Lawrence Berkeley Laboratory, Draft "Maintenance Program for a Fire-safe Sustainable Landscape", March 1996, updated August 1996.

⁶ University of California at Berkeley Long Range Development Plan, May 1990, p. 50, Figure 9.

⁷ East Bay Hills Vegetation Management Consortium, *Fire Hazard Program and Fuel Management Plan for the East Bay Hills*, May 1995.

VMC data as a foundation, and amplified and refined vegetation and fire hazard information pertaining to the main site and adjoining lands. The enlarged database includes a vegetation inventory in greater detail, fuels mapping, and fuels-type-based computer modeling of fire behavior in areas around the main site.

The refined vegetation inventory covered the 134-acre main site and all of the added 70-acre lands and identified two vegetation types not described in the Lab's LRDP EIR or SEIR: 'Successional Scrub' and 'Conifer'. Figure III-D-1, below, shows the distribution of all the vegetation types in the perimeter acreage added to Berkeley Lab's management responsibilities. The following paragraphs describe the additional vegetation types.

Successional Scrub

This vegetation type is a mixture of old shrubby plants and young hardwood trees, and is typically found where land disturbances have not occurred in the last few decades. Generally located on side slopes, successional scrub may grade from oak-bay woodlands on one edge to shrubby vegetation types on the other. Because the scrub is mature in this vegetation type, successional scrub is denser than Coastal Sagebrush Scrub, providing continuous cover between emerging trees.

The shrub stands in successional scrub are generally 30 to 40 years old or older. The trees are in the process of attaining greater height than the shrubs and, in time, will shade out the lower shrubs to become a woodland. The trees, while becoming taller and more evident, cover less than 30 percent of the area.

The shrub species may be components of Coastal Sagebrush Scrub or Baccharis Brushland vegetation types, and include coyote bush (*Baccharis pilularis*), poison oak (*Toxicodendron diversiloba*), California blackberry (*Rubus ursinus*), sticky monkeyflower (*Mimulus aurantiacus*), and California sage (*Artemisia californica*). Typical hardwood species are coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*).

Conifer

This vegetation type is comprised of coniferous trees, all of which have been introduced to the site. The most common species at Berkeley Lab is Monterey pine (*Pinus radiata*), which may occur in pure stands or mixed with hardwoods or other pines. Other conifer species on the site include Aleppo pine (*Pinus halepensis*), Canary Island pine (*Pinus canariensis*), Calabrian pine (*Pinus brutia*), grey pine (*Pinus sabiniana*), Torrey pine (*Pinus torreyana*), Port Orford cedar (*Chamaecyparis lawsoniana*), and coast redwood (*Sequoia sempervirens*).

Generally, the conifer stands are small, almost uniformly mature, and stand density is generally open. An age exception is the string of young coast redwoods planted in 1992 along the fence west of Building 62. A large, relatively pure stand of Canary Island pines exists on a knoll just west of Chicken Creek in the added acreage. The stand is dense and the tree canopy is closed.

In developing the Maintenance Program, the Lab also undertook further fieldwork to determine the health and condition of trees, visual screening needs, and various environmental concerns in the general area. In the process, the Eucalyptus Long-horned Borer (*Phoracantha semipunctata*) was discovered in eucalyptus trees immediately to the west of the Lab. In 1996, the beetles were identified at one location on the main Lab site and four locations in the perimeter area. The beetle targets and kills stressed eucalypts, particularly the Blue Gum species (*Eucalyptus globulus*) which comprise most of the

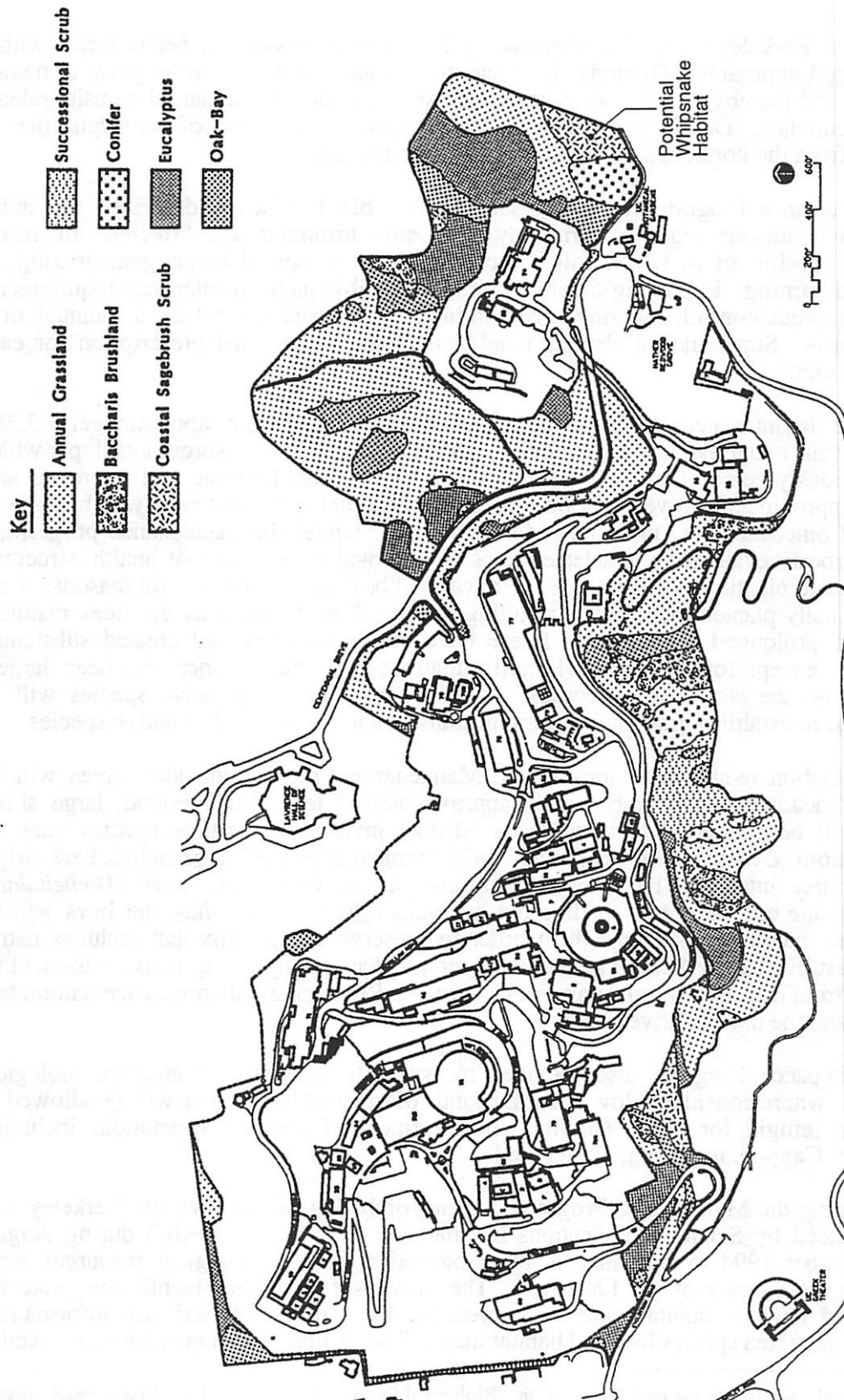


Figure III-D-1
VEGETATION TYPES IN BERKELEY LAB'S NEW MANAGEMENT AREA

eucalypts at Berkeley Lab. The Maintenance Program addresses the beetle threat with a two-pronged approach. Thinning the eucalyptus stands allows them to grow at natural densities, and thereby reduces competitive stresses. In addition, a natural parasite release has been initiated. Despite preventive measures, some further loss of eucalypts may be expected from the borer, at least until the groves are thinned.

The Maintenance Program for a Fire-safe Sustainable Landscape describes the initial vegetation treatments required, primarily vegetation trimming and "freeing" of native species in specific areas, which will be accomplished by manual labor, goat grazing, or prescribed burning. Following the initial treatment, subsequent maintenance requirements involve resprout control, mowing, tree trimming, and shrub control on an annual or a cyclical basis. Supplemental planting is addressed under the initial prescription for each landscape unit.

Under the Maintenance Program, about 4,900 trees, including approximately 3,300 eucalypts (this count includes each individual stem on multi-trunk resprout eucalypts which have previously been felled), will be removed from the main Lab site and perimeter area over an approximately 3-year period. Most of the other trees removed will be various species of pine, including unhealthy Monterey Pine. Under the maintenance program, a certified arborist evaluated and selected trees for removal on the basis of health, structural condition, and planting densities. Tree removal will be extensive for several reasons: trees were originally planted too closely, resulting in unhealthy densities as the trees matured; periods of prolonged drought and freeze have weakened trees and created substantial deadwood; except for emergency hazard situations, tree maintenance has been largely deferred over the last several decades; and in some areas non-native species will be removed to re-establish grassland or support transition to a woodland of native species.

Other vegetation reduction actions in the Maintenance Program include: trees will be pruned of deadwood and limbs within approximately 8 feet of the ground; large shrub masses will be converted to shrub/grass islands; invasive non-native species such as French broom (*Cytisus monspessulanus*) will be removed; and fallen branches, bark strips, and other tree litter will be reduced. In some areas, where bay trees (*Umbellularia californica*) are crowding and shading out live oaks (*Quercus agrifolia*), the bays will be removed to encourage oak growth in order to preserve a plant mix that includes native oaks. Coast live oaks generally are not to be removed and many young native oaks will be protected from deer to foster the oaks' development. Replanting will emphasize natural tree densities and the use of native plants.

The Maintenance Program also includes measures to preserve or enhance biological resources: where considered low-hazard, islands of tree and brush litter will be allowed to remain as refugia for small wildlife; and treatment of riparian vegetation, including Blackberry Canyon, in general is excluded.

In developing the Maintenance Program, a series of biological surveys for Berkeley Lab was conducted by Science Applications International Corporation (SAIC) during August and September 1994 to determine if any protected or unique biological resources were present in the vicinity of the Lab site.⁸ The surveys focused on identifying protected species and unusual habitats and were preceded by a review of existing information, including protected species lists and habitat maps. The perimeter area investigated extended

⁸ Science Applications International Corporation, "Biological Survey for Threatened and Endangered Species and Unique Biological Resources on Lawrence Berkeley Laboratory Perimeter Areas", September 21, 1994. Survey dates were August 5, 22, 26 and September 9, 13, 1994.

from the Lab fence line to either private property lines or roads and included the portion of Blackberry Canyon inside the Lab fence. About 20 percent of the survey area was physically viewed by walking random transects. No protected plant or animal species were observed during the field surveys. Blackberry Canyon was noted to be the most biologically diverse area observed.

A portion of the south-facing mid-slope of Blackberry Canyon has been identified as habitat for a species of Harvestman Spider (*Microcina leei*). The species was first identified in the area in 1960, and more recently in 1995. The U.S. Fish and Wildlife Service (USFWS) may in the future propose *M. leei* for inclusion as a federally-listed threatened or endangered species. The California Department of Fish and Game (CDFG) does not list *M. leei* as a sensitive species. Although there are no current USFWS requirements for protection of *M. leei*, the portion of the site where it is known to be present has been mapped (Figure III-D-2). As part of the Maintenance Program, the area will be delimited to avoid unnecessary disturbance to this area.

Alameda Whipsnake (*Masticophis lateralis euryxanthus*) is known to inhabit specific portions of neighboring Tilden Park and upper Claremont Canyon. Sitings in these areas have been regular and on-going. The State of California lists the Alameda whipsnake as "Threatened" and the federal government recognizes it as a Candidate species for listing. Although no Alameda whipsnake was identified by SAIC and none has been recorded on Berkeley Lab property or the adjacent new management areas, concern regarding the species prompted the Lab to further investigate the possibilities that the species may be resident on the site or in the new management area. UCB Museum of Vertebrate Zoology hepatologist records include only two sitings of the Alameda whipsnake in Strawberry Canyon: both these sitings occurred over a decade ago and were located over one mile southwest of the Lab site and several hundred feet higher in elevation. The sitings were in an area that is immediately adjacent to the known Alameda whipsnake habitat area in upper Claremont Canyon.

In 1996 a whipsnake habitat survey was conducted for the all areas under management by Berkeley Lab.⁹ Three portions of the Laboratory's lands were identified as having some potential as Alameda whipsnake habitat. These are generally areas of northcoastal scrub with a south and southwest aspect. Two of the areas were found to be inadequate for the whipsnake and to be located an infeasible distance for colonization from whipsnake populations. The third site, located in the southeast corner of the recently added lands and immediately adjacent to the UCB Botanical Garden and UCB Seismographic Station (Figure III-D-1) and extending beyond the Laboratory's management area, was determined to have potential as habitat for the Alameda whipsnake. The investigator concluded that the site "either currently supports a small Alameda whipsnake population or would be able to support same would colonizing specimens wander to it at some future date".¹⁰

The survey report recommended that the habitat within the Lab's management area be improved for the whipsnake by selective hand pruning to open the relatively closed shrub canopy and by removing the stand of introduced conifers (Monterey pine) on the western edge of the area. The need for a long-term management plan of the habitat was also discussed. The prescriptions and long-term vegetation management actions described for this area in the Maintenance Program comply with the report's recommendations.

⁹ Samuel M. McGinnis, Ph.D., "An Evaluation of Potential Habitat Sites for the Alameda Whipsnake Within and Immediately Adjacent to the Border of the Lawrence Berkeley National Laboratory," May 1996.

¹⁰ Ibid. pg. 4.

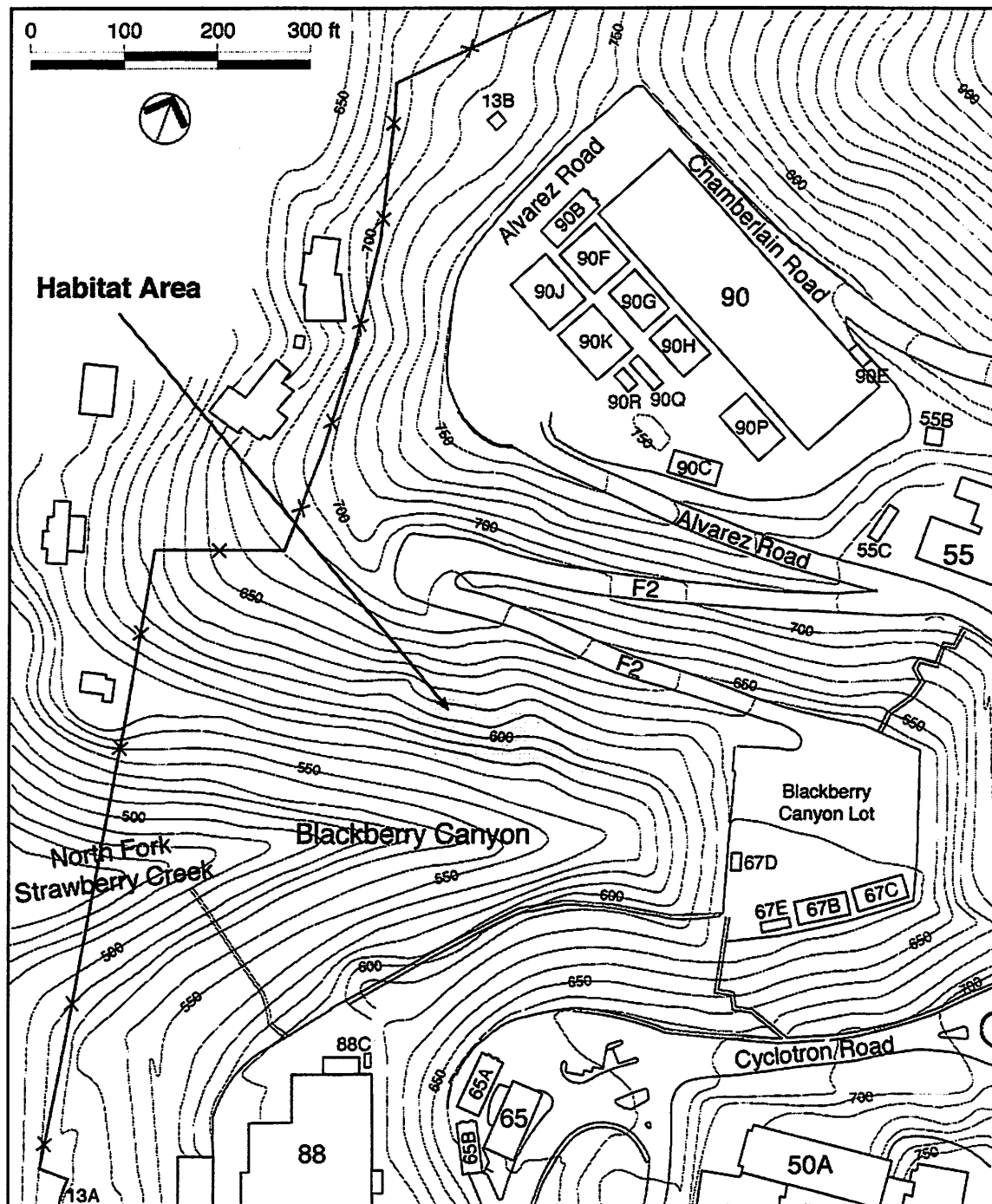


Figure III-D-2
HABITAT AREA FOR *MICROCINA LEEI* WITHIN BERKELEY LAB BOUNDARY

As part of the Maintenance Program, the Lab will extend its perimeter fence at various locations to enclose the additional acreage and conduct vegetation management activities, and to improve perimeter fire response. The new fence will be similar to the existing perimeter fence: 8-foot-high chain link with metal support poles about 10 feet apart and topped by three strands of barbed wire. Consistent with Berkeley Lab site access and maintenance policies, access within the Lab fenceline is assured to University researchers as needed.¹¹ The new fence will not interrupt any major wildlife movement corridors as none have been identified in the Strawberry Canyon watershed, and it has been found that the existing Lab fence does not prevent the movement of deer and other mammals. Fence construction will include placement of pipe under the fence at various points to facilitate the movement of smaller animals such as skunks.

b. Poultry Husbandry Storage/Construction Laydown Area

A storage and construction laydown area of approximately 0.70 acres may be maintained and further developed in the Poultry Husbandry Area (Figure III-F-1, Visual Resources section). The project would utilize the existing upper terraces and access road created when the University developed the research area in the 1920s. Since the 1960s, nearly all of the facilities (barns, storage buildings, laboratories, sheds, and chicken coops) constructed on the terraces have been demolished, leaving concrete pads and level building sites which have been used for decades by the University for storage of miscellaneous items, including salvaged building and construction materials and surplus mechanical equipment.

Berkeley Lab would use the previously disturbed areas of the site for storage and construction laydown, remaining outside the Chicken Creek riparian zone and a minimum of 15 feet from flowing water. Site development may include expanding some of the existing pavement and adding a supportive gravel bed to other areas. Limited parking for construction and service vehicles and workers may be included when the layout design is finalized.

A site visit was conducted by SAIC on April 8, 1993 to map vegetation in the area and determine if any significant biological resources, e.g., wetlands or riparian areas, were present within the survey area, which extends from the Lab's existing fence below the Lab's Building 31 at approximately elevation 780 ft. down to the Lab's new management boundary at approximately elevation 690 ft. Five vegetation types were identified on or adjacent to the project area: pine-grass (previously described as Conifer), coastal shrub (*Baccharis* Brushland), grass-forb (Annual Grassland), wetland, and riparian. The common forbs found in the grasslands include cut-leaved geranium (*Geranium dissectum*), Mediterranean mustard (*Brassica incana*), bull thistle (*Cirsium vulgare*), plantain (*Plantago* spp.), buttercup (*Oxalis* spp.), and vetch (*Vicia angustifolia*).

Two small man-made wetlands resulting from hydrauger discharge were identified just below elevation 700 ft. and near the second curve in the switchback access road. The larger wetland measures about 10 ft. by 50 ft. and the smaller one is about 10 ft. in diameter. The associated wetland species were not noted in the biological resources survey report. The wetland areas will be avoided during project construction.

The riparian habitat of Chicken Creek borders the west side of the Poultry Husbandry Area and is dominated by California bay and coast live oak.

¹¹ Joint Memorandum between University of California at Berkeley and Ernest Orlando Lawrence Berkeley National Laboratory, March 28, 1996, pg. 2.

SAIC performed a literature search and made a follow-up visit on April 12, 1993 to determine the presence or absence of any protected species in the area. Four protected plant species and four protected animal species that were identified in the general hill area in the 1990 UCB LRDP EIR were searched for, but no protected species were found in the survey area. In addition, suitable habitat, as determined from the literature review, for any of the four protected plant species or four protected animal species was not found to be present.

2. Impacts

a. Impact Analysis, Landscape Maintenance Program and Additional Acreage

The Lab's Maintenance Program for a Fire-safe Sustainable Landscape would not result in any new significant impacts on biological resources or make substantially more severe previously identified significant impacts, because vegetation management activities for both the main site and the added perimeter areas are in conformance with existing guidelines, objectives, and mitigations as described below.

The Maintenance Program objectives and prescriptions are consistent with the Lab's 1987 LRDP, specifically the Site Planning Concepts (1987 LRDP, pg. 13), the major goals for landscape planning (1987 LRDP, pg. 16), and the Design Guidelines, particularly the guideline addressing Landscaping and Visual Enhancement (pg. 17). The management activities specified in the program will also further the LRDP goals of establishing fire-resistant vegetation in the landscape buffer areas (1987 LRDP, pg. 69) and augmenting the natural beauty of the area through additional landscaping in the buffer zones (1987 LRDP, pg. 72).

Vegetation management activities in the added perimeter acres conform to the programs and policies outlined in the 1990 UCB LRDP, which designates parts of the transferred lands as Natural Areas, parts as Ecological Study Areas, and a small part for development. Management concepts and activities for the transferred lands are consistent with the UCB LRDP uses identified for these areas.

The 1992 SEIR notes that the continued University operation of Berkeley Lab, including continued implementation of the Lab's LRDP, will result in the loss of vegetation, including mature trees and areas with some habitat value for non-critical species (Impact III-D-2). This is considered a significant impact that the six SEIR mitigation measures reduce to less than significant levels (Mitigation Measures III-D-2a through III-D-2f). The Lab's Maintenance Program implements Mitigation III-D-2b which requires a maintenance program be established to control eucalyptus, French broom, and other opportunistic colonizer shrubs and trees. In addition, by reducing the risk of fire, the program also helps to preserve and protect species and their habitat. The Maintenance Program also implements other mitigations described in the SEIR: revegetation of disturbed areas, minimal removal of native trees and shrubs, minimal encroachment in Blackberry Canyon, and periodic monitoring of areas treated under the revegetation program. Impacts of the Maintenance Program are also mitigated by SEIR mitigations described elsewhere. See for example, Section B: Geology, Soils, and Seismicity of this Addendum.

In addition, the Maintenance Program does not meet the standards of significance established in the SEIR for biological resources: it does not substantially reduce the number or restrict the range of a rare, endangered, or threatened plant or animal; does not cause fish or wildlife populations to drop below self-sustaining levels; and does not adversely affect significant riparian lands, wetlands, marshes, or other wildlife habitats. Any impacts on

wildlife movement, which may occur during the period of fence construction, would be short-term and are considered less than significant.

b. **Impact Analysis, Poultry Husbandry Storage/Construction Laydown Area**

Development of a construction lay-down area in the Poultry Husbandry Area would not result in any new significant impacts on biological resources or make substantially more severe previously identified significant impacts because it would not have an impact on sensitive plant or animal species, and would not adversely affect significant riparian lands, wetlands, marshes, or other wildlife habitats.

3. Summary Conclusion

Project impacts on biological resources would be similar to those described in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to biological resources. Biological resources effects do not require further analysis.

E. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

1. Setting Update

Subsequent to certification of the SEIR in November 1992, and pursuant to Section 106 of the National Historic Preservation Act of 1966, the Lab's site-wide historic building inventory program was initiated. As of September 1996, four facilities have been assessed for potential eligibility for listing on the National Register of Historic Places (NRHP). These include Building 7 (Mechanical and Electronics Shop), Building 10 (which contained beamlines associated with the 184-inch cyclotron, and at one time housed one of the first linear accelerators), Building 51 and 51A complex (the Bevatron), and Building 51B (Experimental Particle Beam Hall). DOE, in consultation with the State Historic Preservation Officer, has determined that of these facilities, only the Building 51 and 51A complex (the Bevatron) is eligible for inclusion in the NRHP. Under a memorandum of agreement that is being drafted between DOE, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation, the Bevatron would be recorded to Historic American Engineering Standards prior to the Lab's undertaking any action that could affect the Bevatron's historic significance. No further analysis is required.

2. Impacts

The SEIR identified impacts to historically significant Laboratory buildings as a potential result of continued University operation of the Lab (Impact III-E-1). The determination that the Building 51 and 51A complex is eligible for inclusion on the NRHP will not result in any new significant impacts to historic resources or make more severe previously identified significant impacts identified in the SEIR.

Based upon consultation with the State Historic Preservation Officer, the mitigation measures identified in the SEIR (Mitigations III-E-1a through III-E-1c) would be adequate to result in less-than-significant impacts to the Bevatron.

3. Summary Conclusion

Project impacts on historical and archaeological resources would be similar to those described in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to historical and archaeological resources. No further analysis is required.

F. VISUAL QUALITY

1. Setting Update

The SEIR describes the visual character of the Berkeley Hills where the Lab is located and the variety of physical components at the Lab's main site that result in few Lab buildings being highly visible from any distance (SEIR, pgs. III-F-1 to III-F-4)

Much of the built development at Berkeley Lab has an industrial appearance which is buffered from many internal and external views by trees (SEIR, Exhibit III-F-3). Lab facilities do not project glare onto adjacent communities, and the night view of the hills is dominated by the lights of the UC Berkeley campus hillside buildings located higher on the slope.

a. Landscape Maintenance Program

The prescriptions developed for the Maintenance Program for a Fire-safe Sustainable Landscape¹² will affect the visual character of the Lab and the visibility of parts of the Lab complex. The reduction/removal of shrub and vine masses, the resumption of mowing and grazing of hillsides, and the 'limbing up' of trees will create a more 'tended' appearance with views below tree canopies. There will be some increased visibility of Lab buildings as tree plots are thinned to healthy densities.

While overall screening generally will be maintained, the reduction in the density of tree plantations will open up the 'uniform pattern of dark green foliage' (SEIR, pg. III-F-1) across the west-facing slopes of the Lab. Views of these slopes as shown in the SEIR as Exhibits III-F-1 and III-F-2 are expected to remain generally the same in terms of screening foliage, although more of the hillside groundplane may show through the trees and some additional portions of buildings may become visible in some areas of the community below. Similar effects are expected for views from the residential areas and the Lawrence Hall of Science located above the Lab to the north and from the Panoramic Hill residential area on the south.

Building 62, which is located on a ridge above Centennial Drive, is screened from most off-site views by trees located on the surrounding slopes. The building, partially visible from UC's Memorial Stadium, will be further exposed to that public vantage point when a number of failed trees, mostly pines, are removed from the west-facing slope under the Maintenance Program. This exposure will continue until recently planted trees grow to an appropriate size to provide screening, which, due to the topography, will take over a decade.

The Life Sciences Research Area, at the east end of the Lab, will remain visible from various vantage points along the Jordan Fire Trail that rims the higher elevations of the canyon. These views are available only from a distance, where the Lab facilities are seen without much detail and as a relatively small component of the broader canyon context. From adjacent portions of Centennial Drive, hillside topography and trees permit partial and intermittent views of facilities in the Life Sciences Research Area. Under the Maintenance Program, establishment of natural eucalyptus spacing along the hillside has opened views to the new buildings (84 and 85) currently under construction. Branching and leaf-out of the thinned grove coupled with replanting and the protection of existing small coast live

¹² Lawrence Berkeley Laboratory, Draft "Maintenance Program for a Fire-safe Sustainable Landscape," March 1996, updated August 1996. Please see Section III.D: Biological Resources, for more information about the Landscape Maintenance Program.

oaks will restore much of the screening. Oaks, pines, and redwoods maintain the bulk of screening along Centennial Drive immediately above and below the Lab's Strawberry Gate.

Along the west side of Centennial Drive above Berkeley Lab's Grizzly Gate, trees have already been removed following the Maintenance Program prescriptions and additional trees have been removed in preparation for UCB road stabilization work that was begun in June 1996. Almost all screening vegetation has been removed from this area, opening views to the Bay as well as to the Lab buildings situated below the road. Trees have been reserved for replanting when road construction is completed.

The Maintenance Program addresses the planting of groundcovers, shrubs, and trees for a variety of objectives, including screening of facilities. Although existing seedling trees will be protected and new trees will be planted, including some at a large size (24" box), it will take some years of growth for foliage to become fully effective as a screening element.

Vegetation treatment began in spring 1996 and initial prescriptions are anticipated to be substantially complete by October 1999. Replanting commenced in October 1996 and will continue for approximately four years.

b. Parking and Modulars

It is assumed that during the contract extension period Berkeley Lab may develop the main site to buildout as anticipated in the 1987 LRDP for the year 20xx, and will continue to comply with the design guidelines and mitigations described in the 1987 LRDP, 1987 LRDP EIR, and 1992 SEIR. The Lab is in the process of developing, or has completed, several small new projects which are consistent with the LRDP land use guidelines and space development ceiling, but are not specifically described in the LRDP, that could affect visual quality (Figure III-F-1):

- The Building 29 parking area encompasses approximately 0.5 acres of land adjacent to Lawrence Road, west of Building 29, and southeast of Building 54, the Lab's cafeteria, with an electrical substation located near the southeast end of the parking pad. The site is located on a west-facing slope entirely within a parcel (Lease parcel 21) leased from The Regents to DOE. The Lab fence has been moved, within the leased parcel, to encompass the entire construction site. Trees were removed to accommodate construction, partially increasing visibility of a grassy west-facing hillside. No existing structures were further exposed to the community or campus below. Landscape plantings help to screen parked vehicles and control possible reflection and glare. The lighting fixtures direct light away from off-site exposures.
- The Life Sciences Research area parking area occupies approximately 0.1 acres along an access road near the middle and on the back (northeast) edge of the developed area between Building 83 and Building 85. The location is the site of a small slide in a grassy slope which has been repaired and does not require removal of any trees or other screening vegetation. Views to the interior of the Life Sciences Research facilities where the parking will be located are essentially available only within the research area or from certain vantage points on the Jordan Fire Trail which rims Strawberry Canyon at higher elevations.
- A storage/construction laydown area is proposed in the Poultry Husbandry Area, designated in the UCB LRDP as the Lower Neighborhood (see Figures III-F-1 and III-G-1: Land Use section). Berkeley Lab recently assumed management responsibility for the upper part of the Lower Neighborhood and will manage the land in conformance the UCB's land use designation.

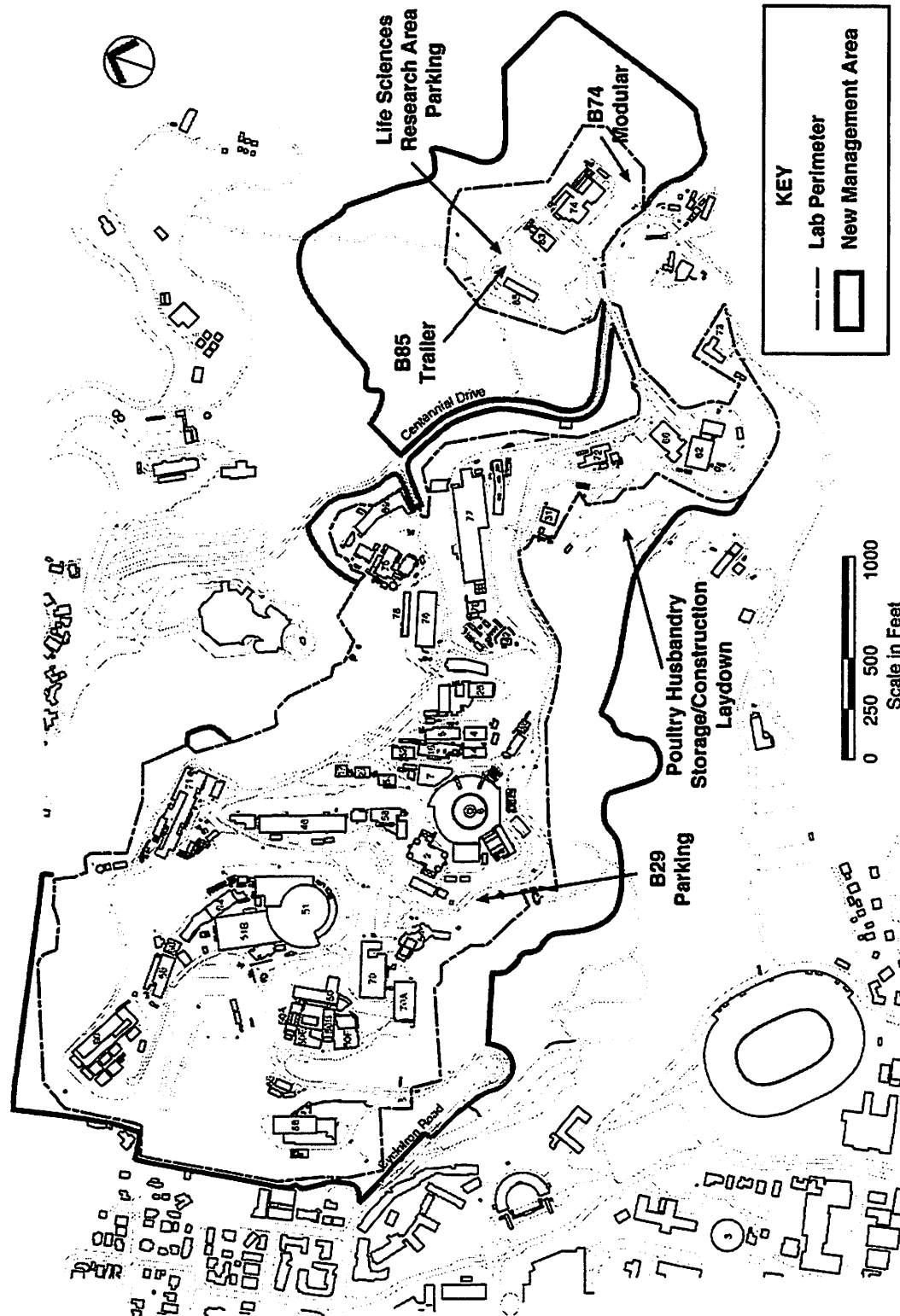


Figure III-F-1
BERKELEY LAB NEW MANAGEMENT BOUNDARY AND SMALL PROJECT SITES

The project would utilize approximately 0.7 acres of the upper terraces and access road created when the University developed the research area in the 1920s. Since the 1970s, nearly all of the facilities (barns, storage buildings, laboratories, sheds, and chicken coops) constructed on the terraces have been demolished, leaving only concrete pads and level building sites currently used by the University for storage of miscellaneous items, including salvaged building materials and equipment and surplus mechanical equipment. Site development may include expanding some of the existing pavement and adding a supportive gravel bed to other areas. Limited parking for construction vehicles and workers may be included when the site layout is prepared. No trees or other screening vegetation would be removed for development of the storage/construction laydown area and the enclosing terrain would not be affected.

The Poultry Husbandry Area is located in a sub-valley of Strawberry Canyon on a south-facing slope depressed below enclosing ridges on three sides. The area is bordered on the west by a riparian corridor of mature live oaks and large California bays. The upper portion of the area is grassy with stands of coyote bush, and the lower portion is a mosaic of woodlands and dense chaparral. Public views into the site are extremely limited due to surrounding steep topography and dense vegetation. The area is not visible from Centennial Drive below and views from the Panoramic Hill residential neighborhood are limited by canyon topography and vegetation on both sides of the canyon. The Poultry Husbandry Area is directly visible from the Lab's corporation yard at Building 31, from portions of Lawrence Road near Building 31, and from the west side of three large Lab research facilities (Buildings 62, 66, and 72) located on the eastern ridge above the site.

- The proposed Building 74 modular site of approximately 0.1 acre is located along the southwest side of the Building 74 access drive at the head of a bowl-shaped west-facing slope. The grassy hillside has newly planted redwood trees at the base which will grow to screen the area from off-site views. The 30 ft. by 60 ft. two-story prefabricated modular structure will be used for offices. The modular will be positioned at road level with a sidewalk provided for pedestrian circulation. Utilities will be installed underground.
- The Building 85 trailer site occupies less than 0.1 acre on the slope southeast of the replacement Hazardous Waste Handling Facility, in the Life Sciences Research Area. A 60 ft. by 60 ft. one-story, prefabricated modular structure, comprised of five trailers, was erected on a pad held level at elevation 873 ft. by retaining walls on the two downhill sides. The retaining walls range in height from 2 ft. at the outer ends to 13 ft. at the junction of the corners. Utilities have been installed underground. Several recently-planted small oak trees were relocated and three other larger seedlings were removed, for construction. Additional vegetation was planted to screen the retaining wall and new structure from adjacent buildings. The trailer site is well within the developed area, set back from the slopes facing Centennial Drive, and is not highly visible from Centennial Drive. Views to the back of the Life Sciences Research Area where the trailer site will be located are essentially available only within the research area or from higher elevations along the Jordan Fire Trail which rims Strawberry Canyon.

2. Impacts

a. Impact Analysis, Landscape Maintenance Program

The Lab's Maintenance Program for a Fire-safe Sustainable Landscape would not result in any new significant visual impacts or make substantially more severe previously identified significant impacts because vegetation management activities are in conformance with existing visual quality guidelines, objectives, and mitigations, as described below.

The Maintenance Program objectives and prescriptions are consistent with the Lab's 1987 LRDP, specifically the Site Planning Concepts (1987 LRDP, pg. 13), the major goals for landscape planning (1987 LRDP, pg. 16), the Perimeter Buffer-Zone Concept (1987 LRDP, pg. 16), and the Design Guidelines, particularly the guideline addressing Landscaping and Visual Enhancement (1987 LRDP, pg. 17). The management activities specified in the program will also further the LRDP goals of establishing fire-resistant vegetation in the landscape buffer areas (1987 LRDP, pg. 69) and augmenting the natural beauty of the area through additional landscaping in the buffer zones (1987 LRDP, pg. 72).

Vegetation management activities in the added perimeter acres conform with the programs and policies outlined in the UCB LRDP, which designates parts of the transferred lands as Natural Areas, parts as Ecological Study Areas, and part for development. Management concepts and activities for the transferred lands are consistent with the UCB LRDP uses identified for these areas.

Although vegetation management actions will change the density and/or species of trees, extensive tree stands will remain, except in the area immediately above the Lab's Grizzly Gate (where additional trees were removed to support UCB road stabilization efforts) and the Building 85 area. Replanting will eventually restore tree screening, although visual quality may be altered in the interim. New plantings will be primarily evergreen species that, in combination with remaining trees, will eventually enhance the quality of viewsheds. The culling of sick and unsound trees and the establishment of natural grove densities will support the health and longevity of screening plants. The visibility of Lab buildings during the growth of replacement planting is noted in the SEIR to be a less-than-significant impact (Impact III-F-2). This impact would be further reduced by the Lab's continued use of non-reflective building materials and choice of building colors which mitigate any potential impacts of light and glare (Mitigation III-F-2).

The SEIR also acknowledges that continued implementation of the Lab's LRDP will result in a change in the visual quality of the Lab and the surrounding environs (Impact III-F-1), but that the impact will be mitigated to less than significant with implementation of directives regarding replacement landscaping and building design (Mitigations III-F-1a and III-F-1b).

The vegetation management program directs the protection and re-establishment of native species found in the Berkeley-Oakland hills, which will help maintain the visual quality and visual resources of the region. The program's focus on reducing the destructive potential of fires will also help maintain visual resources that could otherwise be eliminated by fire.

b. Impact Analysis, Parking and Modulars

Construction and use of the new parking areas and modular sites does not result in any new significant visual impacts or make substantially more severe previously identified significant visual impacts because construction and use of these elements would be done in conformance with mitigation measures identified in the SEIR (Mitigations III-F-1a, III-F-

1b, and III-F-2) and with existing visual quality guidelines and objectives as described below.

The new parking areas and Building 85 trailer site are consistent with the guidelines and goals related to visual quality in the Lab's LRDP, including the Site Planning Concepts (1987 LRDP, pgs. 12-17), particularly the perimeter buffer zone concept (1987 LRDP, pgs. 16). They are also consistent with the LRDP's Design Guidelines (1987 LRDP, pgs. 17-18), in particular Landscaping and Visual Enhancement. Management concepts and activities for the perimeter lands transferred to Berkeley Lab's management are consistent with the UCB LRDP uses identified for these areas.

The parking areas and Building 85 trailer site are small and in locations with limited public visibility resulting in a less-than-significant impact on natural viewsheds, regional visual quality, or regional visual resources. No new light or glare will be directed off-site, and sunlight/shadows will not be affected. Construction and use of the Building 74 modular site would not result in significant new visual impacts because newly planted redwood trees will grow to screen the area from off-site views.

3. Summary Conclusion

Project impacts on visual quality would be similar to those identified in the 1987 LRDP EIR and the 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to visual quality. Visual quality effects do not require further analysis.

G. LAND USE

1. Setting Update

a. Site acreage

As described in the 1992 SEIR, Berkeley Lab's main site is located completely within the boundaries of the University of California and, in 1992, encompassed 134 acres (SEIR, pg. III-G-1). Lab acreage is held under three types of arrangements: lands leased to DOE, lands held under an occupancy agreement with the University, and undeveloped lands enclosed by the Lab fence and controlled by Berkeley Lab.

In May 1996 the UCB and Berkeley Lab acting under guidance from the University of California Office of the President, concluded a formal agreement transferring management responsibility for 70 acres of the UCB's undeveloped lands, located along the perimeter of the Lab site, to Berkeley Lab (see Figure I-1: Background and Summary section). The transfer was undertaken as part of a mutual effort to manage the risk of fire, restore vitality of declining and senescent plantings, and support orderly development in the East Bay hills. Acreage areas were chosen for transfer on the basis of historic fire data, vegetation inventory and analysis, and a determination of what buffer areas were needed and possible in order to establish 'defensible space' for firefighters without resorting to traditional fire-break approaches.

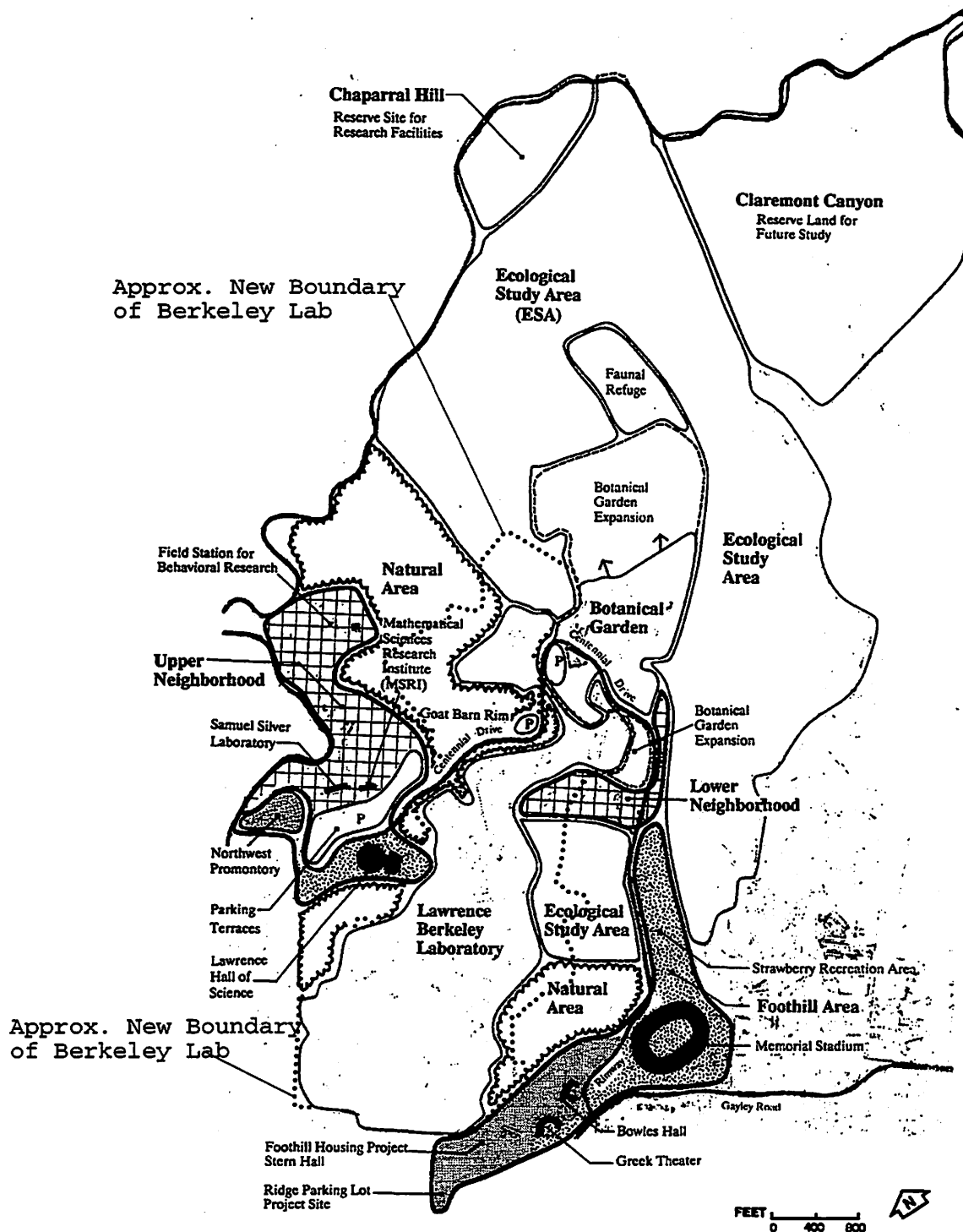
The additional acreage will be managed in conformance with the Berkeley Lab's 1987 LRDP and the UCB 1990 LRDP until the Lab's 1987 LRDP is updated. In the added perimeter acreage, as with the rest of the main site, the Lab is responsible for deferred and regular vegetation maintenance. Other management activities involved are maintenance of utilities, hydrazurs, and trails/roadways, and erosion and sedimentation control.

The UCB 1990 LRDP designates the acreage added along the Lab's northern, eastern, and southern perimeters as Natural Areas or Ecological Study Areas (Figure III-G-1), except for the Poultry Husbandry Area on the Lab's southern boundary, which is designated for development of research facilities. The land added along the western perimeter of the Lab is a narrow area between the Lab's existing fence and existing residential neighborhoods and, as such, has no specific land use designation in the UCB LRDP. The UC land use designations will continue to apply to the acreage now managed by Berkeley Lab. Management activities will conform to those uses pending integration into the Berkeley Lab LRDP, when a single common set of definitions will be applied over the entire 200 acres managed by the Lab.

The Lab will extend its perimeter fence at various locations to enclose the additional acreage and conduct vegetation management activities and to facilitate perimeter fire control. The new fence will be similar to the existing perimeter fence: 8-foot high chain link with metal support poles about 10 feet apart and topped by three strands of barbed wire. Consistent with Berkeley Lab site access and maintenance policies, access within the Lab fence is assured to University staff and researchers as needed.¹³ To assure continued free general access to the Big 'C', no fence is now planned for the Big 'C' draw.

As part of management activities, a 4-ft. wide, low-maintenance dirt trail will be constructed in areas where access is needed for fence and vegetation maintenance. Switchbacks may be employed at steep locations to keep the trail gradient to a moderate

¹³ Joint Memorandum between University of California at Berkeley and Ernest Orlando Lawrence Berkeley National Laboratory, March 28, 1996, pg. 2.



Source: Draft Environmental Impact Report, LRDP, University of California at Berkeley, 1990

Figure III-G-1
UC HILL AREA LAND USE PLANNING ZONES

slope. The trail would not accommodate motorized vehicles and motorcycles would be prohibited from using it.

b. Built Space

In 1992, buildings on the Lab's main site enclosed approximately 1.62 million gsf. The SEIR projected an increase to approximately 1.81 million gsf by 1997, and to 2.00 million gsf at buildout (SEIR, pg. III-G-1).

Buildings on the Lab's main site currently enclose approximately 1.69 million gsf¹⁴, an increase of 4 percent from the 1.62 million gsf existing in 1992. Berkeley Lab's Institutional Plan, FY 1998-2002, reiterates previous projections that full buildout for the main site will result in a total of approximately 2.00 million gsf as described in the SEIR. It is assumed that buildout will occur during the proposed contract extension period.

c. Site Development

The 1992 SEIR notes the greatest potential for future development is found in the original laboratory site area of approximately 15 acres and at the east end of the Lab in another approximately 10 acres of undeveloped land (1992 SEIR, pg. III-G-1). At that time approximately 4 acres in the east site area were scheduled for development. Most of the remaining undeveloped land on the Lab site is described as being in hillside, open space, and circulation.

As planned, the Lab has developed new facilities at the east site area with construction of a replacement Hazardous Waste Handling Facility (HWHF) and the Human Genome Laboratory.

It is assumed that during the proposed contract extension period Berkeley Lab may develop the main site to buildout as anticipated in the 1987 LRDP and SEIR, and will continue to comply with the land use mitigation measure (Mitigation III-G-2) described in the SEIR, which states that buildings proposed for development at the Lab will follow the design guidelines contained in the Lab's LRDP.

The Lab is currently in the process of developing, or has constructed, several new small projects not specifically described in the 1987 LRDP or the SEIR:

- An approximately 0.5-acre parking area near Building 29;
- An approximately 0.1-acre parking lot in the Life Sciences Research Area (also referred to as the East Canyon Site);
- A storage/construction laydown area encompassing approximately 0.70 acre, in the Poultry Husbandry area (within the Lab's new management area);
- A 1-module building site encompassing approximately 0.1 acre near Building 74; and
- A 1-module trailer site encompassing approximately 0.1 acre near Building 85.

These projects are described in Section F: Visual Resources, and their locations are shown on Figure III-F-1.

¹⁴ Berkeley Lab Facilities Planning Department, 1997.

2. Impacts

a. Impact Analysis, Site Acreage

The Lab's management of 70 additional acres of land would not result in any new significant land use impacts or make substantially more severe previously identified significant land use impacts because the land would be managed in conformance with existing land use and development plans and policies as described below.

Land use in the perimeter acreage added to the Berkeley Lab main site is consistent with the Lab's LRDP, including the Site Planning Concepts (1987 LRDP, pg. 12-17), particularly the perimeter buffer zone concept (1987 LRDP, pg. 16). It is also consistent with the LRDP's Design Guidelines (1987 LRDP, pgs. 17-18), in particular those addressing Open Space and Outlooks; Landscaping and Visual Enhancement, and Topography and Grading. The management activities designated for the added acreage are compatible with the planning analysis pertaining to Environmental Management (1987 LRDP, pgs. 44-45) and with the Development Plan Elements (1987 LRDP, pgs. 47-65), specifically those addressing Building Sites, and Landscaping. Management activities in the perimeter areas will also further the LRDP goals of establishing fire-resistant vegetation in the landscape buffer areas (1987 LRDP, pgs. 69) and augmenting the natural beauty of the area through additional landscaping in the buffer zones (1987 LRDP, pg. 72).

Land use in the added areas conforms to the programs and policies outlined in the 1990 UCB LRDP. Chapter Four of that LRDP (1990 UCB LRDP, pgs. 49-54) addresses the University's Hill Area which includes Berkeley Lab's main site and the land added to the Lab's perimeter. The 1990 UCB LRDP designates most of the Lab's new management lands as Natural Areas or as Ecological Study Areas and a small portion is reserved for development. Management concepts, proposals, and activities for the new management areas are described in the Lab's 1996 "Maintenance Program for a Fire-Safe Sustainable Landscape," and are consistent with the 1990 UCB LRDP uses identified for these areas. Access to these lands for University researchers and staff will continue consistent with Berkeley Lab site access and maintenance policies.

b. Impact Analysis, Built Space

The current and projected built space at the Berkeley Lab main site is within development projections described in the 1987 LRDP and addressed in the 1987 LRDP EIR and 1992 SEIR. Therefore, continued implementation of the LRDP to buildout capacity will not result in any new significant land use impacts or make substantially more severe previously identified significant land use impacts.

c. Impact Analysis, Site Development

Construction and use of the new parking areas, trailer/modular placements, and storage/construction laydown site (see Figure III-F-1) will not result in any new significant land use impacts or make substantially more severe previously identified significant land use impacts because the projects do not conflict with existing or proposed land uses at the periphery of the campus or with local land use plans; do not result in the conversion of open space into urban- or suburban-scale uses; do not conflict with local general plans, zoning, or locally-adopted environmental plans and goals; and do not result in nuisance impacts as a result of incompatible land uses, as described below.

The new parking areas and trailer/modular placements are located in areas shown in the Lab's 1987 LRDP as open space and do not change the LRDP description for this land use designation. The 1987 LRDP states that "open space is provided to enhance the working and research environment, to maintain landscape compatibility, and to take advantage of the mild Bay Area climate and the views" (1987 LRDP, pg. 17). As shown in Figure 5-1 of the 1987 LRDP: Long-Range Land-Use Plan (1987 LRDP, pg. 48), the open space designation applies to any land that has no major permanent buildings, parking or primary vehicle circulation routes, even if paved or supporting small structures.

The availability of parking will enhance the working environment for Lab employees, and the additional parking spaces will help the Lab toward the planning goal of 1.8 persons per parking space discussed in the 1987 LRDP EIR (1987 LRDP EIR, pg. 163).

Buffer zones are an additional land use designation to be considered in the siting of new projects. The 1987 LRDP establishes nine buffer zones to provide special consideration of particular constraints and amenities, such as valuable vegetation, scenic vistas of the Bay, visual exposure from the city and UCB campus, and important geological and topographic criteria. Although building sites are largely excluded from the buffer zones, they are not prohibited, nor are other types of development, such as paved walkways, parking, substations, or storage. Compliance with the Planning and Protection Criteria (1987 LRDP Table 5-2: Buffer-Zone Landscape Planning Areas) and the other listed factors to be considered in building location and land use (1987 LRDP, pg. 48) allows development in the buffer zones.

The Building 29 parking area is located within the West Strawberry Canyon Buffer Zone which protects valued views and several tree species of particular value: eucalyptus, dawn redwoods, and cork oaks (Figure III-F-1). The parking site retains views of the Bay and does not affect the tree species listed for special consideration.

The 0.1-acre parking lot project, located in the Life Sciences Area Buffer Zone, will be constructed in an area created by a recent slide: no trees will be removed to accommodate it.

The Poultry Husbandry storage and construction laydown site is located in the added perimeter lands now managed by Berkeley Lab. Because it was not a part of the Lab site until recently, the Lab's LRDP notes no special considerations for this area. However, the storage/construction laydown project is planned to occupy a previously disturbed and developed site on an open slope where trees and other environmental resources of note occur only at the edges of the area (see the Biological Resources section for further discussion). In keeping with Lab's LRDP stated buffer zone principles (1987 LRDP, pg. 47), the project will avoid impacts to the nearby riparian area. As agreed in the Joint Memorandum which transferred management responsibility, Berkeley Lab will manage the additional acreage consistent with the UCB LRDP¹⁵: storage and construction laydown in the Lower Neighborhood conforms to the University's designated land use for the area which provides for research-related development and has supported equipment and materials storage use by the campus.

The Building 74 modular site is located in the Life Sciences Area Buffer Zone, which gives special importance to evergreen and eucalyptus trees and requires consideration of slope stability. The modulares will be screened by landscape trees that have already been planted. Additional screening will be planted as part of the project. Design development of the modular will investigate slope stability of the project site.

¹⁵ Joint Memorandum between University of California at Berkeley and Ernest Orlando Lawrence Berkeley National Laboratory, March 28, 1996, pg. 2.

Projects in buffer zones will follow the design guidelines contained in the Lab's 1987 LRDP (SEIR Mitigation measure III-G-2), including development in accordance with the planning and protection criteria included in 1987 LRDP Table 5-2: Buffer-Zone Landscape Planning Areas.

3. Summary Conclusion

Project impacts on land use would be similar to those identified in the 1987 LRDP EIR and 1992 SEIR. Although there has been a change in the Lab's land management responsibilities, with the transferal of management of 70-acres of land from UC to the Berkeley Lab, this change would not cause new significant land use impacts or a substantial increase in the severity of potential impacts analyzed in the 1992 SEIR. Land use effects do not require further analysis.

H. POPULATION, EMPLOYMENT, AND HOUSING

1. Setting Update

a. Lab Population Growth

The SEIR reported that in 1991 the Berkeley Lab population was 3,940, and projected a Berkeley Lab population of 4,390 persons in 1997, and a population of 4,750 persons at buildout (20xx) (1992 SEIR, pg. III-H-1).

The Lab population has increased by 364 persons over the population reported for 1991 in the SEIR. The current Lab population is 4,304, including 3,548 full- and part-time staff, and 765 guests.¹⁶ Currently the Lab is 86 persons under the SEIR's projection for 1997. The LRDP projected that the buildout population would be 4,750 persons; the Lab population is currently 446 persons below this ultimate population. Like the 1992 SEIR, this Addendum provides for a buildout population of 4,750.

b. Residential Distribution

The SEIR listed the cities of residence for the Lab's full-time staff in 1991, projected the cities of residence for 1992, and stated that the number and percentage of Lab employees living in the City of Berkeley would increase from 356 persons (18.1% of the total Lab population) in 1991 to 558 persons (23.4% of the total Lab population) in 1992.

The distribution of employees' cities of residence has shifted slightly since 1991. Table II-H-1 shows the distribution by city of residence of full-time employees in 1991 and in 1996. Of the 428 additional tabulated population, 223 more employees live in the immediate Berkeley-Oakland area, or the adjacent communities of Albany, El Cerrito, and Kensington. The percentage (and absolute numbers) of employees living in San Leandro and south, San Pablo and north, and other communities has also increased. The increase in the percentage of Lab employees living in Berkeley changes a previous trend of decline and places the percentage between 1980 (22.6 percent) and 1986 (23.4 percent) levels. It is assumed that the cities of residence for the additional employees projected for Lab buildout will be proportionately distributed throughout the communities listed in Table III-H-1.

The SEIR also stated that while the Lab's population growth could create an impact on the availability of owned and rented housing, the impact would be less than significant because the Lab's demand for housing in the City of Berkeley represented only about 0.5 percent of the existing housing supply in Berkeley.

2. Impacts

a. Impact Analysis, Lab Population Growth

Because the current Lab population is consistent with the projections contained in the 1992 SEIR, the proposed contract extension would not result in any new significant impacts or make substantially more severe previously identified significant impacts related to population growth.

¹⁶ The number of registered guests significantly exceeds the number actually working at Berkeley Lab at any given time. The SEIR reported 1,400 registered guests, with 610 on the site at any one time. The current number of registered guests has been adjusted downward by the same proportion as in the SEIR. Berkeley Lab currently has 1,755 registered guests; 765 is thus the adjusted number of active guests.

Table III-H-1
City of Residence, Berkeley Lab Full-Time Staff

City of Residence	1991		1996	
	Number	Percent	Number	Percent
Berkeley	356	18.1	524	21.8
Albany	64	3.2	111	4.6
Richmond	184	9.3	124	5.2
El Cerrito/Kensington	131	6.7	139	5.8
Oakland	339	16.9	291	12.1
San Leandro and South	123	6.2	186	7.8
San Pablo and North	219	11.1	349	14.5
Orinda and East	394	20.0	452	18.8
Marin County	30	1.5	29	1.2
San Francisco	87	4.4	103	4.1
Other	48	2.5	91	3.8
TOTAL	1,971	100.0	2,399	100.0

Sources: SEIR, Table III-H-1; Berkeley Lab's Human Resources database.

b. Impact Analysis, Residential Distribution.

The continued operation and development of Berkeley Lab during the proposed contract extension period would not result in growth of the Lab's population beyond the levels projected in the SEIR and LRDP. In addition, the Lab's population growth would not impact the City of Berkeley's ability to provide housing for its residents or conflict with housing and population projections and policies set forth in the General Plan.¹⁷ The number of Lab employees currently living in Berkeley (524) is below the number projected for 1992 (558). For these reasons, the continued operation and development of Berkeley Lab would not result in any new significant impacts or make substantially more severe previously identified significant impacts.

3. Summary Conclusion

Project impacts on population, employment, and housing would be similar to those identified in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to population, employment, and housing. Population, employment, and housing effects do not require further analysis.

¹⁷ Stephen Barton, Senior Planner, City of Berkeley, Planning and Development Department, personal communication, August 6, 1996.

I. TRAFFIC, CIRCULATION, AND PARKING

1. Setting Update

a. Traffic Counts

The SEIR projected an average daily traffic volume (total of all three Berkeley Lab entrance gates) of 7,827 trips for 1997 (1992 SEIR, Table III-I-3). Increased volumes were also projected on Berkeley roadways leading to the Lab. The projected increases ranged from about 0.3 percent to 7 percent of the total volumes on those road segments in 1991.

Recent traffic counts conducted at the three Berkeley Lab gates¹⁸ indicates that traffic volumes on Berkeley Lab roadways have declined since 1991, and that traffic volumes are well below those projected in the 1992 SEIR for 1997. Counts conducted in January 1996 were 32 percent below the volume projected in the SEIR for 1997. Counts conducted in June 1995 were 10 percent below the volume projected for 1997. Table III-I-1 below summarizes actual count volumes for 1991, June 1995, and January 1996. Volumes projected in the SEIR for 1997 and 20xx are shown for comparison purposes.

Table III-I-1
Average Daily Traffic Volumes

	Actual 1991 ^a	Actual 1995 ^b	Actual 1996 ^c	Projected 1997 ^d	Projected 20xx ^e
Gates to Berkeley Lab					
(1) Cyclotron Road Gate					
(a) Blackberry Canyon	4,163	4,229	4,219	4,816	6,195
(2) Centennial Drive Gates					
(a) Grizzly Peak	1,009	946	909	1,220	1,247
(b) Strawberry Canyon	1,489	1,940	817	1,791	2,509
(3) Total of three Lab Gates	6,661	7,115	5,945	7,827	9,951

Notes and Sources:

a = Actual as reported in SEIR, Tables III-I-3.

b = Actual taken in June 1995 over a 3-day period by Fehr & Peers Associates, Inc., Transportation Consultants.

c = Actual taken in January 1996 over a 3-day period by Fehr & Peers Associates, Inc., Transportation Consultants.

d = Projected in SEIR, Table III-I-3, pg. III-I-5.

e = Projected in SEIR, Table III-I-4, pg. III-I-7.

¹⁸ Fehr & Peers Associates, Inc., Transportation Consultants, letter report on gate counts conducted in 1995 and 1996 at Berkeley National Laboratory, February 14, 1996.

As shown in the table, traffic volumes have declined since June 1995. Partially accounting for this decline is the increase in the number of bicyclists, the increase in carpooling and vanpooling, and the implementation of a Commuter Check Parking Cashout Program, in which about 100 current participants are given monthly cash vouchers in exchange for relinquishing their parking permits. It is presently unknown what accounts for the remainder of the decline.

As shown in Table II-2 of this Addendum, Berkeley Lab's population at the main site is projected to increase by about 569 persons between 1996 and buildout. A portion of this new population would carpool, take the shuttle, or otherwise avoid contributing auto trips to and from the Lab site. However, even if it is assumed that all 569 persons will drive to work, and assuming the 1992 SEIR traffic generation rate of 2.18 trips/employee (or visitor), the increase in traffic trips would result in total volumes that would continue to be below those projected for 1997 in the SEIR and would be at least 28 percent below the SEIR projection of 9,951 trips at buildout.

b. Parking

The SEIR reported that in 1991 there were 1,843 available parking spaces on site, for a ratio of population to spaces of 1.66:1. The SEIR projected a decrease in this ratio over time.

Currently there are 1,884 parking spaces available at the Lab. Based on the current Lab population, the population-to-spaces ratio is 1.86:1, which is slightly above the planning goal of 1.8:1 stated in the 1987 LRDP EIR (1987 LRDP EIR, pg. 163). The Lab plans to develop an additional 526 parking spaces on the Lab site during the contract extension period to reach the 2,410 spaces projected in the LRDP for the year 20xx. These spaces will bring the parking ratio to 1.70:1, the ratio projected in the LRDP for Lab buildout.

2. Impacts

a. Impact Analysis, Traffic Counts

Because Berkeley Lab's traffic volumes have declined rather than increased as projected in the SEIR, and because projected future increases in traffic would remain below projections, the continued development and operation of Berkeley Lab would not result in any new significant impacts or make substantially more severe previously identified significant impacts. Although neither the Lab nor the City of Berkeley have conducted new comprehensive traffic counts on City streets in the campus area since 1991, City staff agree that Berkeley Lab has not significantly added to traffic volumes or congestion on City streets since 1991.¹⁹

b. Impact Analysis, Parking

The population to parking ratio at the Lab has increased, rather than decreased as projected in the SEIR. A decrease in the parking ratio was considered to be a significant impact in the SEIR (Impact III-I-2) that would be mitigated to less than significant by implementation of Mitigation III-I-2, which states that the Lab would continue to implement and monitor the implementation of its Transportation System Management Program (TSMP). Currently, the Lab maintains an active TSMP and plans to continue to maintain the program.

¹⁹ Chuck DeLeuw, Traffic Engineer, City of Berkeley, Public Works Department, personal communication, August 9, 1996.

3. Summary Conclusion

Project impacts on traffic, circulation, and parking would be similar to those identified in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to traffic, circulation, and parking. Traffic, circulation, and parking effects do not require further analysis.

J. AIR QUALITY

1. Regulatory Setting Update

a. Ozone-Depleting Substances (ODSs)

The 1992 SEIR discussed 1990 amendments to the federal Clean Air Act, which included a comprehensive nonattainment program designed to require local areas to achieve expedited compliance with the federal ambient air quality standards (SEIR, pgs. III-J-3 and III-J-6). Title VI (Stratospheric Ozone Protection) of the Amendments established a timetable for the production phaseout of ozone-depleting substances. The production phaseout for Class I ODSs, which include chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform, was the end of 1995, while Class II ODSs have staggered phaseout dates beginning in 2005. Each federal agency was required to conform its procurement regulations with the policies and requirements of Title VI no later than 30 months after November 15, 1990 (i.e., by mid-April 1993).

After certification of the SEIR by the Regents in November 1992, Executive Order 12843 (Procurement Requirements and Policies for Ozone-Depleting Substances, April 21, 1993) was issued, which directed federal agencies to reduce their use of ODSs in conformance with Clean Air Act production objectives. In particular, no later than six months after the effective date of the Order (i.e., by mid-November 1993), each federal agency, where feasible, was to have in place practices that, where economically practicable, minimized the procurement of Class I ODSs.

b. Criteria Pollutants

Ambient Air Quality Standards

The 1992 SEIR stated that the Bay Area had not attained the federal ambient air quality standards for ozone and carbon monoxide (CO), or the state standard for ozone, CO, and PM₁₀ (particulate matter less than 10 microns in diameter) (SEIR, pg. III-J-6). Since certification of the SEIR, the Bay Area has been redesignated as having attainment status with the federal ozone standard, the federal CO standard in rural areas, and the state CO standard.²⁰ The Bay Area Air Quality Management District (BAAQMD) has applied for attainment status for the federal CO standard in urban areas. The Bay Area remains in nonattainment with the state ozone and PM₁₀ standards.

BAAQMD Thresholds of Significance

The 1992 SEIR stated that typically in reviewing proposed projects, the BAAQMD considered a net increase in criteria pollutant emissions of one percent over existing countywide emissions, or a net increase of 150 pounds per day of carbon monoxide precursor organic compounds (POC), nitrogen oxides (NO_x), sulfur dioxide (SO₂), or PM₁₀ to be thresholds of significance (SEIR, pg. III-J-31).

In April 1996, the BAAQMD issued updated guidelines which contain thresholds of significance for air impacts created during construction and project operations.²¹ Where

²⁰ As this Addendum was being finalized in August 1997, EPA was considering the redesignation of the Bay Area as being in nonattainment with the federal ozone standard.

²¹ Bay Area Air Quality Management District, *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, April 1996.

they differ from thresholds used in the 1992 SEIR, these revised 1996 BAAQMD thresholds supersede the standards used in the 1992 SEIR to evaluate air quality impacts, and this Addendum amends the programmatic 1992 SEIR to adopt these changes. The following BAAQMD threshold revisions are relevant to this Addendum.

Construction

The updated BAAQMD guidelines provide that a project which does not implement appropriate PM₁₀ control measures (dust control measures) would be considered to have a significant impact. There are three sets of these control measures: basic (for all construction sites), enhanced (for sites greater than four acres in area), and optional measures. While the previous BAAQMD guidelines listed some dust control measures, thresholds of significance were not tied to whether or not such measures were implemented.

Project Operations

Carbon monoxide. The updated BAAQMD guidelines provide that a project resulting in CO concentrations exceeding the State Ambient Air Quality Standard (9 parts per million averaged over 8 hours and 20 parts per million for 1 hour) would be considered to have a significant impact. This supersedes the standard listed in the 1992 SEIR: a net increase in emissions of one percent over existing countywide emissions, or a net increase of 150 pounds per day (SEIR, pg. III-J-31).

Reactive organic gases, nitrogen oxides, PM₁₀. The updated BAAQMD guidelines provide that a project resulting in emissions of reactive organic gases (ROG)²², NO_x, or PM₁₀ in excess of annual or daily thresholds would be considered to have a significant impact. For each of these pollutants, these thresholds are 15 tons per year and 80 pounds per day. This supersedes the standard listed in the 1992 SEIR: a net increase in emissions of one percent over existing countywide emissions, or a net increase of 150 pounds per day (SEIR, pg. III-J-31).

c. Toxic Air Contaminants (TACs)

The 1992 SEIR stated that the BAAQMD's 1991 Toxic Air Contaminant Reduction Plan included a proposed new source review rule (proposed BAAQMD Regulation 2, Rule 5), specifically addressing potential TAC emissions (SEIR, pg. III-J-18). Since certification of the 1992 SEIR, the BAAQMD has codified TAC requirements within Regulation 2-1. Under this regulation, the Lab is required to evaluate whether TAC emissions from new or modified sources require a permit from the BAAQMD. Several sources at the Lab, including two semiconductor laboratories in Building 70A, have been permitted under this regulation.

d. Radionuclides

The 1992 SEIR reported that the Lab was out of compliance with National Emissions Standards for Hazardous Air Pollutants (NESHAPs) requirements regarding reporting of radionuclide sources, monitoring equipment, and monitoring procedures, and that the University, DOE, and the Lab were finalizing a Federal Facility Compliance Agreement

²² Reactive organic gases are equivalent to precursor organic compounds, the term used in the 1992 SEIR (SEIR, pgs. III-J-7 and III-J-31).

(FFCA) that would address the scope and schedule for bringing the Lab's NESHAPs program into full compliance (SEIR, pg. III-J-29).

Since certification of the 1992 SEIR, the University and DOE have finalized the FFCA addressing nonconformances. Under this Agreement, the Lab has implemented a variety of corrective actions, including upgrading over 60 stacks to allow emission measurements, and upgrading real-time monitoring systems for emissions monitoring at four buildings: National Tritium Labeling Facility, existing Hazardous Waste Handling Facility, Biomedical Isotope Facility, and 88-Inch Cyclotron. The U.S. Environmental Protection Agency notified DOE on November 8, 1995 that the Lab had satisfactorily completed all requirements under the FFCA.

2. Impacts

The Lab's responses to the changes in regulatory requirements are described below. These changes do not create any new significant impacts, or make substantially more severe previously identified significant impacts. The 1992 SEIR assumed that the scope of environmental regulatory requirements would continue to expand over time, with more detailed regulations applying to an increasing number of the Lab's activities; and that the proposed project would be developed in conformance with such applicable laws and regulations (SEIR, pg. IV-K-2).

a. Impact Analysis, Ozone-Depleting Substances

In response to the provisions of the federal Clean Air Act Amendments and Executive Order 12843, the Lab has greatly reduced its use of ODSs, which has led to reductions in associated air emissions. Using 1991 as a baseline, Berkeley Lab has achieved an approximately 70 percent reduction in Class 1 ODS usage through 1995, from such actions as replacing vapor degreasing systems with alternative cleaning systems, converting centrifugal chillers to an alternative refrigerant, and installing leak detection sensors in key workrooms. Further planned actions in replacing or converting equipment are projected to reduce ODS usage an additional 25 percent from the 1991 baseline.

b. Impact Analysis, Criteria Pollutants

Ambient Air Quality Standards. The 1992 SEIR stated that the proposed project would generate long term emissions of criteria air pollutants (Impact III-J-2), and that since the project is located within the BAAQMD, which does not meet ozone, CO and PM₁₀ air quality standards, any air pollutant emissions which contributed substantially to exceedances of standards for these pollutants would be considered to have a significant impact (SEIR, pg. III-J-29). Short-term impacts from construction-related emissions, such as emissions of volatile organic compounds, vehicle exhaust, and PM₁₀, were not considered to be significant, and implementation of dust control mitigation measures would further reduce these less-than-significant impacts (SEIR, pg. III-J-30). (Dust control measures are discussed later in this section.) However, since the Bay Area was in non-attainment for ozone under the federal and state Clear Air Acts, the 1992 SEIR considered any long-term increases in ozone-related emissions from operation of new buildings identified by the project to be significant and unavoidable, even though projected emissions would not exceed the BAAQMD threshold in effect at that time (one percent of county-wide emissions, or a net increase of 150 pounds per day). The 1992 SEIR also stated that Mitigation III-J-2, which requires the Lab to design building ventilation systems to minimize emissions of criteria air pollutants following compliance with all applicable

regulatory requirements, would lessen the impact, but would not reduce it to a less than significant level (SEIR, pg. III-J-32).

Accordingly, the 1992 SEIR considered any long-term increase in ozone-related emissions to be significant and unavoidable (SEIR, pg. III-J-31). A Statement of Overriding Considerations for long-term increases in ozone-related emissions was adopted by The Regents in connection with approval of the project and certification of the 1992 SEIR.

As described above, although the Bay Area has been redesignated as having federal and/or state attainment status in regard to some criteria pollutants, it remains in nonattainment with the state ozone and PM₁₀ standards. Ozone, PM₁₀, and other criteria pollutant emissions from the Lab are discussed further below.

BAAQMD Thresholds of Significance

Construction

The 1992 SEIR concluded that construction of new facilities projected in the 1987 LRDP would generate short-term emissions of certain criteria air pollutants (Impact III-J-1). In regard to PM₁₀, to mitigate this potentially significant impact to a less than significant level, the 1992 SEIR listed the following mitigation measure (Measure III-J-1):

Construction contract specifications would require that during construction exposed surfaces would be wetted twice daily or as needed to reduce dust emissions. In addition, contract specifications would require covering of excavated materials (SEIR, pg. III-J-30).

In addition, mitigation measure III-B-2a states that drainage will be arranged to minimize silting, erosion, and landsliding; and measures III-B-2d and III-D-2a require revegetation of disturbed areas.

Since certification of the 1992 SEIR, the Lab has implemented and will continue to implement these mitigation measures. The Lab currently uses dust control measures comparable to the measures listed in the revised BAAQMD guidelines. Lab construction subcontracts require that all work performed shall be in accordance with all applicable codes, and that during construction periods, dust generated during the course of work must be controlled by appropriate means. For these reasons, Lab construction-related dust emissions would create no new significant impacts and would not cause impacts to be substantially more severe than previously identified.

Project Operations

The 1992 SEIR reported emissions of criteria pollutants for 1991, and assumed that project-related emissions would increase in proportion to the increase in square footage of research space associated with the project (continued operation of the Lab from 1992 to 1997), or by 8.5 percent (SEIR, pg. III-J-31).

Table III-J-1, column 1 shows current emission levels from all Lab activities for criteria pollutants; column 2 shows emission projections for all Lab activities for 1997 derived from the 1992 SEIR; column 3 shows projected emissions from all Laboratory activities to buildout in 20xx; and column 4 shows the revised BAAQMD CEQA thresholds of significance, discussed above. (Figures for column 2 have been converted from tons per

day, as presented in the 1992 SEIR, to tons per year and pounds per day, for better comparison with current BAAQMD thresholds.)²³

Table III-J-1
Current and Projected Criteria Air Pollutant Emissions

	Current Emissions^a	Derived SEIR Projection (1997)^b	Projected Emissions (20xx)^c	BAAQMD Thresholds^d
	Tons/year (lbs/day)			
CO	2.56 (14.0)	2.38 (13.0)	3.02 (16.5)	see note e
POC/ROG	1.64 (9.0)	8.12 (44.5)	1.94 (10.6)	15 (80)
NO _x	10.04 (55.0)	9.50 (52.1)	11.85 (64.9)	15 (80)
SO ₂	0 (0)	0 (0)	0 (0)	none
PM ₁₀	0.18 (1.0)	0.60 (3.3)	0.21 (1.2)	15 (80)

CO = carbon monoxide

POC/ROG = precursor organic compounds/reactive organic gases

NO_x = nitrogen oxide

SO₂ = sulfur dioxide

PM₁₀ = particulate matter less than 10 microns in diameter

Sources and notes:

a. LBNL Environment, Health, and Safety Division data for 1995.

b. 1992 SEIR, Table III-J-9 (figures converted from tons/day to tons/year and lbs/day).

c. Column 1 plus 18 percent.

d. Bay Area Air Quality Management District, *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, April 1996, pg. 15. Note: these thresholds of significance normally would apply to project-related emissions increases only. For this Addendum, as a conservative method of evaluation, total Lab emissions to buildout are compared against the BAAQMD threshold for project-related increases.

e. The BAAQMD CEQA threshold for CO is 9 parts per million averaged over 8 hours and 20 parts per million for 1 hour.

As shown in Table III-J-1, current Lab emissions of POC/ROG and PM₁₀ are substantially less than projected in the 1992 SEIR for 1997. POC/ROG emissions are below the SEIR projection because of the permanent shutdown of several degreasers in Building 25, installation of emission control devices on a degreaser in Building 77 and a subsequent temporary shutdown of this degreaser, and changes in the processes or products used in several emission sources that have lessened POC/ROG emissions. The reason for the

²³ 1992 SEIR tons per day figures were based upon pounds per day totals estimated by the BAAQMD, and were rounded. As a result, there are some slight differences between 1992 SEIR figures when converted to pounds per day and the original BAAQMD totals (e.g., for POC, the BAAQMD total was 41 pounds per day, whereas the 1992 SEIR total of .021 tons per day converts to 42 pounds per day). Due to rounding, pounds per day totals may not convert exactly to tons per year in the remainder of Table III-J-1. Also, in the 1992 SEIR (Table III-J-9), the emission figures for CO and PM₁₀ were inadvertently transposed. The correct figures are presented in Table III-J-1.

decline in PM₁₀ emissions is unclear. Current emissions of CO and NO_x are slightly higher than the emissions projected in the 1992 SEIR for 1997.

This Addendum uses the same methodology used in the 1992 SEIR, and assumes that at a maximum, criteria pollutant emissions generated by all Lab activities during the proposed contract extension period will increase above current levels in proportion to the increase in square footage of research space at the Lab as provided for in the Lab's LRDP.²⁴ This increase is estimated to be 18 percent above current levels to buildout in 20xx.²⁵

Note that column 3 in Table III-J-1 provides projections for emissions from all Laboratory activities at buildout. However, most of these emission-producing activities at the Lab already existed at the time of the 1987 LRDP and the 1987 LRDP EIR. Actual emissions at buildout related to this contract extension project, i.e., emissions from continued implementation of the LRDP, would be substantially less.

The levels of POC/ROG and PM₁₀ projected to be emitted by all Lab activities to buildout are below the levels projected for 1997 in the 1992 SEIR. Therefore, the associated potential impacts that could result from emissions of these criteria air pollutants to buildout in 20xx would be less than the impacts anticipated in the SEIR for 1997. Development of the Lab to buildout thus would not result in new significant impacts in this area, or make substantially more severe previously identified significant impacts.

The levels of CO and NO_x projected to be emitted by the Lab to buildout are somewhat above the levels projected for 1997 in the 1992 SEIR. The increases in these emissions would not create new environmental impacts or a substantial increase in the severity of previously identified impacts because emissions of these criteria air pollutants would remain below regulatory limits. NO_x would remain below both the daily and annual BAAQMD thresholds of significance used to evaluate project-related increases (Table III-J-1, column 4). The Laboratory achieves compliance with the CO threshold by periodic maintenance (tune-up procedures) of its boilers, which are the most substantial emitters of CO at the Lab, in conformance with BAAQMD Regulation 9.

As described above, the 1992 SEIR stated that the proposed project would generate long term emissions of criteria air pollutants (Impact III-J-2), and that since the Bay Area remained in non-attainment for ozone under the federal and state Clean Air Acts, any long-term increase in ozone-related emissions was considered significant and unavoidable (SEIR, pg. III-J-31). The 1992 SEIR further stated that Mitigation Measure III-J-2, which requires the Lab to design building ventilation systems to minimize emissions of criteria air pollutants following compliance with all applicable regulatory requirements, would lessen the impact, but would not reduce it to a less than significant level (SEIR, pg. III-J-32). A Statement of Overriding Considerations for long-term increases in ozone-related emissions was adopted by The Regents in connection with approval of the project and certification of the 1992 SEIR.

The proposed contract extension would not result in long-term increases in ozone-related emissions (POC/ROG and NO_x)²⁶ that would be substantially more severe than previously

²⁴ "Research space" includes wet labs, dry labs, heavy labs, and shops.

²⁵ BAAQMD estimates for Lab criteria pollutant emissions in 1995 are used in this Addendum as the baseline from which to calculate the increase in emissions of these pollutants to buildout. 1995 estimates are used rather than 1996 estimates because the BAAQMD estimates for 1996 did not include unpermitted sources of criteria pollutants at the Lab.

²⁶ NO_x and ROG are ozone precursors. BAAQMD CEQA Guidelines, pg. 5.

identified. As shown in Table III-J-1, emissions of ozone-related compounds to buildout in 20xx are projected to be below the revised thresholds of significance (15 tons/year and 80 lbs/day) used by the BAAQMD for project-related emissions.

c. Impact Analysis, Toxic Air Contaminants

The changes to BAAQMD Regulation 2-1 do not create any new significant impacts, or make substantially more severe previously identified significant impacts. As is the case for all applicable environmental regulatory requirements, conformance with this changed regulation is part of the project.

The 1992 SEIR used a health risk assessment to evaluate whether the SEIR project (operation of the Lab from 1992 to 1997) would exceed the 1992 SEIR standards of significance established for TACs. For carcinogenic effects, the standard was an excess human cancer risk to the Maximally Exposed Individual (MEI) of greater than 10 in one million. The MEI was defined as the location outside of the facility boundary where the modeled concentrations were highest (SEIR, pg. III-J-40). For non-carcinogenic health effects, the standards were a hazard index of greater than one (1.0) when the individual hazard indices for each chemical were summed, and an exposure index of greater than one when the individual exposure indices for each chemical were summed (SEIR, pgs. III-J-32 to III-J-34). The 1992 SEIR assumed that TAC emissions would increase in proportion to the increase in square footage of research space associated with the project, which was estimated to be 8.5 percent (SEIR, pg. III-J-37).

The 1992 SEIR concluded that TAC emissions from the 8.5 percent growth in research space projected during 1992 - 1997 would not create impacts in excess of the standards of significance listed above: increases in TACs would result in an increased cancer risk of 0.6 in one million, and increases in hazard and exposure indices of 0.0003 and 0.002, respectively (SEIR, pg. III-J-40). Thus, no significant impacts were expected to result from the emission of TACs from the project (SEIR, pg. III-J-41).

Current estimated human health risks from TAC emissions from all Lab activities are shown in Table III-J-2, column 1. This Addendum uses the same methodology used in the 1992 SEIR, and assumes that at a maximum, TAC emissions generated by all Lab activities during the proposed contract extension period, and the associated risk, will increase in proportion to the increase in square footage of research space at the Lab as provided for in the Lab's LRDP. This increase is estimated to be 18 percent above current levels to buildout in 20xx.

For this Addendum, as a conservative method of evaluation, total Lab emissions of TACs to buildout are compared against the standards of significance used in the 1992 SEIR for the 1992 - 1997 project-related increases alone. As shown in Table III-J-2, column 2, the cancer risk to the MEI from TAC emissions projected to buildout in 20xx from all Lab operations is estimated to be 6.7 in one million, which is below the 10 in one million standard of significance used in the 1992 SEIR. For the hazard and exposure indices, the risk to buildout from all Lab operations is estimated to be 0.0034 and 0.0230, respectively -- i.e., each index would be less than 1.0, the standard of significance used in the 1992 SEIR. As was the case with criteria pollutants, the risk figures in column 2 reflect emissions from all Laboratory activities, including those already in existence at the time of the 1987 LRDP and the 1987 LRDP EIR. Actual risks at buildout related to this contract extension project, i.e., risks from continued implementation of the LRDP, would be substantially less.

Table III-J-2
Estimated Human Health Risks from Toxic Air Contaminants

	Estimated Risk From Current Operations ^a	Estimated Risk From Projected Operations (20xx) ^b
Cancer risk	5.7 in 1,000,000	6.7 in 1,000,000
Hazard index	0.0029	0.0034
Exposure index	0.0195	0.0230

Sources and notes:

a. Derived from 1992 SEIR calculations for the 1992-1997 project-related increase, pg. III-J-40, minus estimated decrease due to lessened TAC emissions in 1996.

b. Column 1 plus 18 percent.

d. Impact Analysis, Radionuclides

The Lab's actions to address NESHAPs nonconformances do not create any new significant impacts, or make substantially more severe previously identified significant impacts. The Lab has completed all requirements under the FFCA to bring its NESHAPs program into full compliance.

The standard of significance used in the 1992 SEIR for evaluating radionuclide air emissions from the project was a human cancer risk greater than 10 in one million to the MEI. The 1992 SEIR assumed that radionuclide emissions would increase in proportion to the increase in square footage of research space during 1992 - 1997, which was estimated to be 8.5 percent. The total dose impact for potential airborne radionuclides at the nearest receptor attributable to that increase was estimated to be 0.012 millirem, and the cancer risk was estimated to be 0.12 in one million, which was less than the 1992 SEIR standard of significance (SEIR, pgs. III-J- 44 - III-J-45).

Subsequent to certification of the 1992 SEIR, the 0.12 in one million cancer risk estimate was revised in 1993 to 0.57 in one million for the following reason. The 1992 SEIR assumed that the Biomedical Isotope Facility was an existing project, and therefore did not include radioisotope emissions from the facility in calculating the cancer risk associated with the 1992 SEIR project. However, the facility did not actually begin operations until 1995. A project-specific CEQA document prepared for the facility in 1993 (Lawrence Berkeley Laboratory, *Environmental Checklist, Biomedical Isotope Facility*, April 1993) estimated that airborne radionuclides from this facility alone would result in an increase in the cancer risk of 0.45 in one million. When added to the 0.12 in one million risk estimated in the 1992 SEIR, the total cancer risk from radionuclide emissions attributable to projected growth during 1992 - 1997 is 0.57 in one million.²⁷

The current estimated human cancer risk from radionuclide emissions from all Lab activities is shown in Table III-J-3, column 1. This Addendum uses the same methodology used in

²⁷ Lawrence Berkeley Laboratory, *Environmental Checklist, Biomedical Isotope Facility*, April 1993, pg. 19.

the 1992 SEIR, and assumes that at a maximum, radionuclide emissions generated by all Lab activities during the proposed contract extension period, and the associated risk, will increase in proportion to the increase in square footage of research space at the Lab as provided for in the Lab's LRDP. This increase is estimated to be 18 percent above current levels to buildout in 20xx.²⁸

Table III-J-3
Estimated Cancer Risk from Radionuclide Emissions

	Estimated Risk From Current Operations ^a	Estimated Risk From Projected Operations (20xx) ^b
Cancer risk	1.12 in 1,000,000	1.32 in 1,000,000

Sources and notes:

a. Derived from maximum individual 1995 dose from airborne nuclides (Ernest Orlando Lawrence Berkeley National Laboratory, *1995 Site Environmental Report*, July 1996, pg. 11-11).

b. Column 1 plus 18 percent.

For this Addendum, as a conservative method of evaluation, the risk from all Lab radionuclide emissions to buildout are compared against the standards of significance used in the 1992 SEIR for the 1992 - 1997 increases alone. As shown in Table III-J-3, column 2, above, the cancer risk to the MEI from radionuclide emissions projected to buildout in 20xx from all Lab operations is 1.32 in 1,000,000, which is below the 10 in one million standard of significance used in the 1992 SEIR. As described previously for toxic air contaminants, the risk figures in column 2 reflect emissions from all Laboratory activities, including those already in existence at the time of the 1987 LRDP and the 1987 LRDP EIR. Actual risks at buildout related to this contract extension project, i.e., risks from continued implementation of the LRDP, would be substantially less. In addition, onsite worker exposures have been analyzed, and are below applicable regulatory standards.

e. Impact Analysis, Combined Toxic Air Contaminants and Radionuclides

To determine the impacts associated with increases in both TACs and radionuclides from the 8.5 percent growth in research space projected during 1992 - 1997, the 1992 SEIR added the risk numbers for each together. The 1992 SEIR estimated that the growth during this period may produce a total increase in both radionuclides and TACs that could cause an excess cancer risk of 0.7 in one million to the maximally exposed individual, which is below the 10 in one million standard of significance for human cancer risk (SEIR, pg. III-J-45). As described earlier, the estimated cancer risk associated with radionuclide emissions during this period was revised in 1993 from 0.12 in one million to 0.57 in one million, in order to include emissions from the Biomedical Isotope Facility. Accordingly, the combined risk from TACs and radionuclides was revised from 0.7 in one million to

²⁸ Radionuclide emissions data from 1995 rather than from 1996 are used in this Addendum as the baseline to calculate the increase to buildout, because the principal contributor to such emissions, the National Tritium Labeling Facility, had an extended period of down time in 1996.

1.17 in one million (0.6 in one million for TACs and 0.57 in one million for radionuclides).

The combined cancer risk estimated in this Addendum from emissions of both radionuclides and TACs from all Lab activities to buildout in 20xx is 8.02 in one million: 6.7 (TACs) plus 1.32 (radionuclides), which would be below the 10 in one million standard of significance used in the 1992 SEIR for project-related increases alone. Again, actual risks at buildout related to this contract extension project, i.e., risks from continued implementation of the LRDP, would be substantially less..

3. Summary Conclusion

Air quality effects would be similar to those described in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to air quality. No further analysis of air quality effects is required.

K. NOISE

1. Setting Update

The noise measurements presented in the 1992 SEIR are shown in Table III-K-1, below. The measurements were taken between 1979 and 1991 from on-site and off-site locations. Measured noise levels were compared to the limits set by the City of Berkeley's Noise Ordinance. The noise level limits established in the ordinance are not to be exceeded more than 30 minutes per hour, which is equal to a noise measurement called L_{50} (the noise level that is exceeded more than 50 percent of the time period during which the measurement was made). Berkeley's Noise Ordinance limits exterior ambient noise in residential areas to 55 dB during daytime hours (7 a.m. to 10 p.m.) and to 45 dB during nighttime hours (10 p.m. to 7 a.m.).

Based on the noise levels presented in the 1992 SEIR, the nighttime L_{50} in certain neighborhoods adjacent to the Lab sometimes exceeded 45 dB and sometimes was below 45 dB. As shown in Table III-K-1, the nighttime limit of 45 dB was exceeded twice during the 1991 measurements: once by 2 dB at 37/39 Canyon Road and once by 1 dB at the end of Campus Drive. In addition, the daytime limit of 55 dB was exceeded by 6 dB during a 1986 measurement taken at LaLoma Avenue and Ridge Road. As stated in the SEIR, Berkeley Lab site noise is generated by cooling towers and the continued activity of trucks, cars, service vehicles, fork lift vehicles, and other on-site activities. Construction projects, which add to the ambient noise levels, are also frequently in progress at the Lab site.

It can be seen from Table III-K-1 that the L_{eq} (the average sound level measured over the course of the measurement period) noise levels as measured at various times between 1979 and 1996 varied considerably within a range of plus or minus 8 dB. Such fluctuations are inherent in the nature of such short-term (15-minute) noise measurements. Peak noise events, such as passing cars and trucks or operating lawn mowers, will create spikes in the noise levels that can increase the 15-minute average, whereas they might not show up over a 24-hour measurement. Most of the L_{eq} fluctuations shown in Table III-K-1 show a difference of 2 to 5 decibels. The human ear does not detect noise differences of less than 3 dB.

Noise measurements were taken on July 31 and August 2, 1996 to determine whether noise levels generated by Berkeley Lab have increased above noise measurements reported in the SEIR.²⁹ The noise measurements were taken at the same locations and using the same methodology as those presented in the SEIR, Table III-K-1. Measurements were taken for 15-minute periods from the same 11 locations reported in the SEIR. Consecutive 15-minute measurements were taken over a 24-hour period at six of the locations. These longer-term measurements were used to validate the data for the 15-minute periods. The data, which are presented in Table III-K-1, indicate that general noise levels in the residential neighborhoods surrounding the Lab have not appreciably increased, and in some cases have decreased. Increased traffic in these areas accounts for the minor increases.

²⁹ Charles M. Salter Associates, Inc., "SEIR Addendum: Results from Environmental Noise Measurements, CSA Project No. 96-254," August 6, 1996.

Table III-K-1
Ambient Noise Levels, Residential Areas near Berkeley Lab (dB)

Location of Noise Measurement	Date	Time	Sound Levels*		
			L ₁₀	L ₅₀	L _{eq}
1736 Highland Place	07/03/86	1:45 p.m.	48	45	46
	07/27/86	3:15 p.m.	51	46	47
	08/07/86	10:42 p.m.	46	42	44
	07/31/96	11:05 p.m.	55	45	50
End of LeConte Avenue	11/06/91	8:20 p.m.	50	46	49
	08/02/96	4:15 p.m.	51	43	48
East of Stern Hall	07/03/86	2:05 p.m.	55	50	52
	07/27/86	1:55 p.m.	56	50	56
	07/31/96	9:50 p.m.	59	50	57
Road to Blackberry Canyon	07/03/86	3:15 p.m.	56	48	52
	07/27/86	1:32 p.m.	54	50	53
	08/02/96	3:10 p.m.	51	45	49
LaLoma and Ridge Road	07/03/86	3:45 p.m.	66	61	62
	07/27/86	3:29 p.m.	58	53	55
	07/31/96	10:10 p.m.	61	53	57
Botanical Gardens	12/18/84	NA	56	50	53
200 feet from Centennial Dr.	08/02/96	3:40 p.m.	57	50	55
47/49 Canyon Road	11/13/79	10:20 a.m.	49	45	47
	11/13/79	2:13 p.m.	58	46	53
	11/06/91	8:48 p.m.	47	45	46
	07/31/96	10:40 p.m.	46	43	44
37/39 Canyon Road	11/25/91	10:00 p.m.	49	44	46
	11/26/91	10:00 p.m.	54	47	53
	07/31/96	11:00 p.m.	48	43	50
13 Mosswood Road	11/13/79	10:55 a.m.	51	45	48
	11/13/79	2:38 p.m.	53	46	50
	11/06/91	8:28 p.m.	48	46	47
	07/31/96	10:00 p.m.	54	46	52
44 Mosswood Road	11/06/91	8:10 p.m.	49	48	48
	07/31/96	10:18 p.m.	52	44	50

Table III-K-1 (continued)
Ambient Noise Levels, Residential Areas near Berkeley Lab (dB)

Location of Noise Measurement	Date	Time	Sound Levels*		
			L ₁₀	L ₅₀	L _{eq}
Cul-de-sac at end of Campus Drive	08/07/86	10:15 p.m.	42	41	42
	10/30/86	10:02 p.m.	49	45	47
	11/06/91	8:30 p.m.	53	47	50
	11/06/91	10:00 p.m.	47	46	46
	07/31/96	10:40 p.m.	47	46	46

*L₁₀ is the sound level measurement in A-weighted decibels that was exceeded during 10 percent of the measurement period.

L₅₀ is the sound level measurement in A-weighted decibels that was exceeded during 50 percent of the measurement period.

L_{eq} is the average A-weighted sound level measured over the course of the measurement period.

At every location but one the L₅₀ measured in 1996 was equal to or lower than the L₅₀ values presented in the 1992 SEIR. The exception was recorded at the end of Campus Drive. The SEIR reported L₅₀ values of 41, 45, 47, and 46 decibels at this location. While the recently recorded value of 46 dB was above the first of these values, measured in 1986, it is comparable to the 1991 values.

2. Impacts

The 1992 SEIR identified a potentially significant impact associated with operational noise which stated that ambient noise levels from the University's continued operation of Berkeley Lab will generate noise levels which could conflict with applicable noise ordinances and standards (Impact III-K-1). The mitigation measure (Mitigation III-K-1) requires acoustical performance standards to be included in future construction documents and commits the Lab to considering noise reduction measures in the design, construction, and operation of buildings and equipment. The SEIR stated that implementation of this mitigation measure would reduce this impact to a less than significant level.

As stated above, the recent L₅₀ values measured in the vicinity of the Lab site are equal to or less than the values reported in the SEIR for the same locations. A minor exception was noted at the end of Campus Drive where the 1996 measurement was higher than the 1986 values, but is comparable to the 1991 values.

While in some cases the L₁₀ and/or the L_{eq} values were slightly higher than previously recorded levels, it is the L₅₀ value which is the appropriate comparison criteria because it corresponds to the standards established in the City of Berkeley's Noise Ordinance, and the SEIR states that potential adverse impacts due to noise would be considered significant if the project would generate noise that would conflict with local noise ordinances and standards, including State of California and local guidelines for long-term exposure, acceptable interim noise levels, and 24-hour average noise levels (SEIR, pg. III-K-6). The City of Oakland does not have quantitative noise standards in its Noise Ordinance.

Furthermore, as discussed in more detail in Section K.1, above, the increases that were measured at certain locations represented minor noise spikes due to auto traffic passing adjacent to the measurement locations. The fluctuations in these noise levels, which were also lower than previously measured at some locations, are normal for short-term noise measurements and in most cases are barely above the threshold for the human ear to detect a difference.

Planned development at Berkeley Lab during the contract extension period would continue to implement 1992 SEIR mitigation measures and would not result in new significant noise sources. Because no new land uses are proposed that would substantially increase existing noise levels and because existing noise levels are comparable to those reported in the SEIR, continued operation of Berkeley Lab would not result in any new significant off-site noise impacts or make more severe previously identified significant impacts.

3. Summary Conclusion

Noise impacts would be similar to those analyzed in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to noise. No further analysis of noise effects is required.

L. PUBLIC SERVICES

1. Setting Changes

a. Fire Suppression

Staffing/Equipment Changes

The 1992 SEIR reported that Berkeley Lab maintains a minimum fire crew of five staff, seven days per week, plus two to three chiefs and an inspector. In addition, it was reported that the Lab has four emergency vehicles available at all times: three fire trucks and an ambulance (SEIR, pg. III-L-1 and III-L-4).

In August 1995 Berkeley Lab reduced its fire-fighting staff by three part-time positions. Prior to the change in staffing, the number of fire fighters per shift over a 24-hour shift always adjusted down to four on the floor and one in dispatch from 8 p.m. to 7:30 a.m. and all day on weekends. Currently, there are four fire fighters dedicated to emergency response throughout a 24-hour shift. Also, during the normal business day, the Battalion Chief is available to enhance the Lab's emergency response capability. In addition, there is a dispatcher. During normal work hours, the dispatcher position is filled by a person other than a fire-fighting professional. During times other than normal work hours, the dispatcher position is filled by a fire-fighting professional. (In the near future, the Lab plans to implement a system whereby calls coming into the Lab's Fire Services Group on weekends, holidays, and after 4:00 PM on weekdays would be automatically routed to the dispatch center at Lawrence Livermore National Laboratory. This dispatch center would then notify the Berkeley Lab's Fire Services Group.) During nights and weekends, in addition to the Fire Services Group staff, the Facilities Department maintains staff on site (2 to 5 persons) who could respond to emergencies. These staff are trained in such areas as hazardous materials response, spill prevention countermeasures and control, first aid, cardiopulmonary resuscitation (CPR), and mechanical and utilities emergencies. These changes are consistent with staffing recommendations proposed by a DOE evaluation team in 1995: assign at least three fire fighters to the engine company, a separate Fire Department liaison for assisting off-site responders, and a dispatcher.³⁰

Over the proposed contract extension period, it is anticipated that the existing staffing and equipment levels will remain adequate to maintain acceptable service levels because no new types of hazards will be created, new buildings will be built to a standard that will make them less of a hazard than some of the existing buildings, and many older existing buildings will be upgraded or demolished as provided for with the LRDP.

Berkeley Lab's Fire Services Group also transferred ownership of an older fire engine to Berkeley Lab's Facilities Department. This engine, which was used as a backup in case of equipment failure, is now used to pressurize pipes in buildings for maintenance tests. Berkeley Lab now has two fire engines, one of which is used for backup in case the primary engine fails.

³⁰ Office of Environment, Safety, and Health Technical Support, Office of Energy Research, Department of Energy, *Findings and Recommendations From the Lawrence Berkeley National Laboratory Fire Operations Evaluation*, September 6, 1995.

Interjurisdictional Agreements

The 1992 SEIR stated that Berkeley Lab's fire services were available to surrounding cities via mutual aid agreements (SEIR, pg. III-L-4). The Lab continues these mutual aid agreements with Berkeley and all other fire fighting agencies in Alameda County. Under these agreements, the Lab responds to emergency calls in other jurisdictions if requested and the Lab's Fire Department is not already responding to another call.

Berkeley Lab is currently negotiating with the City of Berkeley to establish an automatic aid agreement in which the Lab's Fire Department would automatically provide first response to emergency fire calls located within a designated geographical area of the City adjacent to the Lab. The City would, in turn, automatically respond to the Lab's fire calls. It is estimated that the Lab's fire department would be required to respond to approximately 100 calls per year under an automatic aid agreement.

Vegetation Management

As described in Section III-D: Biological Resources, above, the Lab has implemented the 1996 Maintenance Program for a Fire-safe Sustainable Landscape. In addition, the Lab is working with the East Bay Hills Vegetation Management Consortium in developing the Fire Hazard Mitigation Program and Fuel Management Plan for the East Bay Hills. Actions to reduce fire dangers taken by the Lab as part of these programs include the creation of open areas around new buildings such as the replacement Hazardous Waste Handling Facility, which provide defensible spaces and fuel breaks in the event of a fire, and removal or thinning of non-native vegetation such as eucalyptus or Monterey pine trees to further reduce the fuel loading on the hill. (Native vegetation such as oak and redwood trees are planted at appropriate intervals for soil erosion protection purposes.)

b. Police Protection

The 1992 SEIR stated that the Lab maintains its own security force, the Berkeley Lab Protective Services Department, which was a part of the UC Police Services. The Lab's Protective Services Department had co-jurisdiction with the UCB campus wherever UC Berkeley had agreements to provide services. The Lab's police patrolled and provided response to Donner Laboratory, Calvin Laboratory, and Building 73 on the UC Berkeley campus, as well as the Berkeley Lab lease properties in Emeryville and Berkeley. The Lab's main site entrance gates were staffed by a contract service.

Effective July 1, 1992 Berkeley Lab entered into a Memorandum of Understanding with the UC Police Services whereby police protection services at the Lab were transferred to UCB Police Department and Berkeley Lab's Protective Services Department was eliminated. The Lab now contracts for all police services at the main Lab site and at all offsite locations. This includes staffing of the entrance gates, parking enforcement, traffic enforcement, and patrol of on- and off-site buildings. This change was made to reduce costs and make available increased security service resources to the Lab.

2. Impacts

a. Fire Suppression

Impact Analysis, Staffing/Equipment Changes

The standard of significance identified in the 1992 SEIR for fire protection services stated that continued operation and development of the Lab would be considered significant if it

required additional staff and equipment to maintain acceptable service levels. The current fire-fighting staffing levels are adequate to maintain acceptable service levels as determined by the DOE evaluation team, which recommended a staffing level appropriate for the level of risk present at the Lab. The Lab's current staff level is consistent with the DOE recommendations. It is anticipated that the existing staffing and equipment will be adequate to maintain an acceptable level of service in the future because, as discussed in this Addendum, no new significant hazards are anticipated and new buildings will be built to the current building standards.

The use of two fire engines has not significantly affected fire protection services because the third engine was used as a secondary backup in case of equipment failure. The staff available both in 1992 and currently continues to be adequate to fully staff one engine.

Therefore, the staff and equipment changes will not result in any new significant impacts or make more severe previously identified significant impacts.

Impact Analysis. Interjurisdictional Agreements

Implementation of an automatic aid agreement will increase the level of fire fighting assistance provided to the Lab and to the City and would not result in any new significant impacts or make more severe previously identified significant impacts.

Impact Analysis. Vegetation Management

Vegetation management actions decrease fire hazards at the Lab, and do not result in any new significant impacts or make more severe previously identified significant impacts.

b. Police Protection

Impact Analysis

The standard of significance identified in the 1992 SEIR for police protection services stated that continued operation and development of the Lab would be considered significant if it required additional staff and equipment to maintain acceptable service ratios (officers to population). The service ratio for police protection at Berkeley Lab has not decreased as a result of the elimination of its police department; the Lab now has access to more security resources, which has increased the service ratio.

Although the UC Police base of operations is located offsite (and further locational changes in base operations could occur in the future), the Lab is and will be part of a regular patrol beat, and response time will not be significantly slower than when the Lab had its own police department. Because no additional staff or equipment are required to maintain acceptable service ratios, the change in police services would not result in any new significant impacts or make more severe previously identified significant impacts.

3. Summary Conclusion

Public Services impacts would be similar to those analyzed in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to public services. Public services do not require further analysis.

M. UTILITIES

1. Setting Changes

a. Domestic Water System

Water Supply

As reported in the 1992 SEIR (pgs. III-M-1 to III-M-2), domestic water is supplied to Berkeley Lab by the East Bay Municipal Utility District (EBMUD) primarily via Shasta Reservoir, with a secondary connection to Berkeley View Tank. The EBMUD system is backed up by additional reservoirs, pumping facilities, aqueducts, and transmission lines, and has been a reliable supply of water over the years. To supplement this supply, Berkeley Lab maintains two emergency water supply tanks for emergency fire protection. The tanks, which are located near buildings 71 and 75, each have a capacity of 200,000 gallons and are equipped with a diesel-driven fire pump with automatic controls to pressurize Berkeley Lab's water distribution system if EBMUD service is interrupted.

Berkeley Lab may add an additional water storage tank of undetermined size during the proposed contract extension period. The tank would be used solely as an additional backup supply of potable water or supplementary supply for firefighting purposes. (The water can be maintained as potable because fresh water from EBMUD will be constantly circulated through the tank as part of the regular water supply distribution system.)

Water Use

Water use at the Berkeley Lab hill site in 1990 was 105,103 CCF (hundred cubic feet) (SEIR, pg. III-M-2). In 1995 water use was 50,000 CCF, which represents a 47 percent reduction in water use since 1990. Taking into consideration planned site development and population growth as described in Section II, there would be an average increase in water consumption of approximately 0.5 percent per year over the proposed contract extension period,³¹ bringing the total to 54,200 CCF, which continues to be well below the 1990 level.

b. Natural Gas System

Natural Gas Supply

Berkeley Lab uses natural gas for heating all buildings, for equipment operation, and for some experimental uses. In 1992 the Lab received its natural gas from Pacific Gas and Electric Company (PG&E) via a 6-inch line operating at 50 pounds per square inch (psi). A 4-inch gas line operating at 13 psi provided uninterruptible natural gas from PG&E's meter vault to Building 88 and the Building 50 complex. A second line started at the meter vault and distributed interruptible gas supply to the rest of Berkeley Lab, with the exception of Buildings 73, 73A, 74, and 74B. This line also operated at 13 psi and was distributed in a variety of pipe sizes up to 6 inches. Buildings 73, 73A, 74, and 74B received a separate uninterruptible supply via a 2-inch PG&E line running up Centennial Drive to the UCB Botanical Gardens. Berkeley Lab also had a standby tank of propane fuel next to Building 51 that was capable of providing natural gas to those portions of the Lab on interruptible service.

³¹ Berkeley Lab Facilities Department, 1996

Since then, Berkeley Lab has changed natural gas suppliers. Natural gas is now provided by the Defense Fuel Supply Center from Oregon. The gas is delivered by PG&E in its delivery system. The same basic distribution system is used on the Lab site as previously, with a few changes as follows. Buildings 74 and 74B no longer receive a separate supply from PG&E, but are on the same uninterruptible system as the rest of the Lab. Buildings 73 and 73A receive a separate firm gas supply directly from PG&E via a two-inch line which runs up Centennial Drive to the UCB Botanical Gardens.

Interruption of the Lab's natural gas supply is possible, but unlikely. An extreme series of natural disasters would be required to interrupt delivery.

Natural Gas Usage

The SEIR reported that in 1990 the Lab, including off-site leased space, used 1,772,338 therms of natural gas. In 1995 Berkeley Lab natural gas usage totaled 1,562,807 therms, which represents decrease of about 11 percent below the 1990 figure. This decrease was largely due to completion of energy-efficient retrofit projects and warmer weather than occurred in 1990.

Future projections, based on planned new buildings, additional load growth, and energy conservation measures, show that during the proposed contract extension period, natural gas consumption would reach approximately 1,974,000 therms. This represents a 10 percent increase above 1995 levels. The projections do not attempt to account for weather variations, which are uncertain but which may have an effect on gas usage.

c. Electrical System

Electrical Power Supply

Although Berkeley Lab received electrical power from Western Area Power Administration (WAPA) during part of the year at the time the SEIR was prepared, this information was not provided in that document. The SEIR discussed the Lab's other electrical power provider, PG&E. During seven months of the year (excluding the summer months), WAPA provided a 3-megawatt (MW) interruptible supply, with the rest of the Lab's electricity provided by PG&E.

The Lab's electrical power supply has changed since February 1994. The Lab now receives an 11-MW allocation from WAPA that previously had been supplied to Lawrence Livermore National Laboratory (LLNL). This change was made because LLNL began obtaining power from PacifiCorp, a private utility in Oregon, making the additional WAPA supply available to Berkeley Lab. When Berkeley Lab's demand exceeds 11 MW, PG&E provides additional electricity without limits, but at higher cost rates. The electricity is still supplied to Lab buildings via the same power distribution system.

Electrical Power Usage

Electrical power usage at the Lab in 1990 was 74,045 megawatt-hours (MWh). In fiscal year 95 the Lab used 58,744 MWh of electrical power, a 21 percent decrease from 1990. This reduction was mainly due to the shutting down of the Bevatron in 1993, along with the scaling back of other accelerator use and the implementation of energy conservation measures.

A new program at the Lab, the National Energy Research Scientific Computing Center (NERSC), has been established since the 1992 SEIR. NERSC is located in existing

Berkeley Lab buildings, and required the installation of three emergency motor generators and a 1,500-kVA (kilovolt-amperes) transformer and associated switchgear to provide 480-volt service for the computing equipment. When fully on-line, NERSC will consume approximately 26,000 kWh (kilowatt-hours) of electricity per day (approximately 9,500 MWh/year). Although the service must be transformed to accommodate NERSC's power demand, existing electrical service is adequate to supply the Center's needs.

Future projections of electrical power usage show that based upon planned construction projects, general plant projects, and in-house energy management projects that were identified in the LRDP, along with the new NERSC program and projected load increases, electrical power usage would reach approximately 89,600 MWh at Lab buildout. This represents a 21 percent increase over 1990 usage.

d. Non-Hazardous Solid Wastes

Collection Service

In 1992 Berkeley Lab's recyclable waste was collected by UCB and taken to the Sutta Company in Oakland for recycling. Non-recyclable waste was hauled by the Oakland Scavenger Company to Altamont Landfill near Livermore. Although UC Berkeley still collects the Lab's mixed office waste paper, beginning in 1995 Richmond Sanitary Service (RSS) was awarded the contract to collect Berkeley Lab's white paper, glass bottles, and aluminum cans. RSS takes this waste to its own recycling facility in Richmond where it is sorted and baled for shipment to recyclers. RSS also picks up the Lab's large dumpsters as requested and hauls the waste to the Richmond Sanitary Landfill in Richmond. This landfill is expected to reach capacity and close sometime between Spring 1998 and the end of 2000. At that point, RSS will take the Lab's waste to Potrero Hills Landfill in Solano County, which has at least 50 years of excess capacity. RSS already has numerous accounts in the City of Berkeley and does not need to make a special trip to the area in order to collect the Lab's waste, so the change in collection service does not result in additional traffic.³² When the Richmond Sanitary Landfill reaches capacity and RSS begins shipping waste to Potrero Hills Landfill, it will send waste collection trucks from Berkeley to a transfer station located two blocks from the Richmond landfill. Waste will then be consolidated into large-capacity transfer trucks for the approximate 50-mile trip to the landfill. Berkeley Lab's waste represents a small portion of the waste that would be transferred on a given day or trip, and would not require any additional traffic trips beyond those already occurring due to other waste customers.³³

Waste Generation

The SEIR reported that in 1990 Berkeley Lab generated 1,300 tons of non-hazardous solid waste (550 tons of office-type waste and 750 tons of construction and grounds waste). Reported waste generation has increased to 1,560 metric tons, including 500 metric tons of grounds waste, for 1995. If waste generation is conservatively estimated to increase at the same rate as new space development, then waste generation would be expected to increase by 23 percent between 1995 and buildout.³⁴ This would result in an annual waste generation rate of 1,919 metric tons at buildout. However, as discussed in more detail below, the Lab's successful waste reduction efforts indicate that this is a conservative estimate; it is likely that the increase in generation would be much smaller.

³² Peter Nuti, Richmond Sanitary Service, personal communication, August 16, 1996.

³³ Ibid.

³⁴ Built space at the Lab's main site in 1995 totalled 1.62 million gsf and is projected to increase to 2 mgsf by buildout in 20xx. This represents a 23% increase in built space from 1995 to 20xx.

The apparent difference in reported waste generation between 1990 and 1995 is a reflection of the method used by the Lab to calculate waste over time, rather than a reflection of actual waste generation. The previous waste reporting method resulted in an under-reporting of Lab-wide waste generated. For example, large construction projects (such as the Advanced Light Source), contracted separately for their waste disposal, and none of this waste was included in the Lab's waste totals. The method used currently is a more accurate system, with each load of waste weighed prior to dumping. In addition, the waste disposal for construction projects is now more often included in the Lab's system, resulting in a more comprehensive reporting system.

In 1992 Berkeley Lab implemented a Waste Minimization and Pollution Prevention Awareness Plan, which included a new recycling program to meet waste reduction objectives. Although the Lab is still endeavoring to reduce its solid waste generation, the Lab now recycles a very large proportion (68 percent in Fourth Quarter of 1995) of its sanitary waste, including office white paper, mixed paper, cardboard, aluminum, and glass. This recycling program has resulted in reduced waste generation since 1991. The Lab continues to develop and implement new programs and activities aimed at further reducing the Lab's solid waste generation. In a May 3, 1996 Memorandum ("Departmental Pollution Prevention Goals") to all Heads of Departmental Elements, the Secretary of DOE listed several waste minimization goals to be achieved by December 31, 1999, using calendar year 1993 as a baseline year. The waste minimization goals for sanitary waste set out in this Memorandum is to reduce the generation of sanitary waste by 33 percent (for routine operations). Berkeley Lab's specific goals and implementation methods to meet this guidance have not yet been set. However, it is expected that the Lab will succeed in reducing waste generation in future years of continued operation.

e. Sanitary Sewage Discharges

In 1990 Berkeley Lab discharged an estimated 75,057 CCF (56,142,636 gallons) of sanitary sewage to EBMUD sewers. The discharge was calculated using the total water usage and subtracting estimated volumes of irrigation water, and correcting for estimated evaporation, contributions from the upstream UCB facilities, leakage, and other factors. The 1992 SEIR projected an ultimate (buildout) annual sewage flow of 102,558 CCF, or 76,728,269 gallons.

Berkeley Lab's sewage flow in 1995 was 45,141 CCF or 34 million gallons, which represents a 40 percent decrease from 1990 levels. Projected flows during the proposed contract extension period would reach approximately 46,000 CCF (34,408,000 gallons). This is substantially less than the SEIR projection for buildout, which was 102,558 CCF (76,728,269 gallons). The reason for the difference is that the method of calculating the projected wastewater flows used by the Lab has changed since 1992. The SEIR calculated a daily per capita generation rate based on the estimated wastewater flow for 1990 and the 1990 main Lab site population. This per capita rate of 51.3 gallons per day was then applied to the projected buildout population of 4,100 persons. The Lab currently calculates projected wastewater flows based upon water consumption rates because this method is believed to provide more accurate projections. Currently, wastewater flows are approximately 85 percent of water consumption. The 46,000 CCF (34,408,000) gallon future projection represents 85 percent of projected water consumption at buildout.

2. Impacts

a. Domestic Water System

Impact Analysis. Water Supply

An additional water storage tank to be used as a backup supply of potable water or supplementary supply for firefighting purposes would not result in any new significant impacts or make more severe previously identified significant impacts because the SEIR states (pg. III-M-2) that additional water storage was being reviewed by Berkeley Lab as part of long-range planning activities and because the tank would further increase the reliability of the Lab's emergency water supply system. At a future time when and if the Lab proposes to install a new water tank, a site will be carefully selected and appropriate CEQA review will occur, with mitigation measures adopted to mitigate any potential significant impacts to less than significant levels.

Impact Analysis. Water Use

The 1992 SEIR stated that development proposed under the Lab's 1987 LRDP would increase the demand for domestic water that would be well within the capacity of the existing ties to EBMUD and the Berkeley Lab, and was considered to be not significant (Impact III-M-2). According to the SEIR, impacts on domestic water supply would be considered significant if continued operation and development of the Lab significantly increased the consumption of potable water, or required a substantial expansion of water supply treatment or distribution facilities.

Because the Lab's projected consumption of potable water would not require an expansion of water supply, treatment, or distribution facilities, the proposed project would not result in any new significant impacts or make more severe previously identified significant impacts in water consumption.

b. Natural Gas System

Impact Analysis. Natural Gas Supply

The changes to Berkeley Lab's natural gas supply do not result in new significant impacts or make more severe previously identified significant impacts because the reliability of the gas supply has been increased by switching from an interruptible supply to a firm supply.

Impact Analysis. Natural Gas Usage

The 1992 SEIR stated that development proposed under the 1987 LRDP would increase the usage of natural gas. This increase would be within the capacity of the existing PG&E and Berkeley Lab systems, except for the main extensions required for new buildings (Impact III-M-3), and was considered to be not significant. The projected future increase in natural gas consumption that would occur during the proposed contract extension period as a result of continued development of the 1987 LRDP would be within the capacity of the existing systems, and would therefore not result in new significant impacts or make more severe previously identified significant impacts.

c. Electrical System

Impact Analysis, Electrical Power Supply

The change in the Lab's electrical power supplier has not resulted in any new significant impacts or made more severe previously identified significant impacts because the change in power supply does not affect the Lab's level of consumption of electricity.

Impact Analysis, Electrical Power Usage

The 1992 SEIR projected an increase in electrical power that would be within the supply capacity of PG&E (Impact III-M-5). This increased usage was not considered significant. The SEIR did not identify a criterion of significance applicable to electrical power consumption. Because the current electrical consumption represents a decrease from 1990 levels and the projected increase through buildout (17 percent) would not require an expansion of PG&E facilities, the proposed project would not result in any new significant impacts or make more severe previously identified significant impacts in electrical power consumption.

d. Non-Hazardous Solid Wastes

Impact Analysis, Collection Service

The change in the Lab's waste collection service does not result in any physical changes and therefore would not result in any new significant impacts or make more severe previously identified significant impacts.

Impact Analysis, Waste Generation

The solid waste significance criterion established in the 1992 SEIR states that utilization of a landfill that does not have sufficient available capacity to accommodate the proposed project would constitute a significant impact. The landfill currently being used has adequate capacity to accommodate the Lab's waste, as will the Potrero Hills Landfill when it becomes the destination landfill for RSS-collected waste. Therefore, even if waste generation at Berkeley Lab increases by as much as 23 percent between 1995 and buildout, which is unlikely given the Lab's vigorous waste reduction and recycling efforts, the increase would not result in any new significant impacts or make more severe previously identified significant impacts. It should also be noted that Berkeley Lab has recently become more aggressive in the implementation of recycling and waste minimization programs; this is expected to result in reductions in the Lab's routine non-hazardous waste generation in future years.

e. Sanitary Sewer Discharges

Impact Analysis

The current and projected decrease in wastewater generation over that projected in the 1992 SEIR would not result in any new impact or make substantially more severe those significant impacts previously identified because the decrease would create less of a demand on wastewater treatment and distribution capacity than anticipated and analyzed in the SEIR.

3. Summary Conclusion

Project effects on utilities would be similar to those identified in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to utilities. Project effects on utilities do not require further analysis.

N. ENERGY

1. Energy Consumption

The SEIR reported that the Lab consumed 74,045 megawatt-hours (MWh) of electricity in 1990 in buildings and process areas and 127,672 thousand cubic feet (MCF) of natural gas (including off-site leased space).

In FY1995, the Lab consumed 58,744 megawatt-hours (MWh) of electricity; this represents a 21 percent decrease from 1990 consumption. Electrical consumption may increase by approximately 45 percent during the proposed contract extension period. The major contributors to this increase in the Lab's electrical load are expected to be the National Energy Research Supercomputing Center (NERSC), the Human Genome Laboratory (expected to add 4,600 MWh), General Plant Projects (estimated at 300 MWh a year), and the Advanced Light Source (ALS). The ALS plans to steadily add beamlines that would increase the load by 8,400 MWh between 1995 and buildout.

Consumption of natural gas in FY 1995 was 151,582 MCF. This represents an increase of 19 percent over FY1990 consumption. Gas consumption is projected to increase by 10 percent between 1995 and buildout in 20xx.

Increases in electricity and natural gas consumption are projected at different rates because of different assumptions applicable to use of the two energy sources. For example, energy retrofits that are planned will have different effects on consumption of the two different resources. In addition, some increases in electricity will occur because of the addition of equipment that generates heat in the course of its operation. This will reduce the need for space heating, and thus reduce the need for natural gas. Consequently, electricity consumption is projected to increase more than gas consumption.

2. Energy Conservation

The 1992 SEIR stated that the Lab's Ten-Year In-House Energy Management Plan set target goals for energy conservation and was updated each year. In 1995 the Lab's Ten-Year In-House Energy Management Plan was replaced with five performance measures as a mechanism for planning energy conservation programs and targeting energy conservation goals. The Lab's success in meeting established goals is assessed and reported to DOE on a quarterly basis. The Lab has so far met or exceeded expectations established for each performance measure. The performance measures pertain to the reliability of utility service, reduction in building energy consumption, compliance with energy retrofit schedules, compliance with energy management study schedules, and attainment of goals established in a comprehensive energy management plan.

2. Impacts

Impact Analysis, Energy Consumption. The 1992 SEIR stated that increased energy demand from new facilities will occur in conjunction with continued implementation of the 1987 LRDP (Impact III-N-1). This was determined to be a less than significant impact. The standards of significance presented in the SEIR stated that UC's continued operation and development of Berkeley Lab would be considered significant if the project would fail to use energy, oil, or natural gas in an efficient manner; encourage activities that would result in the use of large amounts of electricity, oil, or natural gas; utilize an energy supplier that does not have the capacity to supply the project's energy needs with existing and

planned energy capacity; or require the development of new non-renewable sources of energy.

Impact Analysis, Energy Conservation. The projected increases in energy consumption during the project period would result from new development and increased population as projected in the Lab's 1987 LRDP. As discussed in Section III.M, above, the Lab's suppliers of natural gas and electricity have capacity to supply the Lab's current and projected energy needs and no new energy sources would need to be developed. All new facilities would incorporate a variety of energy-efficient equipment and design features and would be constructed in accordance with Title 24 energy conservation standards. Therefore, the Lab's energy use during the project period would not result in any new significant impacts or make more severe previously identified significant impacts.

The Lab has met or exceeded expectations in all of the performance measures pertaining to energy management and conservation. These performance measures are designed to ensure that Berkeley Lab identifies and implements cost-effective energy conservation measures and that new buildings comply with all applicable energy performance standards, including those developed by DOE Executive Order 12003 and 10 CFR Part 436 and those issued by the State of California, Title 24. For these reasons, the change in the Lab's mechanism for implementing energy conservation measures would not result in any new significant impacts or make more severe any previously identified significant impacts.

3. Summary Conclusion

Energy impacts would be similar to those analyzed in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to energy. No further analysis of energy effects is required.

IV. HAZARDOUS MATERIALS

Introduction

Hazardous Materials Handling

Disposal of Hazardous Materials

Hazardous Waste Minimization

Hazardous Materials Transportation

Regulated Building Components

Worker Safety and Health

Emergency Preparedness and Response

Remediation Activities

Environmental Monitoring

Impacts

IV. HAZARDOUS MATERIALS

A. INTRODUCTION

Since certification of the SEIR by the Regents in November 1992, two general changes have occurred in the Lab's hazardous materials management and compliance program:

As described in the 1992 SEIR, pgs. IV-A-2 to IV-A-5, the Lab issued a Corrective Action Plan on November 8, 1991, in response to the DOE Tiger Team Assessment. On July 6, 1995, the Lab received formal notification from DOE that all corrective action tasks identified in the Tiger Team Corrective Action Plan had been completed.

In addition, DOE and various DOE facilities began field testing a "necessary and sufficient" program in 1994 and 1995. The object of the program, currently referred to as the Work Smart Standards Project, is to establish a mutually agreed-upon set of standards of performance between DOE and individual laboratories for a program's operations. The criteria for creating such a set of standards are two-fold: 1) sources of possible standards include federal, state, and local laws and regulations; DOE orders; DOE Technical Standards; nationally- and internationally-recognized consensus standards; and industry standards; and 2) the set of standards identified must be sufficient to ensure legal compliance, and appropriate protection against the particular hazards of the work involved.

Berkeley Lab's National Tritium Labeling Facility (NTLF) participated in the pilot program, and a Necessary and Sufficient Standards Set (LBL-37440) for the NTLF was reached between the Lab and the DOE in September 1995. The Lab also has completed establishment of necessary and sufficient standards for other operations.

B. HAZARDOUS MATERIALS HANDLING

1. Receiving Facility Lease Location

The 1992 SEIR reported that the Lab's main receiving facility was located at the Building 901 warehouse in Emeryville (SEIR, pg. IV-B-6). In 1994, the Lab procured new lease space at 2700 Seventh Street (Carleton Street Warehouse) in Berkeley for use as the Lab's main receiving facility.

The Seventh Street facility receives chemicals purchased from various vendors, which are then sent to the Lab's main site. Some low-level radioactive materials, including copper coil windings and other parts from accelerator areas, concrete shielding blocks, a uranium shipping cask, and miscellaneous laboratory equipment, have also been stored at this facility. To minimize radiation exposure to Lab employees and the public, control measures applied at this facility include the following:

- No materials are allowed to be transported to the warehouse that have loose contamination. The depleted uranium cask is completely enclosed in a crate and will not be opened unless brought back to the main Hill site.
- All materials are surveyed to verify that the level of radiation is less than 1 millirem per year at the fence boundary. The Lab monitors the level of radiation exposure at the fence boundary to confirm that these levels are below this limit. No levels above background have been detected at the yard boundary.

2. Chemical and Radioactive Materials Inventories

The 1992 SEIR listed quantities of hazardous and radioactive materials in inventory in 1990/1991, based upon data submitted to the City of Berkeley under the Business Plan Act (SEIR, pgs. IV-B-5 and IV-B-7). The Lab's hazardous materials inventory as of June 30, 1997, was 21,007 pounds of solid hazardous materials, 86,037 gallons of liquid hazardous materials, and 389,387 cubic feet of hazardous gases. As of year-end 1995, the Lab's radioactive materials inventory had 7,090 curies of radioactive materials in sealed sources, and 10,075 curies of other radionuclides, of which nearly all were tritium.

Amounts of chemicals in inventory at the Lab have declined since 1990/1991. Causes of this decline include a major site-wide reduction of the Lab's chemical inventory which was conducted after the 1991 DOE Tiger Team review; waste minimization efforts, which have encouraged and assisted researchers to recycle and transfer surplus chemicals within the Lab system; and the discontinuance of two programs, the plating shop at Building 77 and the Bevatron, which used large quantities of chemicals. In the case of radioactive materials, the amount of curies has been reduced because of Lab efforts to use non-radioactive chemical substitutes in place of radioactive materials in various research activities, and because sealed sources containing large curie amounts were shipped off-site to a vendor for recycling.

3. Safety Documentation

The Lab's *Health and Safety Manual*, PUB-3000, specifies documentation required in order to conduct Laboratory activities in a safe manner. Safety Analysis documents include

a description of the facility involved, identification of hazards, identification of mitigation and a risk analysis, if appropriate. Operational safety requirements are also included in these documents to ensure that the risks are kept acceptably low.

At the time of certification of the 1992 SEIR, the Lab had prepared Safety Analysis documentation for Building 2, the Advanced Materials Laboratory. Since certification of the SEIR, Safety Analysis Documents have been prepared for the following buildings or activities:

<u>Building/Activity</u>	<u>Document Date</u>
Building 6, Advanced Light Source	June 1996
Building 56, Biomedical Isotope Facility	May 1995
Building 70, Chemistry and Physics Laboratories	February 1995
Building 70A, Chemical Sciences Division Activities	June 1997
Building 75, National Tritium Labeling Facility	March 1996
Building 75A, Basis of Interim Operation: Hazardous Waste Handling Facility	November 1993
Building 75C, Radiation Analytical Measurements Laboratory	June 1996
Building 77H, Ultra-High Vacuum Cleaning Facility	June 1995
Building 84, Human Genome Facility	April 1997
Building 85, Hazardous Waste Handling Facility	April 1997
Building 88, 88-Inch Cyclotron	July 1996

Accident analyses performed for each of the above facilities assumed the worst case credible conditions, which result in the highest estimates of potential off-site dose. Typical accident scenarios included a major fire or earthquake, or both. Potential radionuclide exposures were calculated for six of these facilities because a credible accident scenario could result in an off-site dose. Most off-site dose estimates fell below 1 millirem. A few were higher, including a maximum dose of 5 millirems for a worse case accident at the National Tritium Labeling Facility and a maximum dose of 87 millirems for a worse case accident at the Hazardous Waste Handling Facility. The maximum calculated off-site dose -- 87 millirems -- is less than 2 percent of the DOE standard of 5,000 millirems as defined by DOE SAN Management Directive 5480.5 ("Safety of Nuclear Facilities").

Analysis in the above documents of activities with hazardous chemicals showed that potential accidental exposure to persons off-site would be below Level 2 of the Emergency Response Planning Guidelines (ERPG-2), developed by the American Industrial Hygiene Association. ERPG-2 is the principal guideline for evaluating the acceptability of public exposure due to an accidental release of hazardous chemical wastes, and is defined as the maximum airborne concentration below which nearly all individuals could be exposed to up to one hour without experiencing or developing any irreversible or other serious health effects or symptoms that could impair their ability to take protective action.

The 1992 SEIR reported that Risk Management and Prevention Programs (RMPPs) are required for facilities that handle designated types of acutely hazardous materials (SEIR, pg. IV-B-4). Although the Lab does not have any operations which contain hazardous substances above threshold quantities, a Risk Management and Prevention Plan was prepared in 1995 for the Ultra High Vacuum Cleaning Facility in Building 77 in the interest of best management practices.

C. DISPOSAL OF HAZARDOUS MATERIALS

1. Disposal of Hazardous Materials - Regulatory Setting

a. Hazardous Waste Disposal

The 1992 SEIR described the regulatory setting circa 1992, and stated that enforcement authority for certain aspects of the state Hazardous Waste Control Law had been delegated by the State of California to the City of Berkeley (SEIR, pg. IV-C-4). Since that time, Oakland and Berkeley have been certified by the California Environmental Protection Agency (Cal-EPA) as Certified Uniform Program Agencies (CUPA) for their respective jurisdictions and are in the process of developing a coordinating agencies agreement with Alameda County and Fremont as a condition of their CUPA certification that is to provide for consistent regulation within Alameda County. The Lab understands that the cities of Oakland and Berkeley have entered a Memorandum of Understanding (MOU) which provides that Berkeley will act on Oakland's behalf with respect to CUPA program activities in Berkeley Lab's Oakland portion. Under the state statute providing for CUPAs, CUPAs have regulatory authority over hazardous waste generation, certain activities within the state's tiered permitting program, underground storage tanks, above ground storage tanks, and emergency planning. However, the State of California Department of Toxic Substances Control (DTSC) retains exclusive authority over hazardous wastes at hazardous waste handling facilities requiring full permits, which is the case at the Lab's waste handling facilities.

2. Disposal of Hazardous Materials - Berkeley Lab Activities

a. Hazardous Waste Disposal

The 1992 SEIR listed quantities of hazardous, medical, and radioactive waste generated by the Lab in 1990 (SEIR, pg. IV-C-8 through 10). In 1996, the Lab generated 28,596 pounds of routine solid hazardous waste, 10,753 gallons of routine liquid hazardous waste, 41,257 pounds of medical waste, 14,257 pounds of low-level radioactive waste and 1,300 pounds of mixed waste. The radioactive waste contained 1,790 curies, and the mixed waste contained 1,992 curies.

b. Wastewater

Since certification of the 1992 SEIR, the Lab reactivated and upgraded an inactive Fixed Treatment Unit (FTU) at Building 77 to treat wastewater from the new Ultrahigh Vacuum Cleaning Facility prior to discharge to the sanitary sewer system. Each of the Lab's five FTUs received authorization on August 2, 1993 to operate under the state's tiered permitting program. The FTUs at Building 25 and 77 operate under the permit-by-rule tier, while the FTUs at Buildings 2, 70A/70F, and 76 operate under the conditional authorization tier.

c. Stormwater

Since certification of the 1992 SEIR, the Lab was issued a General Industrial Activities Stormwater Permit on October 24, 1992. The permit requires the Lab to collect and analyze stormwater samples for toxics and radioactivity. (Recent results from the Lab's stormwater monitoring sampling program are presented in Section IV-J: Environmental Monitoring).

3. Disposal of Hazardous Materials - Management and Compliance

The following updates information on agency notices of violations issued to the Lab regarding hazardous materials releases since certification of the 1992 SEIR, as well as providing information about other major developments relating to hazardous waste disposal that have occurred since certification.

a. Hazardous Waste Management

Hazardous waste violations at the Lab through 1991 were discussed in the 1992 SEIR. Settlement with the California Department of Toxic Substances Control (DTSC) on those violations was reached in October 1993; the Lab implemented corrective actions and agreed to pay DTSC's administrative costs. In July 1993, DTSC issued an Enforcement Order alleging additional violations observed during inspections in October and November 1992 and March 1993. A number of these alleged violations were dropped or involved no penalty. In October 1993, DTSC and the Lab reached settlement on these remaining alleged violations, for which the Lab paid a fine. DTSC considered all of the remaining alleged violations to be Class II violations; none was treated as a Class I violation.¹ A subsequent hazardous waste inspection in November 1993 resulted in no findings of violations.

b. Radioactive and Mixed Waste Management

The 1992 SEIR stated that Berkeley Lab uses the Hanford Site in Washington State for disposal of low-level radioactive waste (SEIR, pg. IV-C-10). The SEIR also stated that because there are no treatment or disposal options for mixed wastes, the Lab must continue to store mixed wastes onsite. These wastes would be shipped off-site for disposal when an authorized disposal facility exists (SEIR, pg. IV-C-15).

In February 1993, the Lab began sending mixed waste to the DOE Hanford site. In September 1995, the Lab also sent a mixed waste shipment to Diversified Scientific Services, Incorporated (DSSI), a commercial waste treatment, storage, and disposal facility in Tennessee.

An incident involving shipments of mixed waste to Hanford was the subject of review by that facility in February and April 1995:

- Hanford facility personnel suspected that four drums from the Lab contained incompatible wastes (acids and organics in two drums, and incompatible combinations of acids in two other drums). Further investigation disclosed that due to low concentrations of the acids involved and the presence of significant amounts of absorbent materials in the drums, it was unlikely that any of the containers involved posed an incompatibility issue.

¹ Class I violations are defined as significant deviations from statutes and regulations that could result in a failure to accomplish the following: (a) assure that hazardous wastes are destined for and delivered to authorized treatment, storage or disposal facilities; (b) prevent release of hazardous waste or constituents to the environment; (c) assure early detection of such releases; (d) assure adequate financial resources in case of release or to undertake necessary actions at the time of the facility's closure; or (e) perform emergency cleanup operation or other corrective actions for releases. Also included are Class II violations that are chronic or committed by a recalcitrant violator.

- A discrepancy was discovered between the number of inner waste containers contained in two drums as recorded on Lab shipping papers, and the number of waste containers actually shipped within the two drums.

The Washington State Department of Ecology contacted DTSC, and following an inspection, DTSC issued an inspection report on October 27, 1995, alleging violations in connection with the above incident. The Lab has furnished DTSC with additional information, including documentation of corrective actions, and has requested that the agency drop each of the alleged violations. DTSC has issued no notice of violation on the alleged violations to date.

The incidents led Hanford facility personnel to require increased quality assurance and quality control (QA/QC) procedures on waste shipments received from the Lab, and in May 1995, that facility ceased accepting mixed and radioactive waste from the Lab until completion of the QA/QC process. In the interim, the Lab continued to store mixed and radioactive waste onsite. In 1996, at the time of an exhaustive review of a generator process in preparation for shipment to Hanford, the Lab discovered that certain waste previously sent to Hanford as low-level radioactive waste contained a small amount of solvent (13 liters) and should have been sent and managed as mixed waste. Corrective actions undertaken by the Lab in response to this discovery included expanded review of the waste characterization program, a commitment to hire additional certification staff, and an expanded generator assistance program. The Lab was given approval by Hanford, DOE, and the Washington State Department of Ecology to resume radioactive waste shipments to the Hanford site in the first quarter of 1997.

Offsite facilities for treatment of the Lab's mixed wastes are now designated by the Site Treatment Plan (STP) for the Lab that DOE submitted to DTSC pursuant to the Federal Facility Compliance Act of 1992.² In October 1995, the STP was approved by DTSC and made the subject of a Compliance Order signed by DTSC and DOE. Also in October 1995, DTSC issued a Negative Declaration for the STP in accordance with CEQA.³

The STP currently does not include Hanford as an offsite treatment option for the Lab's mixed wastes. The STP designates two DOE sites, Oak Ridge National Laboratory in Tennessee and Idaho National Engineering Laboratory (INEL) in Idaho, as offsite treatment facilities for the Lab's mixed wastes. The STP also provides for the option of using other sites if an amendment to the STP is requested by the Lab and approved by DTSC. An amendment to the STP was made in April 1996 to include DSSI as an offsite option for several Lab waste streams. Since that time, the Lab has sent one shipment of mixed waste to DSSI, and may send additional shipments. The Lab may propose additional sites in the future as they become available and if waste treatment at these sites would be cost-effective. The Lab notifies and receives approval from DOE prior to mixed waste shipments.

It is also possible that after treatment which neutralizes the hazardous waste component of mixed wastes, which is defined in the STP as an on-site waste treatment option, a small

² In 1992, the U.S. Congress passed the Federal Facility Compliance Act, which requires the Department of Energy to develop plans for managing and treating mixed wastes at sites that generate and/or store mixed waste. In California, the STPs must be approved by, and made the subject of an Order issued by, the DTSC. The STP for Berkeley Lab calls for on-site pre-treatment of some wastes and shipment of both treated residuals and the remaining mixed wastes to authorized out-of-state facilities for final treatment. No on-site disposal is allowed.

³ California Environmental Protection Agency, Department of Toxic Substances Control, "DTSC Approves Site Treatment Plan", October 1995.

amount of the Lab's mixed wastes would no longer be regulated as hazardous waste. These wastes would then be available for disposal as low-level radioactive wastes once an offsite option becomes available, or possibly disposal as non-regulated wastes following decay-in-place.

As a result of the Hanford incident, audits of the Lab's hazardous waste management program were conducted in April 1995 by a team from Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL), and the DOE Oakland Operations Office conducted a review shortly thereafter. Findings of the LANL/LLNL team included inadequacies in planning, oversight, and quality assurance in the Lab's program. The DOE review expressed concerns regarding waste traceability, waste characterization, and personnel training. In response to these reviews, and to a later DOE review of the radioactive waste management program, the Lab is undertaking corrective actions in such areas as quality assurance, waste characterization, packaging procedures, sampling, and document control, and has made adjustments in staffing for mixed waste certification.

c. Wastewater

The East Bay Municipal Utilities District (EBMUD) issued a notice of violation against the Lab on January 4, 1993, due to exceedances in discharges of nickel and zinc from the Building 77 Plating Shop Waste Treatment Unit in December 1992. The Lab undertook corrective actions to prevent a recurrence of such discharges. (The Plating Shop has since been removed, and that space is now occupied by an Ultrahigh Vacuum cleaning facility.)

EBMUD also issued a notice of violation and assessed a fine against the Lab on September 15, 1994 for failure to notify the District in a timely fashion of an accidental discharge of low-pH liquid to the sanitary sewer from the FTU at Building 2, that occurred on August 23, 1994. The liquid contained approximately one liter of untreated acid. The discharge itself did not violate any of the limits set in the Lab's wastewater discharge permits. The Lab instituted corrective actions to prevent a recurrence of such discharges and to improve reporting procedures.

d. Construction of Replacement Hazardous Waste Handling Facility

The 1992 SEIR reported that the Lab had received preliminary approvals and funding to construct a replacement hazardous waste handling facility (HWHF), and that a Resource Conservation and Recovery Act (RCRA) Part B Permit to authorize operation of the replacement HWHF and continued operation of the existing HWHF until the replacement HWHF was operational was expected to be approved by the California Environmental Protection Agency during calendar year 1992 (SEIR, pg. IV-C-18). The current status of hazardous waste facility permits for the Lab is as follows:

The DTSC Tiered Permitting program has been in place for hazardous waste treatment and storage units since 1993. The five tiers, listed in decreasing order of regulatory complexity, are full permit, standardized permit, permit-by-rule, conditional authorization, and conditional exemption. The Lab has a permit under the full permit tier of the program that covers both the existing HWHF and the replacement HWHF. The permit, which allows storage and simple treatment of certain hazardous and mixed wastes at the existing and replacement HWHFs, was issued as a renewed permit on May 4, 1993, and is valid for 10 years. The replacement HWHF became operational in April 1997. At the same time, operations were ceased at the existing HWHF, and closure activities are currently in progress.

Occasionally, the need arises to modify the HWHF permit primarily as a result of regulatory changes or the dynamic nature of research activities. A request for modification of certain provisions of the permit was approved by DTSC on July 27, 1994, including adding treatment methods, expanding the boundaries of work areas, changing the closure schedule for individual waste treatment units, and allowing the HWHF to receive hazardous and mixed wastes from Building 934 (an offsite research facility).

On May 8, 1995, the Lab applied to DTSC for temporary authorization of another permit modification affecting the existing facility to cover the period during which a formal modification request would be submitted by the Lab and decided upon by DTSC. DTSC approved the temporary authorization request on May 17 of that year. The modifications included expanding the storage capacity for mixed wastes, and changing the contents and/or configurations of other waste units. Originally, the May 17 approval was valid for 180 days, contingent upon the submission by the Lab of a Class 2 permanent permit modification application to DTSC no later than September 1, 1995. The Lab submitted a Class 2 permit modification to DTSC on August 21, 1995, but subsequent public input and the Lab's identification of additional changes that would expand the scope of its permit modification application resulted in DTSC's agreeing to extend the temporary authorization for another 180 days, allowing the Lab to resubmit the permit modification application on January 11, 1996. The expanded scope of the permit included improving the effectiveness of the training plan by eliminating redundancies and modifying frequencies of refresher classes, converting certain areas at the existing HWHF from radioactive waste storage to mixed waste storage, converting a portion of the replacement HWHF from hazardous waste storage to mixed waste storage, deleting requirements to maintain and inspect high-efficiency particulate air filters in the hood exhaust systems of certain treatment units, storing one new hazardous waste stream and two new mixed waste streams, and using additional waste treatment methods.

Currently, the replacement HWHF is operating under a consent order issued by DTSC that outlines operating conditions for that facility until DTSC's decision on the Lab's permit modification request.

As discussed below under Waste Minimization, the Lab has a waste minimization program that is instrumental in keeping waste generation volumes at levels that can be accommodated by the permitted capacities of the existing and replacement HWHFs. For example, under ongoing waste minimization initiatives under Appendix F of the UC/DOE contract for the operation of the Laboratory, the Lab has achieved large reductions in waste generation, including lowering the generation of acid waste by 98 percent, contaminated solids by 56 percent, and coolants by 88 percent for the period 1993 through 1995. For the future, DOE has set a goal for routine operations of reducing the generation of hazardous, radioactive, and low-level mixed waste by 50 percent by December 31, 1999, using calendar year 1993 as a baseline year.

To minimize the possibility that additional permit modifications requesting increases in permitted mixed waste capacity of the HWHF would become necessary, the Lab's Waste Minimization/Pollution Prevention Program will focus on assisting waste generators in reducing the amount of mixed waste produced by laboratory processes. In addition, the Lab's current permit modification request includes provisions for treating waste that will reduce the quantity that must be stored and eventually disposed of, or puts the wastes in a form acceptable to off-site treatment facilities.

e. Discharge to Surface Water

A fire alarm at the new replacement Hazardous Waste Handling Facility malfunctioned during a holiday break in December 1996, resulting in the accidental release of fire suppression foam and the discharge of some of this foam to Strawberry Creek. The foam was not considered toxic, consisting of more than 80 percent water and containing no ingredients on regulatory emergency reporting lists. Because the incident happened during the holiday, and prior to the alarm being connected to the Lab-wide communication system, the incident went undetected until after the fire suppression foam entered Strawberry Creek. (There was no waste stored in the facility at the time, since the building was still undergoing final construction activities.) The Lab received a citation for a violation of the Clean Water Act and a bill for the time of City of Berkeley employees who responded to investigate the incident.

D. HAZARDOUS WASTE MINIMIZATION

1. Hazardous Waste Minimization - Regulatory Setting

The 1992 SEIR summarized requirements related to hazardous waste minimization that were in effect in 1992 (SEIR, pg. IV-D-1 to IV-D-3). Changes in waste minimization requirements since certification of the SEIR have included the following:

- Executive Order 12856 (Federal Compliance with Right-to-Know and Pollution Prevention Requirements, August 4, 1993) applied Emergency Planning and Community Right-to-Know Act (EPCRA) requirements to federal agencies. (EPCRA was part of the Superfund Amendments and Reauthorization Act enacted in 1986.) Of relevance to waste minimization was a provision of the Executive Order for each federal agency to develop a pollution prevention strategy within one year of the date of the Order. The strategy was to include voluntary toxic chemicals reduction goals to reduce the agency's total releases of toxic chemicals to the environment reportable under EPCRA, and off-site transfers of such chemicals for treatment and disposal, by 50 percent by the end of 1999. The baseline for comparison is the first year in which toxic chemical releases and off-site transfers are publicly reported as required under EPCRA.
- Appendix F of the contract between UC and DOE for operation of the Laboratory contains Performance Measures that require the Laboratory to select specific waste streams for targeted reductions during the contract period (October 1, 1992 through September 30, 1997). In 1994, DOE and the Lab selected three process waste streams -- acids, contaminated solids, and coolants -- and set as an objective an annual 5 percent reduction for each of these wastes.
- In a May 3, 1996 Memorandum ("Departmental Pollution Prevention Goals") to all Heads of Departmental Elements, the Secretary of DOE listed several waste minimization goals to be achieved by December 31, 1999, using calendar year 1993 as a baseline year. These waste minimization goals include the following:

For routine operations

- Reduce generation of each of the following by 50 percent: radioactive waste, low-level mixed waste, and hazardous waste.
- Reduce generation of sanitary waste by 33 percent.
- Reduce total releases and off-site transfers for treatment and disposal of toxic chemicals by 50 percent.

For all operations

- Recycle 33 percent of sanitary waste generated during cleanup/stabilization and other operations.

2. Hazardous Waste Minimization - Berkeley Lab Activities

In addition to the types of waste minimization plans listed in the 1992 SEIR (pgs. IV-D-3 and 4), the Lab issued a *Low-Level Radioactive Waste and Mixed Waste Reduction Plan* in April 1997.

In support of DOE's voluntary commitments to EPA, the Lab is committed to reducing EPCRA hazardous wastes 50 percent by calendar year 2000.

The Lab has greatly exceeded waste reduction goals contained in the 1992-1997 UC/DOE contract. For example, through 1995, acid waste generation was reduced by 98 percent, contaminated solids by 56 percent, and coolants by 88 percent as compared with 1993.

In addition, the Lab will continue to implement the DOE waste minimization goals through a combination of on-going waste reduction programs and new initiatives. Comparing 1996 with 1993, the following decreases in routine operational waste streams have already been achieved:

<u>Waste</u>	<u>Reduction</u>
Hazardous waste	69 percent
Low level radioactive waste	26 percent
Mixed waste	52 percent

E. HAZARDOUS MATERIALS TRANSPORTATION

The 1992 SEIR described the Lab's hazardous materials transportation and shipping operations, and stated that the Lab's main receiving facility was located in Emeryville (SEIR, pg. IV-E-2). In 1994, the Lab procured new lease space at 2700 Seventh Street in Berkeley for use as the Lab's main receiving facility.

F. REGULATED BUILDING COMPONENTS

The 1992 SEIR reported that transformers containing PCB concentrations of between 50 and 500 parts per billion (ppb)⁴ in oil were removed from service by November 1990, in compliance with the Toxic Substances Control Act (TSCA) (SEIR, pg. IV-F-6). Three transformers containing PCBs with concentrations in excess of 500 ppm were identified at the Lab in 1993. One of these transformers was disposed of through the Hazardous Waste Handling Facility that same year. The PCB-containing oils in the other two transformers were drained and disposed of as waste in 1993, and the transformers themselves were removed from the Lab in 1994.

⁴ The 1992 SEIR erroneously listed the TSCA PCB concentration standard in parts per billion (ppb) rather than parts per million (ppm).

G. WORKER SAFETY AND HEALTH

1. Worker Safety and Health - Regulatory Setting

The 1992 SEIR (pgs. IV-G-1 to IV-G-3) presented an overview of federal requirements, local standards, and other regulatory requirements applicable to Lab operations that help to ensure worker safety and health.

As described in the Introduction to the Hazardous Materials section of the Addendum, the Lab is currently implementing a new DOE initiative entitled the Work Smart Standards Project. The initiative will result in the identification and implementation of a set of standards that address the specific environment, health and safety hazards at the Berkeley Lab. The set will include standards required by law and any additional standards necessary to assure sufficient protection of the safety and health of the employees, the public, and the environment. The final set of standards for Berkeley Lab will replace the environment, health and safety directives that are currently in the DOE/UC contract for operations and management of the Lab.

2. Worker Safety and Health - Berkeley Lab Activities

The 1992 SEIR (pgs. IV-G-9 to IV-G-10) reported that there were 87 full-time staff equivalents (FTEs) in the Lab's Environment, Health, and Safety (EH&S) Division in FY 1991, which was expected to rise to 133 FTEs in order to implement the Tiger Team Corrective Action Plan. Subsequent to certification of the 1992 SEIR, the Lab's EH&S Division was reorganized to better serve the health and safety needs of the research organizations, to optimize Lab resources, and to place emphasis where needed to respond to changes in regulations.

As of mid-1997, the EH&S Division consisted of 129 FTEs. The Lab will continue to adjust staffing levels for EH&S functions as necessary to continue to meet regulatory requirements and ensure worker safety and health.

H. EMERGENCY PREPAREDNESS AND RESPONSE

1. Response to Hazardous Materials Incidents

The 1992 SEIR (pg. IV-H-5) reported that the Lab had a contract with I.T. Corporation to respond to chemical spills. Effective in October 1996, Advanced Environmental Technology Services (AETS) replaced I.T. Corporation as a responder to chemical spills. The same services will be provided. The Lab expects to continue to use either contractor/and or internal services to meet spill response needs.

2. Facility-Wide Emergency Coordination

According to the 1992 SEIR (pg. IV-H-6), the Lab's Director's Office assumes command in the event of an emergency that involves multiple locations or requires major involvement from more than one emergency response support group. Currently, this responsibility lies with the Lab's Emergency Command Center. Specific delegations of responsibility are periodically modified to effectively and efficiently coordinate emergency response.

3. Emergency Preparedness Documentation

The 1992 SEIR (pg. IV-H-6) listed several examples of emergency preparedness documents that had been prepared by the Laboratory. Since that time, in August 1994, the Lab's Wildland Fire Evacuation/Relocation Plan was published in coordination with the UC Berkeley emergency planning manager, with copies provided to the City of Berkeley. The Lab's plan is based on a wildland fire scenario which would require rapid mobilization of resources, quick decision making and well-coordinated execution. The Evacuation/Relocation plan is adaptable to be used under other circumstances, such as after an earthquake.

I. REMEDIATION ACTIVITIES

1. Remediation Activities - Regulatory Setting

At the time the 1992 SEIR was certified, there were no interagency agreements involving any actual or potential waste sites on the Lab (SEIR, pgs. IV-I-8 to IV-I-9). In a letter from the Department of Toxic Substances Control (DTSC) to the Lab dated July 29, 1993, DTSC attached a Coordination Plan describing the responsibilities of the City of Berkeley, San Francisco Bay Regional Water Quality Control Board, California Department of Health Services, and DTSC with respect to Resource Conservation and Recovery Act (RCRA) corrective action and the RCRA Facility Investigation (RFI) at the Lab.⁵

In addition, at the request of members of the Committee to Minimize Toxic Waste, a local citizen's group, the U.S. Environmental Protection Agency (EPA) Region IX agreed to re-evaluate the need for further action at the Berkeley Site under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The EPA anticipates this re-evaluation will be completed by the end of September 1997.

2. Remediation Activities - Berkeley Lab Activities

The 1992 SEIR (pgs. IV-I-5 through IV-I-10) described the Lab's RCRA Corrective Action Program and provided a summary of the status of on-going RCRA Facility Assessment (RFA) activities. The following provides a summary update of the Lab's RCRA Corrective Action Program activities as of August 1997. Updates on findings and follow-on work are published by the Lab in the Site Restoration Program quarterly reports.

In September 1992 the Lab completed the RFA, and in February 1997 completed the second step of the four-step RCRA Corrective Actions Program process, the RFI. The Lab will perform a Corrective Measures Study, and implement Corrective Measures, if required.⁶

Under the RFI, the Lab investigated Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified in the RFA in order to confirm whether releases of contaminants have occurred. Where a release was confirmed, the Lab conducted additional investigations to evaluate the nature and extent of the contamination. Types of RFI activities included soil, surface water, sediments, soil gas, soil water, and groundwater sampling and analyses; and geological, geophysical, and saturated and unsaturated zone hydrogeologic studies. In addition, Interim Corrective Measures (ICMs) were implemented in consultation with regulatory oversight agencies, and the Lab conducted pilot testing to evaluate potential methods for remediating contaminated soil and groundwater.

Volatile organic compounds (VOCs) have been detected in the majority of groundwater monitoring wells at the Lab. The VOCs that have been detected are primarily halogenated hydrocarbons that are components of solvents and degreasers used at the Lab, and aromatic and non-halogenated hydrocarbons that are components of petroleum products. Other contaminants that have been detected in groundwater at the Lab include metals, tritium, semi-volatile organic compounds (SVOCs), and various organics quantified within the

⁵ Letter, Sal Ciriello, California Environmental Protection Agency, Department of Toxic Substances Control, Region 2, Facility Permitting Branch, to David McGraw, Lawrence Berkeley Laboratory, July 29, 1993.

⁶ Remediation activities are still scheduled to be completed by the end of 2002, as reported in the 1992 SEIR (SEIR, pg. IV-I-14).

boiling point ranges of gasoline diesel, kerosene, and waste oil. No confirmed detections of contaminants in off-site groundwater monitoring wells have been reported. Halogenated hydrocarbons that have been detected in groundwater monitoring wells at concentrations above Maximum Contaminant Levels (MCLs) for drinking water include primarily tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride, 1,1-dichloroethene (1,1-DCE), vinyl chloride, cis-1,2-DCE, trichloroethane (TCA), and chloroform. Benzene has also been detected above the MCL in several wells.

Eight major groundwater contamination plumes have been identified at the Lab, five of which are halogenated VOC plumes, two are fuel hydrocarbon plumes, and one is a tritium plume.⁷ There are additional areas at the lab where contaminated groundwater has been detected, but the contaminant concentrations are minor relative to the plume areas. The Old Town VOC Plume covers the widest area and has the highest concentration of contaminants of the defined plumes. The maximum concentration of total halogenated hydrocarbons detected in samples from groundwater monitoring wells has been 298,100 micrograms per liter. The sample contained primarily PCE, TCE, and carbon tetrachloride. This location is immediately downgradient from the former location of the abandoned Building 7 sump, which is believed to have been the primary source of contamination of the Old Town plume. The sump was removed in 1995 and adjacent highly contaminated soil was excavated to a depth of 17 feet. A groundwater collection trench was installed immediately downgradient from the former sump location in July 1996 to control the source of the contamination. Pumping, treating and reinjection of groundwater from the collection trench is currently (August 1997) underway. To date about 12 kg of PCE, TCE and carbon tetrachloride have been removed from the groundwater at the source area.

Surface water at the Lab has been monitored for potential contaminants in all off-site flowing creeks, which include North Fork Strawberry Creek, Botanical Garden, Creek, Cafeteria Creek, Chicken Creek, No Name Creek, Ravine Creek, and Ten Inch Creek. Small amounts of VOCs, some metals, and tritium have been detected.

Sediment from creeks, storm drain catch basins, and sumps have also been analyzed for potential contaminants. Diesel-range organics, small amounts of VOCs, tritium, and traces of curium-244 were detected in sediment samples from creeks. Traces of polynuclear aromatic hydrocarbons (PAHs), VOCs, PCBs, petroleum hydrocarbons, tritium, mercury, and lead were detected in storm drain catch basin sediment samples.

Contaminants detected in soil include organic chemical, tritium, curium-244, strontium-90, cyanide, and metals. The organic chemicals detected include halogenated VOCs, PAHs and other SVOCs, PCBs, aromatic hydrocarbons, and organics quantified within the ranges of gasoline, diesel, kerosene, motor oil, waste oil, and oil and grease. The highest concentrations of halogenated VOCs were detected near the former location of the abandoned Building 7 sump. The area of soil with the highest concentration of contaminants was excavated in 1995. PAHs were detected adjacent to an abandoned liquid waste aboveground storage tank. High concentrations of PCBs were detected beneath the concrete floor at the Building 88 hydraulic gate pump room. The PCB contaminated material that was accessible was removed. PCBs were also detected in surface soil at several locations in the Old Town area.

⁷ An investigation by the University of California, Berkeley has shown a maximum tritium concentration of about 25,200 pCi/L at a monitoring well next to their chemical facility. The tritium found at this location has no connection to the tritium plume at Berkeley Lab: there is a hydrologic divide between the Lab plume and the University monitoring well; the largest concentration of tritium found at the front of the Berkeley Lab plume is less than 6,000 pCi/L; and the distance between the front of the Lab's plume and the University well is about 1,500 feet.

Investigations will continue in areas where more detailed site characterization is required and areas where oversight agencies may request additional work. Interim Corrective Measures that are planned or currently underway include: excavation and remediation of contaminated soil and groundwater at select on-site locations, pump-and-treat of contaminated groundwater for plume containment and source removal, and implementation of a treatment for extracted groundwater. In addition, the Lab will prepare both human health and ecological risk assessments based on the data presented in the RFI. Corrective Measures Studies will be conducted at all SWMUs and AOCs identified by either the human health or ecological risk assessment as requiring further action.

J. ENVIRONMENTAL MONITORING

Section IV-J of the 1992 SEIR reported analytical results of samples obtained from surface water sources and sanitary sewers as part of the Lab's environmental monitoring program in 1990. In order to present a more complete discussion of the Lab's environmental monitoring program, this Addendum presents recent results of sampling activities, both from the media reported in the 1992 SEIR, and from additional media that are sampled as part of the environmental program. These additional media include groundwater, rainwater, stormwater, lakes, soil and sediment, and vegetation. Sampling data for 1995 are summarized and, where appropriate, presented in tabular form. Sampling data for 1996 were not finalized in all cases as of the date of this Addendum, and are summarized only.⁸

1. Radionuclides⁹

a Groundwater

Analytical results for tritium in samples collected from Lab on-site and off-site monitoring wells in 1995 are reported in Table IV-J-1, below. The maximum concentration of tritium found in groundwater monitoring well samples was approximately 7,500 pCi/L, less than one-half of the EPA drinking water standard of 20,000 pCi/L. In 1996, the maximum tritium concentration detected in monitoring well samples was 11,626 pCi/L.

Water samples collected from a slope stability well located near the National Tritium Labeling Facility (NTLF) have shown tritium levels up to 35,800 pCi/L through 1996, which is above the drinking water standard. The basis for these results is not understood. However, this well was not constructed for groundwater sampling, and does not include a seal to avoid surface water contamination. A groundwater monitoring well located within five feet of the slope stability well have shown a maximum tritium level of about 5,400 pCi/L through 1996. Based on this information, the Lab believes that the sampling results from the slope stability well are not representative of subsurface conditions.

Berkeley Lab also monitors soil water as part of its effort to better understand the contamination profile of the site and to track changes over time. Soil water is water contained in soil above the level of groundwater, and is typically extracted using mechanical suction equipment. This water is not available for consumption, and does not represent the source of the community's drinking water; therefore, drinking water standards do not apply. Typical sample volumes for soil water are 20 milliliters (less than 1 fluid ounce). The highest tritium level observed to date was a concentration of 86,000 pCi/L in a soil water monitoring instrument (lysimeter) closest to the NTLF. A lysimeter 55 feet away from the NTLF stack showed tritium with a concentration of about 10,000 pCi/L. Soil water samples extracted in the vicinity of the Lawrence Hall of Science in May 1996 showed tritium concentrations ranging from below detection limits to 3,500 pCi/L.

It should be noted that any chemicals or radioactivity, such as tritium, detected in groundwater at the Lab do not come into contact with the community's drinking water.

⁸ Results for 1995 are from the Lab's *1995 Site Environmental Report*, July 1996 and data provided by the Lab's Environment, Health, and Safety Division. Results for 1996 are from several sources, including a draft version of the 1996 Site Environmental Report, Lab responses to questions submitted at a November 12, 1996 meeting of the Berkeley City Council, and EH&S Division data.

⁹ The 1992 SEIR reported analytical results for alpha and beta in microcuries per milliliter (uCi/ml), while recent results are reported in becquerels in the Lab's Site Environmental Report. Results are reported in this Addendum in picocuries per liter (pCi/L), which is consistent with the nomenclature used for EPA Maximum Contaminant Levels. 1 uCi/ml = 1,000 pCi/L and 1 becquerel = 27 pCi.

The East Bay Municipal Utility District provides the water supply to the area. Therefore, EPA drinking water limits do not apply and are used as a conservative benchmark.

Table IV-J-1

Groundwater Sampling: Radiological Results (1995)

(Concentration in pCi/L)

	Jan-Mar 95	Apr-Jun 95	Jul-Sep 95	Oct-Dec 95
Well No.	Tritium	Tritium	Tritium	Tritium
MCL:	20,000	20,000	20,000	20,000
MW76-1	<400		818 ± 349	
MW91-4	1,030 ± 195	958 ± 207	606 ± 222 <400	1,015 ± 202
MW91-5	1,790 ± 268		1,856 ± 407	1,018 ± 294
MW91-6	4,074 ± 451		4,728 ± 521	4,284 ± 463
75-92-23	1,110 ± 296		1,202 ± 373	4,417 ± 431 4,239 ± 425
75B-92-24	6,710 ± 467	6,745 ± 490	6,896 ± 564 7,378 ± 594	7,497 ± 545
CD-92-28	<400	<400	<400	<400
76-93-6	3,210 ± 397 3,280 ± 400 (D) 3,510 ± 405 (S)	3,671 ± 391	3,584 ± 474	3,232 ± 430
53-93-16-69'		<400		
MWP-1	<400	<400	<400	<400
MWP-2	<400	<400	<400	<400
MWP-4	<400	<400	<400	<400
MWP-5	<400	<400	<400	<400
MWP-6	<400	<400	<400	<400
MWP-7	<400	<400	<400	<400
MWP-8	<400	<400	<400	<400
MWP-9	<400	<400	<400	<400
MWP-10	<400	<400	<400	<400
OW3-225	<400	<400	<400	<400
85-95-1			<400	<400
85-95-2			<400	

pCi/L = picocuries per liter

MCL = Maximum contaminant level for drinking water determined by California DTSC

D = Duplicate Sample

S = Split

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 *Site Environmental Report*, July 1996, pg. 6-9.

b. Surface Water

The 1992 SEIR reported that there were no exceedances of regulatory standards in radiological analyses of surface water samples collected from creeks in 1990 (SEIR, pg.

IV-J-1). Sampling results for 1995 are presented in Table IV-J-2, and sampling locations are shown in Figure IV-J-1. The maximum tritium concentrations detected in 1995 and 1996 were 4,833 pCi/L and 1,026 pCi/L, respectively, both found in samples collected from Chicken Creek. These results are well below the EPA drinking water standard. As with groundwater, water from local creeks is not used as a public drinking water supply, and EPA drinking water limits do not apply to creek samples; however, they are here compared with sample results as a conservative benchmark.

Table IV-J-2

Surface Water Sampling: Radiological Results (1995)

Location	<u>Maximum Concentration (pCi/L)</u>		
	Alpha	Beta (Maximum)	Tritium (Maximum)
Botanical Garden Creek			ND
Cafeteria Creek			ND
Chicken Creek	ND	7.0	4,833
Claremont Creek	ND	5.4	540
Lower Strawberry Creek	ND	7.3	1,010
North Fork Strawberry Creek	ND	ND	1,890
No Name Creek			ND
Ravine Creek			ND
Strawberry Creek (UC)	ND	5.9	859
Ten-Inch Creek			ND
Wildcat Creek	ND	4.9	1,571
Regulatory Standard	15	50.0	20,000

pCi/L = picocuries/Liter

ND = not detected (concentration was less than the minimum detectable amount for the sample aliquot)

Source: Ernest Orlando Lawrence Berkeley National Laboratory, *1995 Site Environmental Report*, July 1996, pg. 5-5.

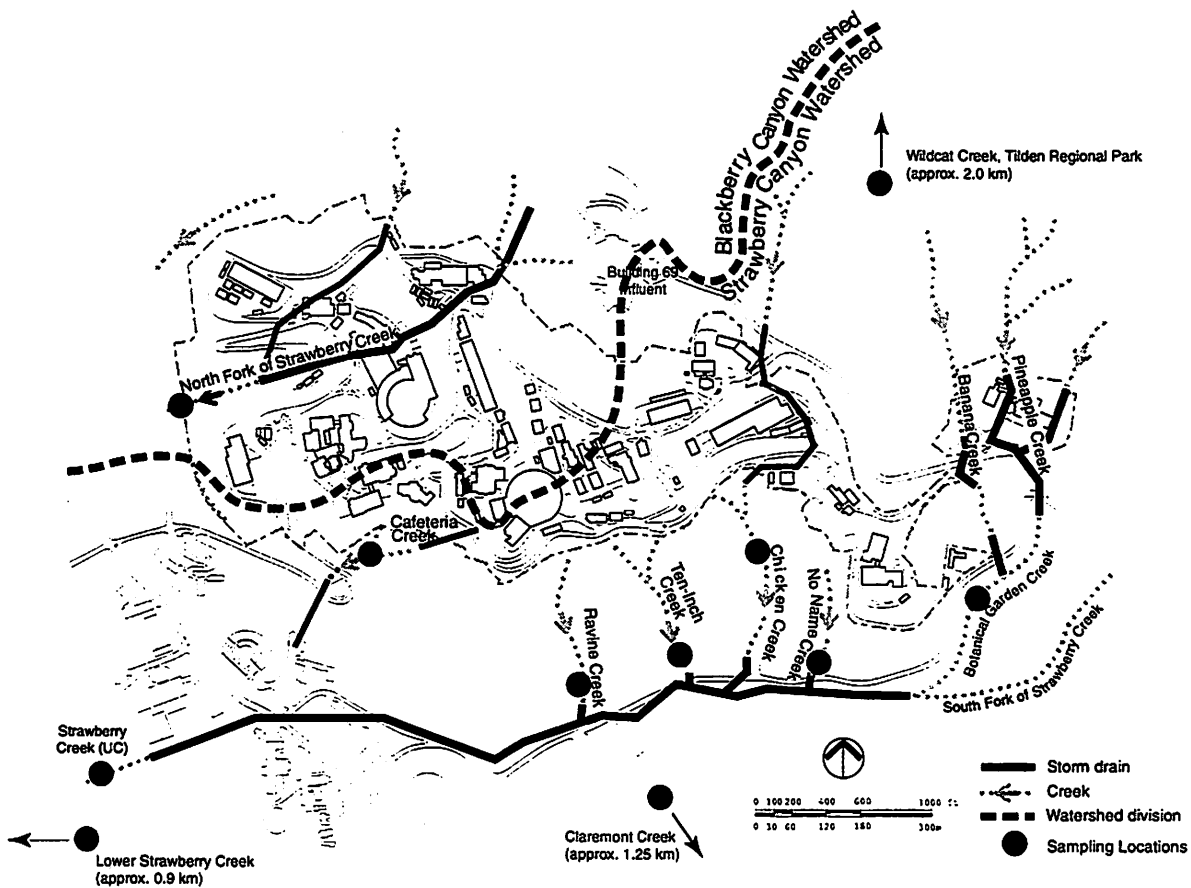


Figure IV-J-1
SURFACE WATER SAMPLING LOCATIONS

The 1992 SEIR did not report rainwater sampling results. Occasionally, the concentration of tritium detected in rainwater at some locations around the NTLF has been above the EPA drinking water limit of 20,000 pCi/L. In 1995 and 1996, concentrations were below this limit. In 1995, a maximum of 13,400 pCi/L of tritium was detected in a rainwater sample collected in the vicinity of the NTLF, about two-thirds of the EPA drinking water limit. In 1996, the maximum level measured was 432 pCi/L. Again, EPA drinking water limits do not apply and are used as a conservative benchmark.

The Lab expanded its surface water sampling program in 1996 to include lakes. Two lakes, Lake Anza and Lake Temescal, were chosen for their proximity to the Lab. For 1996, samples from both lakes were below detection limits for tritium and alpha activity. At Lake Anza, beta activity was detected at slightly above the detection limit.

c. Sanitary Sewer

The 1992 SEIR reported that there were no exceedances of regulatory standards in radiological analyses of sanitary sewer samples collected in 1990 (SEIR, pg. IV-J-3). This was also the case in 1995 and 1996. Regulatory standards permit the discharge of 5 curies of tritium, 1 curie of carbon-14, and 1 curie of all other radioisotopes per year into sanitary

sewerage (10 CFR 20). In 1995, the Lab's wastewater discharges were below these levels: the Lab discharged 1.3 Ci of tritium, and 0.16 Ci of all other radioisotopes combined. In 1996, the comparable figures were 0.18 Ci of tritium, and 0.019 Ci of all other radioisotopes combined.

d. Stormwater Monitoring

The 1992 SEIR reported that the Lab had submitted a Notice of Intent to comply with the State of California General Industrial Stormwater Permit on March 27, 1992 (SEIR, pg. IV-C-12). Following this submittal, the Lab was issued a General Industrial Activities Stormwater Permit on October 24, 1992. In conformance with this permit, the Lab now collects and analyzes stormwater samples. The General Permit does not set regulatory limits upon substances contained in stormwater discharges. Results from 1995 radiological sampling of stormwater are presented in Table IV-J-3, below. In 1995, the maximum beta and tritium concentrations were about 3 pCi/L and 2,780 pCi/L, respectively. In 1996, the maximum beta and tritium concentrations were about 7 pCi/L and 2,540 pCi/L, respectively.

Table IV-J-3
Stormwater Monitoring: Radiological Results (1995)

Maximum Concentration (pCi/L)

Location	Beta	Tritium
STW 2	1.4	ND
STW 3	3.2	2,780
STW 4	3.0	1,188

pCi/L = picocuries/Liter

Source: LBNL EH&S Division.

e. Soil and Sediment

Results from 1995 radiological sampling of soil and sediment are presented in Table IV-J-4, below. Maximum concentrations of tritium and gamma in 1995 were approximately 1.2 pCi/g and 18 pCi/g, respectively. In 1996, the maximum tritium and gamma concentrations were approximately 0.5 pCi/g and 16 pCi/g, respectively. For comparison, the EPA preliminary remediation goal for residential soil is 11,000 pCi/g.

Table IV-J-4
Soil and Sediment Sampling: Radiological Results (1995)

Concentration (pCi/g)

Location	Tritium	Gamma
B13C (soil)	0	18
B50 (soil)	0.07	18
B69 (soil)	0.08	11
Chicken Creek (sediment)	1.19	0.7
N. Fork Strawberry Creek (sediment)	0.07	11

pCi/g = picocuries/gram

Note: one sample collected at each location.

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 Site Environmental Report, July 1996, pg. 8-2.

f. Vegetation

Tritium has been detected in plants on and near the Berkeley Lab. The presence of tritium is due to the wash out of tritium from the exhaust air during rainy or foggy periods. In 1995, the Lab conducted a special study to measure tritium concentrations in extracted water from vegetation in the vicinity of the replacement waste handling facility. The maximum tritium concentration was found in laurel leaves at 18,000 pCi/L.

Beginning in 1996, the Lab measured tritium in water extracted from eucalyptus leaves. The maximum concentration of tritium in this water was approximately 128,000 pCi/L in the immediate area of the NTLF stack, which decreased to approximately 18,000 pCi/L at 50 meters from the stack. Five vegetation samples were collected north of the NTLF beyond the Lab site perimeter in 1996. Preliminary results for plant water tritium concentrations are: at 100 meters, 3,600 pCi/L; at 200 meters, 2,100 pCi/L; and at 300 meters, 1,400 pCi/L.

The Lab manages onsite trees and brush as part of its ongoing fire prevention and control program. In February 1996, 60 tree foliage samples were collected at various locations around the site to determine the range of tritium concentrations in the moisture within trees. The results of this sampling were used in part in evaluating feasible and cost-effective disposal alternatives for a project that removed trees from nearby areas later that year. The removed trees were shipped offsite for conversion into paper products after confirming that regulations allowed the unrestricted release of residual tree material containing tritium concentrations at the levels expected.

At each sampling location, multiple foliage samples were collected and analyzed. Average tritium concentrations in foliage exceeded the minimum detectable amount only in trees immediately adjacent the NTLF stack and at one location adjacent Building 77. Samples from near the NTLF stack had tritium activities ranging from 28,600 to 119,000 pCi/L. The samples from the tree near Building 77, which is 150 meters southeast from the tritium stack, ranged from 4,440 to 8,860 pCi/L.

To get a better understanding of the risk associated with removed trees, the Lab estimated the maximum public dose from tritium from the release and use of the wood. The assessment considered several plausible scenarios, including the one selected for the removed trees: converting the tree wood to paper products. Using the range of tritium results described above, an average tritium concentration of 10,000 pCi/L of tree water was assumed. The length of exposure was dependent upon the quantity of trees that the Lab expected to remove. The maximum dose to a pulp mill worker from inhaling and being immersed in tree water vapors produced by the removed trees was estimated at 0.005 millirem, which is below regulatory standards. As a result of these estimates, all trees were authorized for removal with the exception of a grove directly adjacent to the NTLF stack.

In April 1997, the Lab collected 30 samples from trees in the vicinity of Building 74, which is about 600 meters upwind from the NTLF. The maximum concentration of free water tritium in leaf/needle samples was 0.67 pCi/g, with a calculated mean value of 0.22 pCi/g. For organically bound tritium, the maximum value was 0.95 pCi/g, with a calculated mean value of 0.069 pCi/g. The mean values for these samples were at or below their respective detection limits. After comparing samples collected from leaves/needles and trunk wood in Pacifica, the Lab concluded that tritium levels in trees in the Building 74 area are indistinguishable from regional background levels.¹⁰

EPA has not established concentration limits for tritium in vegetation. The EPA drinking water standard of 20,000 pCi/L applies to drinking water sources, and is derived from assumptions that someone uses a single drinking water source and consumes 2 liters of water a day for 70 years. Such assumptions are not applicable to transpired water vapor. Potential exposures to tritium from all air-derived emissions, including exposure to tritium from plant transpiration, or from eating tritium-containing plants, are regulated under EPA's 10 millirem annual dose limit for air emissions.

A private citizen group, the Committee to Minimize Toxic Waste, performed its own testing of tritium in vegetation and soil in late 1996, finding concentrations of close to 60,000 pCi/L in vegetation and 269,000 pCi/L in soil. These results are not consistent with the results of the Lab's measurements. An independent monitoring program is being developed by a Tritium Issues Workgroup, composed of representatives from the State Department of Health Services, the U.S. EPA, the City of Berkeley's Toxics Management Department, and the State Department of Toxic Substances Control. This group will monitor tritium levels in the air, soil, water, and plants in the vicinity of the NTLF. The Workgroup intends to receive suggestions from the broader Berkeley community in developing protocols for the independent sampling program. All tritium measurements, including the results obtained by the Committee, can be used to provide input to the program.

¹⁰ Plant transpiration studies have been conducted as research, in contrast to compliance-related monitoring, at the Laboratory. In these experiments, tritium was measured in transpired water, water released from plants to the atmosphere. The transpired water data were collected as part of an experimental technique developed by a researcher and a graduate student. Maximum tritium concentrations of close to 200,000 pCi/L were found. These results were not collected by Lab personnel involved with compliance monitoring. To date, no peer-reviewed publication or formal report of this research has been provided to the Berkeley Lab by the researchers. Because the Lab was requested to provide this raw data during a Berkeley City Council meeting on November 11, 1996, the Lab looked for the data from the transpired water vapor measurements, and upon finding that the data had been analyzed using Lab analytical facilities, sent it to the City Council.

Table IV-J-6 (continued)

Method 8260 Analytes	Number of Wells Sampled	Number of Samples	Range Concentrations (µg/L)	of Federal California Contaminant (MCL) (µg/L)	or Max. Level
Halogenated (Continued)					
cis-1,3-Dichloropropene	109	1	4.4		
trans-1,3-Dichloropropene	109	1	4		
Methylene Chloride	109	2	1 - 11.5	5	
1,1,1,2-Tetrachloroethene	109	3	30.9 - 329		
Tetrachloroethene	109	53	0.5 - 190,000	5	
1,1,1-Trichloroethane	109	20	0.51 - 213	200	
1,1,2-Trichloroethane	109	4	1.6 - 5.1	5	
Trichloroethene	109	50	0.47 - 100,000	5	
Trichlorofluoromethane (CFC 11)	109	2	0.53 - 3.9		
1,1,2-Trichlorotrifluoroethane (CFC 113)	109	21	0.4 - 610	1,200	
Vinyl Chloride	109	15	0.51 - 50.9	0.5	

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 Site Environmental Report, July 1996, pg. 6-7, 6-8.

To get a better understanding of the risk associated with removed trees, the Lab estimated the maximum public dose from tritium from the release and use of the wood. The assessment considered several plausible scenarios, including the one selected for the removed trees: converting the tree wood to paper products. Using the range of tritium results described above, an average tritium concentration of 10,000 pCi/L of tree water was assumed. The length of exposure was dependent upon the quantity of trees that the Lab expected to remove. The maximum dose to a pulp mill worker from inhaling and being immersed in tree water vapors produced by the removed trees was estimated at 0.005 millirem, which is below regulatory standards. As a result of these estimates, all trees were authorized for removal with the exception of a grove directly adjacent to the NTLF stack.

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¹⁰ Plant transpiration studies have been conducted as research, in contrast to compliance-related monitoring, at the Laboratory. In these experiments, tritium was measured in transpired water, water released from plants to the atmosphere. The transpired water data were collected as part of an experimental technique developed by a researcher and a graduate student. Maximum tritium concentrations of close to 200,000 pCi/L were found. These results were not collected by Lab personnel involved with compliance monitoring. To date, no peer-reviewed publication or formal report of this research has been provided to the Berkeley Lab by the researchers. Because the Lab was requested to provide this raw data during a Berkeley City Council meeting on November 11, 1996, the Lab looked for the data from the transpired water vapor measurements, and upon finding that the data had been analyzed using Lab analytical facilities, sent it to the City Council.

2. Nonradiological Results

a. Groundwater

Groundwater monitoring well sampling results for metals, hydrocarbon analytes, and total petroleum hydrocarbons in 1995 are reported in Tables IV-J-5 through IV-J-7, below. As shown in the tables, contaminants at concentrations in excess of regulatory agency limits were detected in some samples. These included three metals and 14 aromatic, non-halogenated, or halogenated hydrocarbons. The results for 1996 varied in comparison with 1995 results: maximum concentrations of some analytes were greater in 1996 than 1995, while concentrations of other analytes were less. Contaminants in concentrations in excess of regulatory agency limits in 1996 included two metals and 13 aromatic, non-halogenated, or halogenated hydrocarbons.

Table IV-J-5
Groundwater Sampling Results: Metals (1995)

Metal	Number of Wells	Number of Samples	Number of Samples Detected	Range of Concentrations (µg/L)	California Maximum Contaminant Level for Drinking Water (µg/L)
Antimony	62	83	2	4 - 11	6
Arsenic	62	83	45	2 - 120	50
Barium	62	83	36	10 - 360	1,000
Beryllium	62	83	1	2	4
Cadmium	62	83	1	6	5
Chromium	62	83	11	10 - 40	50
Cobalt	62	83	2	9 - 40	NS*
Copper	62	83	3	11 - 17	1,000
Lead	62	83	0	—	15***
Mercury	62	83	1	0.2	2
Molybdenum	62	83	29	10 - 360	NS*
Nickel	62	83	2	10 - 40	100
Selenium	62	83	19	2.4 - 62	50
Silver	62	83	0	—	100**
Titanium	62	83	0	—	2
Vanadium	62	83	13	6 - 82	NS*
Zinc	62	83	10	10 - 73	5,000**

* NS: Not Specified

** Secondary MCL

*** Action Level

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 Site Environmental Report, July 1996, pg. 6-6.

Table IV-J-6
Groundwater Sampling Results: Hydrocarbon Analytes (1995)

Method 8260 Analytes	Number of Wells Sampled	Number of Samples	Range Concentrations (µg/L)	of Federal California Contaminant Level (µg/L)	or Max. (MCL)
<u>Aromatic or Non-halogenated Hydrocarbons</u>					
Benzene	109	8	0.63 - 76	1	
Bromobenzene	109	1	1.1		
sec-Butylbenzene	109	3	0.63 - 3.1		
ter-Butylbenzene	109	2	1.2 - 1.6		
Isopropylbenzene	109	3	0.51 - 2.1		
Naphthalene	109	4	0.57 - 26		
n-Propylbenzene	109	2	1 - 3		
Toluene	109	9	0.55 - 32.3	150	
1,2,4-Trichlorobenzene	109	1	0.76	70	
1,2,3-Trichloropropane	109	1	1.1		
1,2,4-Trimethylbenzene	109	2	1.7 - 18		
1,3,5-Trimethylbenzene	109	3	0.82 - 11		
Xylenes, total	109	1	1	1,750	
<u>Halogenated Hydrocarbons</u>					
Bromodichloromethane	109	5	0.94 - 6.6	100	
Carbon Tetrachloride	109	19	0.53 - 8,100	0.5	
Chloroethane	109	1	0.7 - 0.96		
Chloroform	109	39	0.52 - 108	100	
Dibromomethane	109	1	4.5		
Dichlorodifluoroethane (Freon 12)	109	1	0.66		
1,1-Dichloroethane	109	32	0.51 - 21.5	5	
1,2-Dichloroethane	109	4	0.53 - 4.6	0.5	
1,1-Dichloroethene	109	36	0.51 - 525	6	
cis-1,2-Dichloroethene	109	33	0.5 - 556	6	
trans-1,2-Dichloroethene	109	15	0.56 - 75	10	
1,3-Dichloropropane	109	1	3.7		
1,1-Dichloropropene	109	1	3.2		

Table IV-J-6 (continued)

Method 8260 Analytes	Number of Wells Sampled	Number of Samples	Range Concentrations (µg/L)	of Federal California Contaminant (MCL) (µg/L)	or Max. Level
<u>Halogenated (Continued)</u>					
cis-1,3-Dichloropropene	109	1	4.4		
trans-1,3-Dichloropropene	109	1	4		
Methylene Chloride	109	2	1 - 11.5	5	
1,1,1,2-Tetrachloroethene	109	3	30.9 - 329		
Tetrachloroethene	109	53	0.5 - 190,000	5	
1,1,1-Trichloroethane	109	20	0.51 - 213	200	
1,1,2-Trichloroethane	109	4	1.6 - 5.1	5	
Trichloroethene	109	50	0.47 - 100,000	5	
Trichlorofluoromethane (CFC 11)	109	2	0.53 - 3.9		
1,1,2-Trichlorotrifluoroethane (CFC 113)	109	21	0.4 - 610	1,200	
Vinyl Chloride	109	15	0.51 - 50.9	0.5	

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 Site Environmental Report, July 1996, pg. 6-7, 6-8.

Table IV-J-7

Groundwater Sampling: Total Petroleum Hydrocarbon Concentrations at Underground Storage Tank (UST) Sites (1995)

UST Location	Status	Previous Contents	TPH Detected in 1995 (µg/L)
Building 7E	Removed	Fuel	TPH-D* = 390 to 1,400,000
Building 76	Removed	Diesel	TPH-D* = 100 to 1100
Building 76	Removed	Gasoline	TPH-G** = 70
Building 74	Removed	Diesel	TPH-D* = 240 to 530
Building 62	Removed	Diesel	TPH-D* = 58 to 400
Building 88	Abandoned	Diesel	TPH-D* = 78
Building 46A	Abandoned	Gasoline	Trace oil range hydrocarbon

* TPH-D = Total Petroleum Hydrocarbons quantified as diesel range hydrocarbons

** TPH-G = Total Petroleum Hydrocarbons quantified as gasoline range hydrocarbons

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 *Site Environmental Report*, July 1996, pg. 6-13.

b. Sanitary Sewer

The 1992 SEIR reported that there were a total of seven violations of EBMUD wastewater discharge limits for total chlorinated hydrocarbons at the Hearst and Strawberry Monitoring Stations in 1990 (SEIR, pg. IV-J-6). In 1995, all measurements were within EBMUD permit limits, with the exception of chlorinated hydrocarbons: several samples from the Strawberry Station contained methylene chloride in excess of the permitted discharge limit. Sampling results for 1995 are presented in Table IV-J-8, below. In 1996, all measurements were within permit limits.

Table IV-J-8

Sanitary Sewer Sampling Results: Toxic Compounds/Metals (1995)

Analyte	<u>Average Concentration (mg/L)</u>		
	Hearst Station	Strawberry Station	EBMUD Wastewater Discharge Limit
Cadmium	0.005	0.005	1.0
Chromium	0.012	0.015	2.0
Copper	0.061	0.07	5.0
Lead	0.0085	0.0165	2.0
Mercury	0.0005	0.0005	0.05
Nickel	0.05	0.05	5.0
Silver	0.01	0.082	1.0
Zinc	0.335	0.67	5.0
Chlorinated hydrocarbons	0.065	0.515	0.5

mg/L = milligrams/Liter

Source: Berkeley Lab EH&S Division.

c. Stormwater Monitoring

As described above, the Lab collects and analyzes stormwater samples. The Lab's permit does not set regulatory limits upon substances contained in stormwater discharges. Results from 1995 stormwater sampling for metals are presented in Table IV-J-9, below. The results for 1996 varied in comparison with 1995 results: the concentrations of some metals were greater at some locations, while other concentrations were less.

Table IV-J-9
Stormwater Monitoring Results: Metals (1995)

<u>Average Concentration (mg/L)</u>			
Analyte	STW 2	STW 3	STW 4
Antimony	ND	ND	ND
Arsenic	0.0045	ND	0.0054
Barium	0.06	ND	ND
Beryllium	ND	ND	ND
Cadmium	ND	ND	ND
Chromium	0.024	ND	0.021
Cobalt	ND	ND	ND
Copper	0.038	0.017	0.033
Lead	0.022	0.017	0.025
Mercury	ND	ND	ND
Molybdenum	ND	ND	ND
Nickel	ND	ND	ND
Selenium	ND	ND	ND
Silver	ND	ND	ND
Thallium	ND	ND	ND
Vanadium	ND	ND	ND
Zinc	0.018	0.073	0.244

mg/L = milligrams/Liter

ND = not detected

Source: Ernest Orlando Lawrence Berkeley National Laboratory, *1995 Site Environmental Report*, July 1996, pg. 5-9.

d. Soil and Sediment

Results from 1995 sampling of soil and sediment for metals and pH are presented in Table IV-J-10, below. All samples were below regulatory limits. All samples were also below regulatory limits in 1996.

Table IV-J-10
Soil and Sediment Sampling: Nonradiological Results (1995)

Sample Location								
Analyte	Soils			Sediment		MDA*	Regulatory Criteria (TTL C**)	Units
	B13C	B50	B69	Chicken Creek	N. Fork Strawberry Creek			
Antimony	ND***	ND***	ND***	ND***	ND***	5	500	mg/kg
Arsenic	7.5	7.2	6.3	2.6	5.1	0.5	500	mg/kg
Barium	131	149	114	117	30	0.5	10,000	mg/kg
Beryllium	ND***	0.52	ND***	ND***	ND***	0.5	75	mg/kg
Cadmium	0.63	0.75	4.1	0.75	0.93	0.5	100	mg/kg
Chromium	27	34	70	46	57	0.5	2,500	mg/kg
Cobalt	7.8	11	15	8.8	3.9	2	8,000	mg/kg
Copper	25	39	48	30	33	0.5	2,500	mg/kg
Lead	64	17	42	61	283	2	1,000	mg/kg
Mercury	ND***	ND***	ND***	ND***	ND***	0.2	20	mg/kg
Molybdenum	ND***	ND***	ND***	ND***	ND***	2	3,500	mg/kg
Nickel	27	36	80	44	15	2	2,000	mg/kg
Selenium	ND***	ND***	ND***	ND***	ND***	0.5	100	mg/kg
Silver	ND***	ND***	ND***	1.5	ND***	1	500	mg/kg
Thallium	ND***	ND***	ND***	ND***	ND***	0.5	700	mg/kg
Vanadium	34	37	50	35	23	0.5	2,400	mg/kg
Zinc	96	86	340	179	308	2	5,000	mg/kg
pH	4.9	6.15	5.21	7.85	7.91	0.01	2 - 12.5	S.U.

* Minimum Detectable Amount

** Total Threshold Limit Concentration

*** Non-detectable

Source: Ernest Orlando Lawrence Berkeley National Laboratory, 1995 Site Environmental Report, July 1996, pg. 8-3.

K. IMPACTS

1. Hazardous Materials Handling

a. Impact Analysis, Receiving Facility

A separate CEQA review was undertaken in 1994 for the lease and use of the main receiving facility by the Lab. The project was determined to be categorically exempt because the storage of materials would not pose significant environment impacts, including human health risks. In addition, traffic-related impacts would be minimal, as local traffic in the immediate vicinity of the facility would be increased by only 0.6 percent. In addition, this facility is located closer to the Lab than the former Emeryville facility, thereby reducing travel distance and decreasing the amount of vehicle-related air emissions.

b. Impact Analysis, Chemical and Radioactive Materials Inventories

The 1992 SEIR projected that chemical and radioactive materials use at the Lab would increase during the project period (1992 to 1997) in proportion to the increase in square footage of research space associated with the proposed project. This increase was projected to be 8.5 percent (SEIR, pg. IV-K-1).

Table IV-K-1, column 1 shows current hazardous materials volumes and radioactive materials activity levels; column 2 shows projections for 1997 derived from the 1992 SEIR; and column 3 shows projected inventories to buildout in 20xx.¹¹ (This Table shows hazardous and radioactive materials levels, and does not include the changes in waste generation volumes. Waste generation volumes are shown in Table IV-K-2.) Current inventories of hazardous solids, liquids, and gases are much less than those forecast by the SEIR for 1997. This decline is due to such factors as a site-wide reduction of the Lab's chemical inventory that took place after certification of the 1992 SEIR; Lab waste minimization efforts; discontinuance of several programs which used large quantities of chemicals; and shipment of many curies in radioactive sealed sources to an off-site vendor for recycling (see Section IV.B.2, Chemical and Radioactive Materials Inventories).

This Addendum uses the same methodology used in the 1992 SEIR, and assumes that at a maximum, hazardous materials inventories associated with all Lab activities during the proposed contract extension period will increase above current levels in proportion to the increase in square footage of research space at the Lab as provided for in the Lab's LRDP. This increase is estimated to be 18 percent above current levels to buildout in 20xx.

As was the case with air emissions, discussed in Section III-J: Air Quality, the hazardous materials inventory figures presented in column 3 provide projections for inventories from all Lab activities at buildout. However, most of the activities at the Lab requiring hazardous materials already existed at the time of the 1987 LRDP and the 1987 LRDP EIR. Actual inventories at buildout related to this contract extension project, i.e., inventories related to continued implementation of the LRDP, would be substantially less.

¹¹ It should be noted that a large proportion of the hazardous materials used at the Lab are of the type commonly used in non-laboratory settings. For example, over half of the hazardous liquids in inventory on June 30, 1997 consisted of diesel fuel or gasoline.

Table IV-K-1
Hazardous Materials Volumes and Radioactive Materials Activity Levels
(does not include waste volumes; see Table IV-K-2)

	Current Volume^{a,b}	Derived SEIR Projection (1997)^c	Projected Volume (20xx)^d
<i>Hazardous materials</i>			
Solid (pounds)	21,007	176,000	24,788
Liquid (gallons)	86,037	187,050	101,524
Gas (cu. ft.)	389,387	4,738,750	459,477
<i>Radioactive materials</i>			
Sealed sources (curies)	7,090	21,250	8,366
Other (curies)	10,075	10,875	11,889

Sources and notes:

a. Hazardous materials: LBNL EH&S Division data as of June 30, 1997.

b. Radioactive materials: "E.O. Lawrence Berkeley National Laboratory Radioisotope Inventory", memorandum to DOE Berkeley Site Office from James Floyd, Radiological Control Manager, Lawrence Berkeley National Laboratory, June 28, 1996.

c. Derived from 1992 SEIR, pg. IV-K-2.

d. Column 1 plus 18 percent.

The amounts of hazardous solids, liquids and gases, and curies in sealed sources projected to be present at the Lab to buildout are below the amounts projected for 1997 in the 1992 SEIR. Therefore, the associated potential impacts that could result from the presence of hazardous materials to buildout in 20xx would be less than the impacts anticipated in the SEIR for 1997. Development of the Lab to buildout thus would not result in new significant impacts in this area, or make substantially more severe previously identified significant impacts.

An increase of about 9 percent over the derived 1992 SEIR forecast for 1997 is projected to buildout for curies in radioactive materials other than in sealed sources. The 1992 SEIR stated that continued UC operation of the Lab, including proposed increases in laboratory and facility space, may result in impacts from the increased use of hazardous materials in research, facility construction, and facility maintenance activities (Impact IV-K-1). The impact of this increase would be less than significant through compliance with applicable regulatory requirements, which is part of the project for CEQA purposes, and implementation of the existing SEIR Mitigation Measure IV-K-1 (preparation of an annual self-assessment summary report summarizing environmental health and safety program activities and identifying areas where the Lab is not in compliance with laws and regulations governing hazardous materials, hazardous waste, hazardous materials transportation, regulated building components, worker safety, emergency response, and remediation activities). The Lab has implemented and will continue to carry out this mitigation measure, and the increase associated with the proposed project in the number of curies in radioactive materials other than sealed sources would not result in substantial new environmental impacts or a substantial increase in the severity of previously identified impacts.

c. **Impact Analysis, Safety Documentation**

The preparation of additional Safety Analysis Documents and a Risk Management Prevention Plan does not result in new significant impacts, or make substantially more severe previously identified significant impacts because it enhances Lab capabilities to manage its operations in a safe manner.

2. **Disposal of Hazardous Materials**

a. **Impact Analysis, Regulatory Setting**

The change in regulatory authority brought about by the formation of Certified Uniform Program Agency agreements does not create any new significant impacts, or make more severe previously identified significant impacts. As is the case for all applicable environmental regulatory requirements, conformance with the changed regulatory setting is part of the project.

b. **Impact Analysis, Berkeley Lab Activities**

Hazardous Waste Disposal

The 1992 SEIR projected that waste volumes generated at the Lab would increase during the project period (1992 to 1997) in proportion to the increase in square footage of research space associated with the proposed project. This increase was projected to be 8.5 percent (SEIR, pg. IV-K-1).

The 1992 SEIR listed an erroneous figure (3,538,200 curies) for the amount of curies in radioactive waste generated in 1990. The actual figure was approximately 3,538 curies. The source of the SEIR's error was a failure to convert millicuries to curies (1 curie = 1,000 millicuries). This resulted in a further error in the SEIR's projection for 1992 to 1997 (3,000 curies) for this type of waste. Using the 8.5 percent growth rate consistent with the SEIR analysis, the adjusted SEIR figure for the project change from 1992 to 1997 should have been 300 curies.

Table IV-K-2, column 1 shows current hazardous waste volumes and radioactive/mixed waste activity levels; column 2 shows projections for 1997 derived from the 1992 SEIR; and column 3 shows projected waste amounts to buildout in 20xx. Current waste volumes and activity levels are less than those forecast by the SEIR for 1997. This decline is due largely to waste reduction/minimization efforts at the Lab (see Section IV.D, Hazardous Waste Minimization).

This Addendum uses the same methodology used in the 1992 SEIR, and assumes that at a maximum, waste volume generated by all Lab activities during the proposed contract extension period will increase in proportion to the increase in square footage of research space at the Lab as provided for in the Lab's LRDP. This increase is estimated to be 18 percent above current levels to buildout in 20xx.¹²

¹² The 1992 SEIR did not report nonroutine hazardous waste generation. Nonroutine waste includes hazardous waste from site restoration and site renovation activities, as well as wastes regulated under the Toxic Substances Control Act, such as polychlorinated biphenyls (PCBs). Nonroutine waste has no set pattern of increase or decrease, and cannot be forecast based on the growth in laboratory space. Since 1990, nonroutine waste has varied from a low of 14 percent to a high of 71 percent of total hazardous waste. In 1996, nonroutine waste totalled 166,305 pounds of solids and 852 gallons of liquids -- about 63 percent of total hazardous waste.

Table IV-K-2
Hazardous Waste Generation Volumes and Radioactive Waste Activity Levels

	Current Volume ^{a,b}	Derived SEIR Projection (1997) ^c	Projected Volume (20xx) ^d
<i>Hazardous waste</i>			
Solid (pounds)	28,596	116,000	33,743
Liquid (gallons)	10,754	14,500	12,690
<i>Radioactive waste</i> (Curies)	3,782	3,838	4,463

Sources and notes:

a. Hazardous waste: LBNL EH&S Division.

b. Radioactive waste (includes curies in mixed waste): *Low-Level Radioactive Waste and Mixed Waste Reduction Plan*, April 1997.

c. Derived from 1992 SEIR, pg. IV-K-2. See text regarding an error by the SEIR in reporting curies in radioactive waste.

d. Column 1 plus 18 percent.

The 1992 SEIR did not estimate 1997 volumes of medical waste. Based upon the generation of 41,257 pounds of medical waste in 1996, and projecting an increase of 18 percent, this Addendum projects the volume of medical waste to buildout in 20xx to be 48,683 pounds.

As was the case with hazardous materials inventories, the hazardous and radioactive waste generation figures presented in column 3 of Table IV-K-2, and the medical waste generation figures presented above, provide waste generation projections for Lab activities at buildout. However, most of the activities at the Lab generating waste already existed at the time of the 1987 LRDP and the 1987 LRDP EIR. Actual waste generation at buildout related to this contract extension project, i.e., generation related to continued implementation of the LRDP, would be substantially less.

The amounts of hazardous solid and liquid waste projected to be present at the Lab to buildout are below the amounts projected for 1997 in the 1992 SEIR. Therefore, the associated potential impacts that could result from the generation of these wastes to buildout in 20xx would be less than the impacts anticipated in the SEIR for 1997. Development of the Lab to buildout thus would not result in new significant impacts in this area, or make substantially more severe previously identified significant impacts.

An increase of about 16 percent over the derived 1992 SEIR forecast for 1997 is projected to buildout for curies in radioactive/mixed waste, and medical waste volumes are projected to increase. The SEIR stated that continued operation of the Lab, including proposed increases in laboratory and facility space, is expected to result in the increased generation and discharge of hazardous wastes, including offsite disposal of hazardous, radioactive and medical wastes, from research, facility construction, and facility maintenance activities (Impact IV-K-2). Impacts from this increase would be less than significant through

compliance with applicable regulatory requirements, which is part of the project for CEQA purposes, and implementation of the existing SEIR Mitigation Measures IV-K-2a (prior to shipping any hazardous materials to any hazardous waste treatment, storage or disposal facility, the Lab will confirm that the facility is licensed to receive the type of waste the Lab is proposing to ship to that facility) and IV-K-2b (the Lab will continue its waste minimization program and strive to identify new and innovative methods to minimize hazardous waste generated by Lab activities). The Lab has implemented and will continue to carry out these mitigation measures.

In addition, the 1992 SEIR addressed potential human health impacts from air emissions generated during normal operations at Berkeley Lab. The analysis, which included emissions from waste management activities, has been updated in this Addendum and is presented in Section III.J: Air Quality. Also, as described above in Section IV.B.3. (Safety Documentation), a Safety Analysis Document was prepared for the Hazardous Waste Handling Facility, which concluded that the consequences of accidents would be below applicable regulatory limits.

For these reasons, the increase in waste generation volumes/activity levels associated with the project would not result in substantial new environmental impacts or a substantial increase in the severity of previously identified impacts.

Wastewater

Compliance with applicable regulatory requirements is part of the project for CEQA purposes (SEIR, pg. IV-K-3). The reactivation and upgrading of the FTU at Building 77 was performed in order to improve the Lab's pretreatment of discharges to the sanitary sewer system, and Lab FTUs were permitted as required under state regulations. Therefore these changes do not result in new significant impacts, or make substantially more severe previously identified significant impacts.

Stormwater

Compliance with applicable regulatory requirements is part of the project for CEQA purposes (SEIR, pg. IV-K-3). Conformance with the applicable stormwater monitoring general permit is required under state regulations, and does not result in new significant impacts, or make substantially more severe previously identified significant impacts.

c. Impact Analysis, Management and Compliance

Hazardous Waste Management

The waste management permitting violations noted by DTSC have been corrected by the Lab.

Radioactive and Mixed Waste Management

Storage of mixed waste at the Lab until offsite facilities are available does not create new significant impacts, or make substantially more severe previously identified significant impacts. The 1992 SEIR stated that because there were no treatment or disposal options, the Lab would have to continue to store mixed wastes onsite, and that the Lab would promptly arrange for off-site disposal when an authorized disposal facility existed (SEIR, pg. IV-C-15). On-site storage of mixed waste is in accordance with regulatory requirements. Mixed waste will be sent to offsite facilities as approved by DOE and DTSC. The Lab is taking corrective actions in response to the reviews described above of

its mixed waste practices by DOE, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory.

Similarly, storage of radioactive waste at the Lab until offsite facilities are available does not create new significant impacts, or make substantially more severe previously identified significant impacts. This waste is stored in accordance with regulatory requirements, and the Lab is taking corrective actions in response to the above reviews of its radioactive waste practices.

Transportation of mixed waste to facilities specified by the Site Treatment Plan and other facilities approved by DTSC and DOE does not create new significant impacts, or make substantially more severe previously identified significant impacts because the 1992 SEIR addressed the transportation of waste to offsite facilities, and because the applicable mitigation measure has been and will continue to be implemented. The SEIR stated that hazardous wastes are transported from the Lab by licensed hazardous waste haulers over surface streets during ordinary business hours (SEIR, pg. IV-E-1). Transportation impacts of the project were considered to be less than significant (SEIR, pg. I-35). These impacts would be further reduced by implementation of mitigation measure IV-K-3 (the Lab will require hazardous waste haulers to provide evidence that they are appropriately licensed to transport the type of wastes being shipped from the Lab). The Lab ships waste, including mixed waste, in accordance with this mitigation measure.

In addition, the potential environmental impacts at off-site DOE facilities, such as Oak Ridge and INEL, from the management of mixed waste generated by DOE facilities is addressed in the Department of Energy's *Waste Management Programmatic Environmental Impacts Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste (DOE/EIS-0200-F)* (May 1997), and in the site-specific documents for those facilities prepared under the National Environmental Policy Act.

The 1992 SEIR addressed potential human health impacts from air emissions generated during normal operations at Berkeley Lab. The analysis, which includes emissions from waste management at the Lab's hazardous waste handling facility, has been updated in this Addendum and is presented in Section III.J: Air Quality.

Wastewater

The wastewater discharge violations noted by EBMUD have been corrected by the Lab.

Construction of Replacement Hazardous Waste Handling Facility

Changes in the operation of the Lab's hazardous waste facility are being made to allow Berkeley Lab to continue to handle and store hazardous, radioactive, and mixed wastes in an environmentally safe manner that is in conformance with regulatory requirements. All changes have undergone separate environmental reviews under CEQA. These analyses show that operations of the hazardous waste facility will not result in new significant impacts or in substantially more severe significant effects than shown in the 1992 SEIR.

Discharge to Surface Water

The causes of the discharge of fire suppression foam have been corrected by the Lab.

3. Hazardous Waste Minimization

Impact Analysis, Regulatory Setting and Berkeley Lab Activities

The 1992 SEIR identified waste minimization as a mitigation measure (IV-K-2b) to reduce potentially significant impacts from increased generation and discharge of hazardous, radioactive, and medical wastes to less than significant. The changes in the regulatory setting and in Lab waste minimization practices that have occurred do not result in new significant impacts, or make substantially more severe previously identified significant impacts. Each of the changes has increased the stringency of waste minimization at the Lab or given guidance to the Lab in implementing waste minimization. The changes thus have made this mitigation measure more effective in reducing potentially significant impacts.

4. Hazardous Materials Transportation

Impact Analysis, Transportation

The use of new lease space at the Seventh Street facility in Berkeley lessens potential transportation-related impacts, because this facility is closer to the Lab than the former Emeryville facility, thereby reducing travel distance. Transport of radioactive materials is undertaken in accordance with Department of Transportation regulations.

5. Regulated Building Components

Impact Analysis, Regulated Building Components

The 1992 SEIR stated that continued UC operation of the Lab, including proposed increases in laboratory and facility space, would result in the upgrading or removal of regulated building components (Impact IV-K-4). The upgrading or removal of these components was considered to be a less than significant impact because the activities would be performed in compliance with comprehensive environmental regulations, and would result in reductions in the likelihood of potential harm to human health (SEIR, pg. IV-K-6).

The removal of the additional transformers discovered at the Lab did not result in new significant impacts, or make substantially more severe previously identified significant impacts, because these actions were instituted by the Lab in response to regulatory requirements that reduce environmental risk. The Lab will continue to implement the practices described in the 1992 SEIR related to regulated building components, including complying with applicable regulations.

6 Worker Safety and Health

a. Impact Analysis, Regulatory Setting

Compliance with applicable regulatory requirements is part of the project for CEQA purposes (SEIR, pg. IV-K-3). Under the Work Smart Standards program described in Section IV.A above, the Lab will continue to comply with all legal requirements, as well as other standards that are determined to be appropriate. The Work Smart Standards program will not result in new significant environmental effects, or represent a substantial increase in the severity of previously identified significant effects.

b. **Impact Analysis, Berkeley Lab Activities**

Reorganization of the Environment, Health, and Safety Division and associated staffing changes do not present new significant impacts, or make substantially more severe previously identified significant impacts. Staffing reductions are obtained through greater efficiencies and do not affect essential activities, including implementation of 1992 SEIR mitigation measures.

7. Emergency Preparedness and Response

a. **Impact Analysis, Response to Hazardous Materials Incidents**

The change of emergency response contractors does not result in new significant impacts, or make substantially more severe previously identified significant impacts because emergency response functions have been transferred to a different entity, without a change in capability to respond to emergencies.

b. **Impact Analysis, Facility-Wide Emergency Coordination**

The delegation and reassignment of emergency response responsibility does not result in new significant impacts, or make substantially more severe previously identified significant impacts because emergency response functions have been transferred to a different Lab entity, without a change in the Lab's emergency response capability. See Section III.J for a discussion of Fire Department staffing/equipment changes.

c. **Impact Analysis, Emergency Preparedness Documentation**

The issuance of an additional emergency preparedness document does not result in new significant impacts, or make substantially more severe previously identified significant impacts, because it enhances Lab emergency response capabilities.

8. Remediation Activities

a. **Impact Analysis, Regulatory Setting**

Implementation of the Lab's RCRA Corrective Action Program was considered a part of the project in the 1992 SEIR, and the Lab's continuation of this program in a manner consistent with regulatory requirements and agreements continues to reduce the potential environmental and human health risks related to the presence of contaminants in soil and groundwater. Continuation of this program does not result in new significant impacts, or make substantially more severe previously identified significant impacts.

b. **Impact Analysis, Berkeley Lab Activities**

Development of an interagency agreement that sets out agency responsibilities with respect to the Lab's RCRA Corrective Action Program is an administrative change with no potential to impact the environment.

9. Environmental Monitoring

Impact Analysis, Environmental Monitoring

In 1995 and 1996, the Lab's monitoring programs found radiological and non-radiological contaminants in surface and subsurface samples. The presence of these contaminants does

not result in new significant impacts, or make substantially more severe previously identified impacts, because contamination was acknowledged in the 1992 SEIR, the relevant mitigation measures listed by the SEIR continue to be implemented, and the Lab continues to implement environmental compliance measures and to remediate contamination.

The 1992 SEIR described contamination at the site in several sections, including Remediation Activities (IV-I) and Environmental Monitoring (IV-J). The SEIR stated that continued UC operation of the Lab, including proposed increases in laboratory and facility space, may result in impacts from the increased use of hazardous materials in research, facility construction, and facility maintenance activities (Impact IV-K-1). This was considered to be a significant impact that would be reduced to a less than significant level because the Lab would continue to ensure implementation of environmental compliance programs. In addition, the Lab would implement Mitigation Measure IV-K-1, which requires the Lab to prepare an annual self-assessment summary report that would include identification of areas where the Lab is not in compliance with Laws and regulations governing hazardous materials. The Lab continues to implement this mitigation measure. As described in Section IV-I: Remediation Activities, remediation measures are undertaken by the Lab in cooperation with regulatory agencies to clean up contamination as appropriate.

10. Summary Conclusion

Project impacts on hazardous materials would be similar to those identified in the 1987 LRDP EIR and 1992 SEIR. No substantial changes in circumstances or in Berkeley Lab operations and no new information of substantial importance would involve new significant impacts or a substantial change in the severity of previously identified significant impacts related to hazardous materials. No further analysis of hazardous materials effects is required.

V. CEQA CONSIDERATIONS

Growth Inducing Impacts

Cumulative Impacts

V. CEQA CONSIDERATIONS

A. GROWTH-INDUCING IMPACTS

The nature of research and other activities conducted at Berkeley Lab currently occurring and projected to continue through buildout has not changed since preparation of the 1992 SEIR. The existing population and space development is within levels projected for 1997 in the SEIR. In addition, there have been no activities that would trigger the following significance criteria for growth-inducing impacts: extension of urban services or infrastructure into a previously unserved area; extension of a transportation corridor into an area that may be subsequently developed; or removal of a major obstacle to development and growth. Growth of the population and development of additional space as projected through buildout would also not meet these criteria or result in additional growth-inducing impacts beyond those previously identified in the 1992 SEIR. Consequently, the growth analysis performed in the SEIR is still valid.

B. CUMULATIVE IMPACTS

1. Geology, Soils, and Seismicity

The 1992 SEIR stated that cumulative development at and in the vicinity of Berkeley Lab is not expected to result in significant adverse impacts upon people or property as a result of geologic hazards.

There are no proposed project changes, changed circumstances, or new information which might involve new significant impacts or make a substantial change in previously identified significant impacts. Continued development of the Lab through buildout would be within the projections contained in the 1987 Long Range Development Plan (LRDP), the impacts of which were examined in the 1987 LRDP EIR and 1992 SEIR, and therefore no new cumulative impacts pertaining to geology, soils, and seismicity would result.

Revisions to the California Building Code (CBC) since preparation of the 1992 SEIR have resulted in more stringent requirements for certain types of building design. Cumulative development of replacement facilities in accordance with more stringent building codes was identified in the SEIR as a cumulative beneficial impact. The CBC has been further strengthened since 1992 and therefore the beneficial cumulative impact identified in the SEIR would be even greater with the continued construction of replacement facilities at Berkeley Lab.

2. Hydrology and Water Quality

The 1992 SEIR stated that cumulative development at and in the vicinity of Berkeley Lab is not expected to have significant adverse hydrologic impacts within the Strawberry Creek watershed. It stated that implementation of adopted mitigation measures and compliance with all applicable laws will ensure that impacts pertaining to water quality, potential for erosion and sedimentation of drainage facilities, and the quality of Strawberry Creek remain less than significant. The SEIR also stated that cumulative development in the City of Berkeley may adversely impact water quality, potential for erosion, and sedimentation of drainage facilities, but that potential impacts can be reduced if the agencies responsible for reviewing and approving new development projects adopt feasible mitigation measures to control surface water runoff, prevent erosion, and maintain adequate drainage facilities.

The analysis performed in the 1992 SEIR included development and population growth envisioned in the 1987 LRDP. Current Berkeley Lab development as well as development projected through 20xx are within the projections contained in the LRDP. Consequently, the cumulative analysis performed in the SEIR is still applicable and no new cumulative impacts have been or will be created by continued operation of Berkeley Lab.

3. Biological Resources

As described Section III.D, special-status plant or wildlife species have not been found on Berkeley Lab's main site or in the added perimeter lands, including the former Poultry Husbandry Area. Although a small portion of a slope of Blackberry Canyon has been identified as habitat for a species of Harvestman Spider (*Microcina leei*) that the U.S. Fish and Wildlife Service (USFWS) may in the future propose for inclusion as a federally-listed species, the spider does not currently possess special status listing with either the USFWS or the California Department of Fish and Game (CDFG). The Lab has mapped the identified location of the spider and will avoid conducting vegetation management activities in this area. In addition to the *Microcina* species, potential habitat for a protected species, the Alameda whipsnake, has been identified in a portion of the added perimeter lands and actions are underway to improve the habitat in ways recommended to encourage whipsnake colonization. However, to date, no whipsnakes have been observed in this area.

Thus, as stated in the 1992 SEIR, while cumulative development of the hillside area surrounding Berkeley Lab, as well as development elsewhere in the City of Berkeley and sub-regional areas, may result in a reduction of habitat appropriate to endangered or threatened species, the University's continued operation of Berkeley Lab will not cause or contribute to any of these impacts. Accordingly, no further analysis is required for potential cumulative impacts for purposes of this Addendum.

4. Historical and Archaeological Resources

The 1992 SEIR stated that impacts of cumulative development upon archaeological or historical resources at and in the vicinity of Berkeley Lab are not expected to be significant. The 1992 SEIR considered impacts from implementation of the 1987 LRDP; the cumulative analysis presented in the SEIR is still applicable to the continued operation of the Lab and the development projected through buildout in 20xx.

5. Visual Quality

The 1992 SEIR stated that cumulative development in the Berkeley Lab/UCB hillside area is not expected to have a significant impact upon visual quality. The SEIR further stated that cumulative development in the hillside area as a whole has the potential to degrade the existing visual character of the hills, but because the Lab's 1987 LRDP proposed only minimal development of the hill areas, and implementation of the mitigation measures will safeguard the aesthetic character of the hillside under Lab management, no significant adverse effect on visual quality is expected.

The Lab will continue to develop the main site as anticipated in the 1987 LRDP, and will continue to comply with the design guidelines and mitigations described in the 1987 LRDP and 1992 SEIR. The 70-acres of University perimeter lands that are now managed by Berkeley Lab will be done so in conformance with the Lab's 1987 LRDP and the 1990 UCB LRDP. Vegetation management activities that will take place on the main site and perimeter lands as part of the Landscape Maintenance Program will be in conformance with existing visual quality guidelines, objectives and mitigations.

6. Land Use

The 1992 SEIR stated that no significant impacts upon land uses at and in the vicinity of Berkeley Lab would result from cumulative development. Compliance with the mitigation measure identified in the Land Use chapter of the SEIR was expected to minimize any potential land use conflicts between the Lab and its neighbors. This mitigation required buildings proposed for development at Berkeley Lab to follow the design guidelines contained in the Lab's 1987 LRDP.

The current and projected (through buildout) development at Berkeley Lab was previously addressed and analyzed in the 1992 SEIR except for several small projects that were not addressed in the SEIR. These include a 0.5-acre parking area, a 0.1-acre parking area, a storage and construction laydown area encompassing 0.7 acre, a 1-module trailer site encompassing 0.1 acre, and a 1-module building site encompassing 0.1 acre. This development would occupy approximately 1.5 acres of space, half of which has been previously disturbed. Implementation of these small projects would follow the guidelines specified in the LRDPs for the Lab and UCB, and would include relevant mitigation measures identified in the 1987 LRDP EIR and 1992 SEIR. These project would not result in any new significant impacts. For these reasons, continued development and operation of Berkeley Lab through buildout would not result in any new cumulative land use impacts.

7. Population, Employment, and Housing

The 1992 SEIR stated that no significant impacts upon employment or housing would result from cumulative development at and in the vicinity of Berkeley Lab. This analysis included the population growth projected in the Lab's 1987 LRDP. The projected population growth of the Lab through buildout would be within the projections contained in the LRDP and therefore no new cumulative impacts pertaining to population, employment, and housing would result.

8. Traffic, Circulation, and Parking

The 1992 SEIR identified a deterioration in the levels of service at intersections and road segments in the vicinity of the UCB campus and Berkeley Lab area as a significant cumulative impact, but stated that mitigation commitments set forth in the 1992 SEIR, in the UCB 1990 LRDP EIR, and in the UCB/City Mitigation Monitoring Agreement would reduce cumulative impacts to a less-than-significant level and in fact would result in a net improvement in local traffic and parking conditions. The traffic, circulation, and parking impact analysis presented in the 1992 SEIR included potential impacts from implementation of the 1987 LRDP. The projected increases in traffic generated by the Lab through buildout would be within the projections contained in the LRDP and analyzed in the 1987 LRDP EIR and 1992 SEIR and therefore no new cumulative impacts pertaining to traffic, circulation, and housing would result beyond those already addressed.

9. Air Quality

Cumulative air quality impacts resulting from continued regional growth and development in the San Francisco Bay Area were identified in the 1992 SEIR as significant and unavoidable because implementation of regional emission control measures is not within the jurisdiction of the UC Regents. Because the Bay Area was a non-attainment area for ozone under the federal and State Clean Air Acts (and still is under the State act), any increase in ozone-related emissions was and still is considered significant and unavoidable. Therefore, as determined in the SEIR, any increase in ozone-related emissions would create a significant and unavoidable air quality impact. A Statement of Overriding Considerations

for this unavoidable significant impact was adopted by The Regents in connection with approval of the project and certification of the SEIR in 1992.

The 1992 SEIR assumed that project-related emissions of criteria pollutants through 1997 would increase in proportion to the increase in square footage of research space associated with the continued operation of the Lab from 1992 to 1997, or by 8.5 percent. This Addendum assumes that, at a maximum, criteria pollutant emissions generated by Lab activities through buildout will increase in proportion to the increase in square footage of research space at the Lab between 1997 and buildout, which is estimated to be 18 percent above current levels. As stated above, any increase in ozone-related emissions is considered a significant and unavoidable impact, because the Bay Area is in non-attainment for ozone under the State air quality standards. Therefore, this impact remains significant and unavoidable, as stated in the SEIR. The criteria pollutant emissions associated with the project through buildout, however, would not be substantially more severe than those identified in the 1992 SEIR, because emissions from the project would continue to remain below Bay Area Air Quality Management District threshold criteria.

The 1992 SEIR stated that the Lab will comply with applicable transportation management and emission control measures imposed by the Bay Area Air Quality Management District pursuant to the 1991 Clean Air Plan and the California Clean Air Act; the Lab continues to comply with these measures, which act to reduce the Lab's contribution to regional emissions of criteria air pollutants.

The 1992 SEIR stated that the SEIR project would contribute to cumulative toxic air emissions in the vicinity of the Lab. It concluded that mitigation measures that would serve to minimize project impacts also would serve to reduce the project's contribution to cumulative toxic air contaminant levels. Any regional measures intended to reduce emissions of toxic air contaminants were not within the jurisdiction of the Lab's management to implement, and therefore, the cumulative air quality impacts of toxic air contaminant emission increases due to regional growth and development remained significant for purposes of the SEIR. A Statement of Overriding Considerations for this unavoidable significant impact was adopted by The Regents in connection with approval of the project and certification of the SEIR in 1992.

The same considerations apply to cumulative toxic air emissions to buildout as were described in the SEIR. As stated above, the 1992 SEIR assumed that project-related emissions of criteria pollutants through 1997 would increase in proportion to the increase in square footage of research space associated with the continued operation of the Lab from 1992 to 1997, or by 8.5 percent. This Addendum assumes that, at a maximum, toxic air contaminants generated by Lab activities through buildout will increase in proportion to the increase in square footage of research space at the Lab between 1997 and buildout, which is estimated to be 18 percent above current levels. Because any regional measures intended to reduce emissions of toxic air contaminants are not within the jurisdiction of Berkeley Lab's management to implement, the cumulative air quality impacts of toxic air contaminant increases remain significant and unavoidable, although the Lab continues to apply the mitigation measures listed in the SEIR to reduce project impacts, which serve to reduce the Lab's contribution to cumulative toxic air contaminant levels. The toxic air contaminant emissions associated with the project through buildout would not be not substantially more severe than those identified in the 1992 SEIR however, because emissions from the project would continue to remain below the standards of significance used in the SEIR.

10. Noise

The 1992 SEIR stated that noise impacts resulting from cumulative development at or in the vicinity of Berkeley Lab were not expected to be significant. Because no new land uses are proposed that would substantially increase existing noise levels and because existing noise levels are comparable to those reported in the SEIR, continued operation of Berkeley Lab would not result in any new cumulative off-site noise impacts or make more severe previously identified cumulative impacts.

11. Public Services

The 1992 SEIR did not identify any significant impact upon public services as a result of cumulative development at or in the vicinity of Berkeley Lab. As discussed in Section III-L, the changes in fire-fighting staffing levels have not adversely affected the Lab's ability to provide an adequate level of fire protection services to the site. It is anticipated that there would be no future project changes through buildout that would give rise to significant cumulative impacts.

12. Utilities

The 1992 SEIR stated that potentially significant cumulative impacts on the sanitary sewer system would be accommodated by the 20-year sewer rehabilitation program undertaken by the City of Berkeley. This program has been expanded and extended an additional ten years, currently encompassing a planning horizon from 1986 to 2016. The City is continuing to perform sewer rehabilitation on a priority (i.e., greatest need) basis.¹ The SEIR also identified the shortage of solid waste disposal capacity in the Bay Area as a potentially significant cumulative impact that would be mitigated with implementation of State legislation requiring a reduction in waste generation levels of 50 percent over the next several years. All cities and counties in California are responsible for meeting this target and face monetary fines if they fail to comply. No other cumulative impacts on utilities or waste services were identified. The utilities impact analysis presented in the SEIR encompasses development projected in the 1987 LRDP, and current and projected development would remain within the levels projected in the LRDP; therefore, the cumulative impact analysis presented in the SEIR remains applicable with respect to utilities impacts.

13. Energy

The 1992 SEIR stated that cumulative development at and in the vicinity of Berkeley Lab was not expected to result in significant adverse impacts upon energy resources because increases in energy demands would be met through existing resources and new development would be constructed in accordance with Title 24 energy conservation standards. Because built space is considered to be the primary driver for energy consumption and because the amount of built space at Berkeley Lab at buildout will be within the amount projected in the SEIR, the cumulative analysis performed for that document remains valid and no new cumulative impacts would be created by continued operation and development of the Lab through the contract period. It should also be noted that the Lab has so far met or exceeded expectations established for each of five energy conservation performance measures that were adopted in 1995 to replace the Lab's Ten-Year In-House Energy Management Plan as a mechanism for planning energy conservation programs and targeting energy conservation goals.

¹ Henry Yee, Supervising Civil Engineer, City of Berkeley, personal communication, September 9, 1996.

14. Hazardous Materials

The 1992 SEIR stated that the project would result in the increased handling of hazardous materials in the Berkeley area but that because of the localized nature of hazardous materials use in the quantities that would be used for the project, no cumulative impacts as a result of their use would be expected. The SEIR also stated that the project would increase the quantity of various types of hazardous wastes which are being generated in California as a whole; although the State lacked adequate disposal capacity, the Lab and other California generators continued to rely on licensed facilities out of state, and this was not considered a significant adverse impact. The SEIR further stated that DOE was evaluating cumulative impacts of waste generation on treatment and disposal at a national scale as part of its Programmatic Environmental Impact Statement (PEIS) for Environmental Restoration and Waste Management.

Since certification of the SEIR, DOE published the final PEIS for Environmental Restoration and Waste Management in May 1997. The cumulative impact analysis in the PEIS found that mitigation measures could be required at some of the sites considered for waste management activities to achieve compliance with air quality or drinking water standards, or to ensure adequate utility and other infrastructure capacity.²

DOE currently relies on a combination of commercial and DOE facilities for hazardous waste management. This approach is projected to continue, with adequate disposal capacity available for projected increases in waste generation. Offsite facilities for treatment of the Lab's mixed wastes are designated by the Site Treatment Plan for the Lab. Apart from compliance with applicable regulatory requirements, which is part of the project for CEQA purposes, the Lab has implemented and will continue to carry out the mitigation measures listed in the SEIR to reduce potentially significant impacts of increased use of hazardous materials to less than significant levels. This would continue to be a localized impact and would not result in any new or increased cumulative impacts over those analyzed in the SEIR. Similarly, potentially significant cumulative impacts from the projected increases in waste generation would be reduced to a less than significant level by compliance with applicable regulatory requirements and continued implementation of the mitigation measures listed in the SEIR.

² Department of Energy, *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F), May 1997, "Summary", pgs. 84 - 86; Volume I, Chapter 11.

VI. SUMMARY AND CONCLUSIONS

VI. SUMMARY AND CONCLUSIONS

This Addendum analyzes the environmental impacts associated with the proposed extension of the contract between the UC and DOE for operation and management of the Berkeley Lab from October 1, 1997 to September 30, 2007, and the continued implementation of the Lab's 1987 Long Range Development Plan. Based upon the above review, analysis, and evaluation, none of the circumstances exist with respect to the proposed project that would require preparation of a subsequent or supplemental EIR under State CEQA Guidelines sections 15162 and 15163. Specifically, the Addendum concludes that the contract extension would not result in:

- Substantial changes in the project that would require major revisions of the 1992 SEIR due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.
- Substantial changes with respect to the circumstances under which the project is being undertaken that will require major revisions of the 1992 SEIR due to the involvement of new significant effects or a substantial increase in the severity of previously identified significant effects.
- New information of substantial importance that was not known and could not have been known with the exercise of reasonable diligence at the time the previous 1992 SEIR was certified which shows that:
 - The project will involve one or more significant impacts not discussed in, or substantially more severe than shown in, the 1992 SEIR;
 - Mitigation measures or alternatives previously found infeasible would be feasible and would substantially reduce one or more significant effects on the environment, but the University declines to adopt them; or
 - Mitigation measures or alternatives that are considerably different from those analyzed in the previous SEIR would substantially reduce one or more significant effects on the environment, but the University declines to adopt them.

VII. BIBLIOGRAPHY

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VIII. APPENDICES

Appendix A: Berkeley Lab Building Numbers and Descriptions

Appendix B: Summary of Environmental Impacts

APPENDIX A

Berkeley Lab Building Numbers and Descriptions

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
C	1	DONNER LAB	B	48,722	4,526.32	22,900	2,127.43	178
C	3	MELVIN CALVIN LAB	B	20,426	1,897.59	16,584	1,540.66	128
C	003A	MCL ROOF TRLR	T	756	70.23	741	68.84	0
C	003B	MCL ROOF MODULAR	M	532	49.42	196	18.21	0
C	8	HEARST MINING	B	10,730	996.81	1,028	95.50	9
C	11	HILDEBRAND	B	18,837	1,749.93	7,099	659.50	22
C	18	GILMAN	B	11,226	1,042.90	4,207	390.85	32
C	19	LE CONTE	B	5,455	506.77	3,273	304.07	9
C	019A	BIRGE	B	15,336	1,424.69	7,383	685.86	37
C	020A	LSB ADDN	B	358	33.26	0	0.00	2
C	21	GIAUQUE	B	9,500	882.55	7,029	652.99	10
C	22	LATIMER	B	16,073	1,493.18	4,399	408.69	45
C	24	ETCHEVERRY	B	2,072	192.49	0	0.00	2
C	38	LEWIS	B	5,183	481.50	2,593	240.86	13
C	39	CORY	B	13,428	1,247.47	0	0.00	0
C	301	HILGARD		948	88.07	0	0.00	2
C	850	TAN HALL	B	5,847	543.23	2,043	189.81	6
C	905	HESSE	B	176	16.35	0	0.00	0
C	921	STANLEY	B	304	28.24	0	0.00	3
C	927	KOSHLAND HALL	B	327	30.38	98	9.10	0
C	953	MCCONE HALL		248	23.04	0	0.00	2
C	983	WURSTER	B	3,239	300.90	770	71.53	0
C	990	EVANS	B	1,218	113.16	194	18.02	8
C	995	BARKER	B	2,757	256.12	331	30.76	2
CAMPUS SUBTOTAL:				193,698	17,994.60	80,868	7,512.68	510

H	2	ADVANCED MATERIALS LABORATORY	B	85,856	7,976.12	48,850	4,538.24	211
H	002A	HAZARDOUS MATERIALS STORAGE	SHD	182	16.91	182	16.91	0
H	4	ALS SUPPORT FACILITY	B	10,178	945.51	6,800	631.72	31
H	004A	SFTY EQPMT STOR	SHD	133	12.36	117	10.87	0
H	5	AFR	B	7,192	668.13	5,317	493.95	23
H	005A	MECH STOR	C	160	14.86	146	13.56	0
H	005B	ELEC STOR	C	160	14.86	146	13.56	0
H	6	ADVANCED LIGHT SOURCE	B	116,546	10,827.15	85,155	7,910.90	279
H	7	ALS SUPPORT	B	21,433	1,991.08	18,472	1,716.02	52
H	007A	RADIO SHOP	SHD	128	11.89	106	9.85	0
H	007C	OFFICE	M	480	44.59	437	40.60	3

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
H	10	ALS SUPPORT FACILITY	B	15,172	1,409.49	12,747	1,184.21	24
H	010A	UTIL STORAGE	UTL	242	22.48	221	20.53	0
H	013A	ENV MON (B88W)	SHD	76	7.06	0	0.00	0
H	013B	ENV MON (B90W)	SHD	76	7.06	0	0.00	0
H	013C	ENV MON (STRWB CNY REC SOUTH)	SHD	76	7.06	0	0.00	0
H	013D	ENV MON (B71N)	SHD	76	7.06	0	0.00	0
H	013E	SWR MON (B88S)	SHD	68	6.31	0	0.00	0
H	013F	SWR MON (HAAS CLUBHS NE)	SHD	36	3.34	0	0.00	0
H	013G	WSTE MON (B70W)	CHW	140	13.00	0	0.00	0
H	013H	RADN MON (B45SW)	SHD	90	8.36	0	0.00	0
H	14	ES LAB	B	4,200	390.18	3,860	358.60	20
H	16	AFR LAB	B	11,771	1,093.53	8,143	756.50	5
H	016A	UTIL STORAGE	SHD	339	31.50	319	29.64	0
H	17	EHS	B	2,065	191.84	1,914	177.81	3
H	017A	TELEPHONE STOR	C	174	16.16	160	14.86	0
H	25	ENG SHOP	B	20,450	1,899.80	17,078	1,586.55	23
H	025A	ENG SHOP	B	7,335	681.41	6,970	647.50	19
H	025B	WASTE TREATMT	UTL	258	23.97	225	20.90	0
H	26	HLTH SVCS, EH&S	B	10,563	981.24	6,364	591.17	1
H	27	ALS SUPPORT FACILITY	B	3,288	305.45	3,118	289.66	28
H	29	ENG, LS	B	10,567	981.72	7,600	706.09	10
H	029A	ENG	M	1,751	162.68	1,446	134.34	7
H	029B	ENG	M	1,439	133.68	1,307	121.42	7
H	029C	EE	M	1,440	133.78	1,356	125.98	0
H	029D	RST RM TRLR	M	276	25.65	0	0.00	14
H	31	CHICKCRK MAINT, ES	B	6,033	560.48	5,278	490.33	1
H	031A	ES	T	624	57.97	534	49.61	0
H	033A	STRWB CNYN GATEHSE	M	52	4.83	44	4.09	4
H	033B	BB CNYON GATEHSE	M	94	8.73	89	8.27	0
H	033C	GRZZL PK GATEHSE	SHL	80	7.43	68	6.32	0
H	34	ALS CHILLER	B	5,163	479.64	0	0.00	0
H	36	GRIZZLY SUBSTAION	B	901	83.70	0	0.00	0
H	37	UTIL SVC	UTL	5,833	541.89	0	0.00	0
H	40	ENG ELECTRONICS LAB	B	952	88.45	902	83.80	5
H	41	ENG COMMUNICATIONS LAB	B	995	92.44	927	86.12	0
H	42	SALVAGE	B	1,268	117.79	876	81.38	0
H	042A	EMG GEN HOUSE	M	144	13.38	0	0.00	0
H	43	COMPRESSOR	B	1,020	94.76	0	0.00	0

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
H	44	IND AIR POLLUTN STUDIES	B	800	74.33	692	64.29	0
H	044A	FACILITIES	M	480	44.58	437	40.59	2
H	044B	EE	M	1,439	133.70	1,135	105.46	10
H	45	FIRE APPARATUS	B	3,342	310.47	3,169	294.40	0
H	045A	SMK HOUSE	C	128	11.89	112	10.40	0
H	46	AFR, EE, ENG, PRINTING PLT, PHOTO LAB	B	60,595	5,629.28	36,018	3,346.06	145
H	046A	ENG DIVISION OFFICE	B	5,550	515.56	3,874	359.86	32
H	046B	ENG	T	1,238	115.02	993	92.26	9
H	046C	AFR	T	1,028	95.51	680	63.18	2
H	046D	AFR	T	775	72.02	723	67.19	1
H	47	AFR	B	6,242	579.88	4,479	416.09	39
H	48	FIRE STATION, EMG COMMAND CTR	B	4,695	436.17	3,054	283.72	24
H	048A	FIRE STA STOR	C	320	29.73	296	27.50	0
H	50	AFR, PHY, AUDITORIUM, LIBRARY, COPY CTR	B	47,479	4,410.83	32,514	3,020.58	188
H	050A	DIRECTORATE, PHYSICS, NUCLEAR SCIENCE	B	66,741	6,200.25	36,511	3,391.82	270
H	050B	PHYSICS, COMPUTING SCIENCES	B	63,483	5,897.62	41,216	3,828.96	290
H	050C	COMPUTING SCIENCES, NERSC	B	2,766	256.97	1,973	183.30	24
H	050D	COMPUTING SCIENCES	B	4,959	460.66	3,418	317.50	33
H	050E	PHYSICS, NS DIVN OFFICE, ICS	B	10,878	1,010.57	8,055	748.31	68
H	050F	ICS, TEID	B	8,429	783.07	5,515	512.35	21
H	51	BEVATRON, EHS, HR, ES	B	87,979	8,173.24	74,667	6,936.56	68
H	051A	BEVATRON	B	24,894	2,312.65	24,894	2,312.65	0
H	051B	EXTERNAL PARTICLE BEAM HALL	B	44,182	4,104.51	38,873	3,611.30	0
H	051F	NS	M	1,495	138.89	1,370	127.28	0
H	051G	NS	M	1,440	133.78	1,316	122.26	0
H	051L	COMPUTER TRAINING CENTER	M	863	80.18	785	72.93	0
H	051N	ES	B	645	59.93	374	34.75	4
H	051Q	ES	T	2,780	258.26	1,788	166.10	0
H	52	CABLE WINDING FACILITY	B	6,425	596.89	5,523	513.09	1
H	052A	UTIL STORAGE	SHD	516	47.94	489	45.43	0
H	052B	ALS SUPPORT	M	1,174	109.07	974	90.49	10
H	53	E&E	B	6,935	644.26	6,364	591.21	16
H	053A	GARDNRS STOR	SHD	192	17.84	178	16.54	0
H	053B	AFR	T	464	43.12	423	39.31	1
H	54	CAFETERIA	B	15,281	1,419.60	11,959	1,110.98	28
H	054A	WELLS FARGO ATM	SHD	195	18.12	169	15.70	0
H	55	LS	B	19,027	1,767.63	13,141	1,220.80	79
H	055A	LS	B	1,535	142.60	1,300	120.76	2

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
H	055B	EMG GEN	SHL	209	19.42	0	0.00	0
H	055C	LS	T	520	48.31	447	41.53	1
H	56	BIOMED ISOTOPE FAC	B	1,782	165.56	1,311	121.80	2
H	58	HEAVY ION FUSION	B	10,321	958.83	8,533	792.72	14
H	058A	ACCEL R&D ADDN	B	12,653	1,175.45	10,671	991.33	0
H	60	HIBAY LAB	B	3,400	315.86	3,360	312.14	0
H	61	STDBY PROPEN PLT	B	323	30.01	0	0.00	0
H	62	MS, CS LAB	B	55,626	5,167.68	35,863	3,331.68	93
H	062A	EE, MS	T	1,248	115.93	979	90.94	2
H	062B	UTIL STOR	UTL	169	15.70	0	0.00	0
H	63	EE	M	2,702	251.02	2,531	235.13	0
H	64	LS/B-FACTORY	B	24,281	2,255.70	19,376	1,800.01	37
H	064B	OFFICE	M	480	44.59	437	40.60	0
H	65	VISITOR CTR	B	3,426	318.26	1,842	171.11	14
H	065A	OFFICE	M	1,454	135.06	1,218	113.14	6
H	065B	OFFICE	M	1,020	94.78	970	90.13	8
H	66	SURFACE SCI CATALYSIS, CTR FOR ADV MTRL	B	44,123	4,099.18	26,033	2,418.62	104
H	067B	EE: MOBL WNDW THERML TEST FAC SUPPT	M	1,237	114.92	1,186	110.18	3
H	067C	EE: INDOOR ENVIRONMENT LABORATORY	M	1,237	114.92	1,186	110.18	0
H	067D	MOBILE INFILTRATN TST UNIT (MITU)	T	130	12.08	114	10.59	0
H	067E	EE FIELD LAB	T	296	27.50	270	25.08	0
H	68	UPP PUMP HOUSE	B	500	46.45	0	0.00	0
H	69	ARCHIVES, PROCUREMENT & SHIPPING	B	17,752	1,649.19	14,255	1,324.31	99
H	70	NS, EE LAB	B	62,507	5,806.92	43,513	4,042.37	192
H	070A	NS, LS, CS, ES, ENG LAB	B	67,848	6,303.12	44,637	4,146.78	171
H	070B	UTIL STOR TERMINAL HUT	UTL	382	35.48	0	0.00	0
H	070E	STOR	C	432	40.12	396	36.78	0
H	070G	LIQUID NITROGEN STORAGE	SHL	173	16.08	157	14.59	0
H	71	ION BEAM TECH, CTR BEAM PHY, EHS/CSNS	B	56,841	5,280.52	42,318	3,931.34	78
H	071A	ION BM TECH, LOW BETA LAB	UTL	4,127	383.40	3,973	369.09	0
H	071B	CTR BEAM PHYS	B	7,062	656.08	4,591	426.52	15
H	071C	OFFICE, B-FACTORY	T	511	47.48	361	33.54	3
H	071D	OFFICE, B-FACTORY	T	520	48.31	489	45.43	4
H	071E	STORAGE	T	513	47.66	135	12.54	0
H	071F	OFFICE, B-FACTORY	T	516	47.93	475	44.12	2
H	071G	OFFICE	T	517	48.03	470	43.66	1
H	071H	OFFICE, B-FACTORY	T	1,424	132.29	1,139	105.81	7
H	071J	OFFICE, B-FACTORY	T	1,288	119.64	1,091	101.34	7

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
H	071K	AFR/CS/B-FACTORY	T	474	44.04	439	40.79	2
H	071P	B-FACTORY	T	512	47.57	481	44.69	4
H	071Q	RESTROOM TRAILER	T	0	0.00	0	0.00	0
H	72	NATL CENTER FOR ELECTRON MICROSCOPY	B	6,105	567.17	4,121	382.85	12
H	072A	HIGH VOLTAGE ELECTRON MICROSCOPE	B	2,532	235.23	2,334	216.84	0
H	072B	ATOMIC RESOLUTION MICROSCOPE	B	4,413	409.97	3,743	347.72	0
H	072C	ARM SUPPORT LAB	B	5,335	495.60	3,175	294.94	2
H	73	ATM AEROSOL RSCH	B	4,228	392.79	3,311	307.59	5
H	073A	UTIL STOR	UTL	403	37.44	366	34.00	0
H	74	LS LABS	B	45,430	4,220.55	29,100	2,703.47	185
H	074C	EMG GEN	UTL	180	16.73	0	0.00	0
H	074D	STORAGE	C	190	17.65	160	14.86	0
H	75	NTLF, RADIOISO SVCS	B	8,545	793.83	6,466	600.69	19
H	075A	EH&S	B	4,000	371.60	3,957	367.61	0
H	075B	EH&S	M	4,681	434.87	3,507	325.80	17
H	075C	EH&S	M	450	41.81	420	39.02	0
H	075D	WSTE STOR	SHD	1,035	96.15	1,000	92.90	0
H	075E	OFFICE, EH&S	M	410	38.09	385	35.77	5
H	075F	LAB PACK SEG & SEP	CHW	207	19.23	176	16.35	0
H	075G	BASES STORAGE	CHW	75	6.97	59	5.48	0
H	075H	FLAMMABLE LIQUIDS	CHW	21	1.95	15	1.39	0
H	075J	HAZ WSTE CMPACTN	SHD	424	39.39	424	39.39	0
H	075K	ACIDS STORAGE	CHW	75	6.97	59	5.48	0
H	075L	POISONS STORAGE	CHW	75	6.97	59	5.48	0
H	075O	HAZ WSTE STOR	C	157	14.58	139	12.91	0
H	075P	HAZ WSTE STOR	C	157	14.58	139	12.91	0
H	76	FACILITIES SHOPS	B	31,450	2,921.76	27,645	2,568.26	195
H	076A	PAINT STOR	SHL	160	14.86	146	13.56	0
H	076D	ELECL	C	160	14.86	146	13.56	0
H	076H	EMG UTIL STOR	C	160	14.86	142	13.19	0
H	076J	CUSTOD STOR	C	160	14.86	142	13.19	0
H	076K	FACILITIES	M	357	33.16	242	22.48	0
H	076L	FACILITIES	M	1,439	133.69	1,119	103.96	7
H	77	ENG SHOPS	B	68,768	6,388.56	59,108	5,491.13	77
H	077A	ULTRA HIGH VACUUM FACILITY	B	10,862	1,009.09	10,068	935.32	8
H	077C	WELDG STOR	C	23	2.13	18	1.67	0
H	077D	DRUM LIQD STOR	SHD	108	10.03	103	9.57	0
H	077H	AUXILRY PLATG SHOP	SHD	576	53.51	527	48.96	0

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
H	78	CRAFT STORES	B	5,392	500.92	4,989	463.48	5
H	79	METAL STORES	B	4,453	413.68	4,269	396.59	1
H	80	ALS SUPPORT FACILITY	B	29,908	2,778.41	22,054	2,048.77	63
H	080A	ALS SUPPORT FACILITY	B	960	89.18	898	83.42	2
H	81	LIQD GAS STORAGE	SHD	1,129	104.88	1,110	103.11	2
H	82	LOWER PUMP HOUSE	SHD	537	49.89	0	0.00	0
H	83	LS LAB	B	6,995	649.87	4,698	436.48	29
H	083A	LS OFFICE TRAILER	T	538	49.99	465	43.21	0
H	85	HAZARDOUS WASTE HANDLING FACILITY	B	15,420	1,432.54	9,631	894.73	13
H	085B	OFFICE TRAILER	T	3,603	334.69	2,444	227.02	20
H	88	88 CYCLOTRON	B	52,970	4,921.03	37,539	3,487.45	386
H	088B	CMRPSR SHLTR & STOR	SHL	534	49.62	247	22.95	0
H	088C	FLAMBL GAS/LIQD STOR	SHD	80	7.43	65	6.04	0
H	088D	EMG GEN	UTL	265	24.62	0	0.00	0
H	90	DOE EE EHS, ES, COPY CTR	B	89,357	8,301.30	60,121	5,585.28	480
H	090B	FACILITIES	M	1,440	133.79	1,151	106.94	10
H	090C	FACILITIES	M	1,185	110.07	901	83.69	7
H	090E	FACILITIES	M	188	17.47	169	15.70	0
H	090F	FACILITIES	M	2,459	228.45	1,828	169.83	10
H	090G	FACILITIES	M	1,846	171.50	1,533	142.42	10
H	090H	FACILITIES	M	1,849	171.78	1,360	126.35	10
H	090J	FACILITIES	M	2,846	264.40	2,168	201.41	18
H	090K	FACILITIES	M	2,844	264.23	2,115	196.50	14
H	090P	ES	M	2,129	197.82	1,611	149.69	20
H	090Q	RESTROOMS	M	425	39.48	0	0.00	0
H	090R	UTIL BLDG	UTL	160	14.87	0	0.00	0
HILL SUBTOTAL:				1,688,363	156,850	1,215,859	112,954	4,665
O	903	WAREHOUSE, RECEIVING	B	122,504	11,380.61	117,625	10,927.35	5
O	934	DYMO: LS LAB	B	30,720	2,853.89	24,074	2,236.47	55
O	936	HINKS: CFO	B	17,334	1,610.30	13,985	1,299.16	78
O	938	PROMENADE: HR, ISS, CSEE	B	20,898	1,941.39	12,020	1,116.63	173
O	940	CHOLES RSCH CTR: LS	B	2,945	273.61	1,499	139.26	0
O	960	DC, THE PORTALS	B	6,342	589.17	6,342	589.17	0
O	965	KITTY HAWK		2,547	236.61	1,575	146.32	0
OFF SITE LEASED SUBTOTAL:				203,290	18,886	177,120	16,454	311

LBNL BUILDING LIST
August 8, 1997

SITE	BLDG #	BUILDING NAME	TYPE	GROSS SF	GROSS SM	NET SF	NET SM	OCCUPANTS
BERKELEY LABORATORY TOTAL:				2,085,351	193,730	1,473,847	136,921	5,486

APPENDIX B

Summary of Environmental Impacts

Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-B. GEOLOGY, SOIL AND SEISMICITY			
III-B-1 There could be significant adverse impacts on people or property due to continued operation and development of LBL facilities in areas susceptible to surface rupture. There may be potential adverse impacts to people and property at the site caused by ground-shaking, landsliding, lurching, and differential compaction during a seismic event.	S	III-B-1 Geologic and soils studies will be undertaken during the design phase of each LBL building project. Recommendations contained in those studies would be following to ensure that the effects of landsliding, lurching, and liquefaction potential will not represent a significant adverse impacts during a seismic event.*	LS
III-B-2 Soil erosion, sedimentation and landsliding caused by construction work may adversely affect the stability of LBL buildings placed on the site.	S	III-B-2a Excavation and earth moving will be designed for stability, and accomplished during the dry season when feasible. Drainage will be arranged to minimize silting, erosion, and landsliding. Upon completion, the land will be restored, covering exposed earth with planting.*	LS
		III-B-2b Foundations for proposed structures will be designed in accordance with geologic and soil engineering recommendations to minimize the long-term possibilities of landslide.*	
		III-B-2c Excavations will be shored as required by law to preclude minor short-term land slides during construction.*	

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
		III-B-2d	Revegetation of disturbed areas, including slope stabilization sites, using native shrubs, trees and grasses will be included as part of all new projects.*

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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-C. HYDROLOGY AND WATER QUALITY			
III-C-2 Continued University operation of LBL, including continued implementation of the 1987 LRDP, could produce increased surface and storm runoff.	S	III-C-2 Each individual project will continue to be designed and constructed with adequate storm drainage facilities to collect surface water from roofs, sidewalks, parking lots and other surfaces and deliver it into existing channels which have adequate capacity to handle the flow.*	LS

Less Than Significant Impacts For Which No Mitigation Measures Are Suggested

III-C-1	LBL is not located in a flood-plain area. Continued University operation of LBL, including continued implementation of the 1987 LRDP, is not expected to increase off-site flood hazard, erosion or sedimentation. The project is not expected to deplete groundwater resources, interfere with groundwater recharge, or degrade surface or groundwater quality substantially.
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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-D. BIOLOGICAL RESOURCES			
III-D-2 Continued University operation of LBL, including continued implementation of the LRDP, will result in the loss of some vegetation, including potential loss of mature trees and areas with some habitat value for non-critical species.	S	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.*	LS
		III-D-2b Invasion by opportunistic colonizer trees and shrubs will be controlled. A maintenance program for controlling the further establishment of eucalyptus, green wattle acacia, French broom, <i>Cotoneaster</i> , and other opportunistic colonizer shrubs and trees in disturbed areas. on-site will be undertaken. Herbicides will not be used for this purpose.*	
		III-D-2c Removal of native trees and shrubs will be minimized. (To the greatest extent feasible, the removal of large coast live oak, California Bay, and Monterey Pine trees, will be avoided.)*	
		III-D-2d Disturbance to the site perimeter buffer zones will be minimized.*	
		III-D-2e LBL activity and encroachment in Blackberry Canyon will be minimized.*	

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**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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III-D-2f Periodic monitoring of disturbed areas, fill slopes, and other areas of exposed soil treated under the revegetation program will be conducted and fixed.*

Less Than Significant Impacts For Which No Mitigation Measures Are Suggested

III-D-1 Continued University operation of LBL, including continued implementation of the 1987 LRDP, is not expected to restrict the number or reduce the range of any rare, endangered or threatened plant or animal species, or the cause any existing fish or wildlife populations to drop below self-sustaining levels.

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-E. HISTORICAL AND ARCHAEOLOGICAL RESOURCES			
III-E-1 Continued University operation of LBL, including continued implementation of the 1987 LRDP, while resulting in removal of substandard buildings, is not expected to adversely impact any significant prehistoric, archaeological or paleontological site, or any property of historic or cultural significance, other than the Laboratory itself.	LS	III-E-1a A photographic record will be made of all structures demolished as part of future projects.*	LS
		III-E-1b An individual well-versed in the history of science in the twentieth century will evaluate the significance of specific pieces of equipment that may be replaced due to obsolescence or a change in the vector of research.*	
		III-E-1c Prior to the completion of a precise development plan for the original laboratory site portion of LBL, an analysis will be made of the historical significance of buildings on this site. An analysis has been completed of the historical significance of the 184-inch Cyclotron building.*	

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-F. VISUAL QUALITY			
III-F-1 Continued implementation of the 1987 LRDP will result in a change in the visual quality of LBL and the surrounding environs.	S	III-F-1a Buildings will occupy a limited a footprint as feasible. They will incorporate features that enhance flexibility and future versatility.*	LS
		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 Some LBL projects may be visible because trees, which would have screened the building, have been removed and replacement landscaping will take some time to reach full height.	LS	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.*	LS

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-G. LAND USE			
III-G-2 Continued operation of LBL by the University, including continued implementation of the 1987 LRDP, would result in the conversion of a small amount of open space into urban or suburbanscale uses.	S	III-G-2 Buildings proposed for development at LBL will follow the design guidelines contained in the LBL Long Range Development Plan.*	LS

Less Than Significant Impacts For Which No Mitigation Measures Are Suggested

- III-G-1** There are no LBL proposed developments in the site development plan which would impact directly on the privately owned multiple family or single family housing along the LBL western and northern boundaries.
- III-G-3** Continued operation of LBL by the University, including continued implementation of the 1987 LRDP, would be consistent with the 1990 UC Berkeley Long Range Development Plan, and the General Plans of the City of Berkeley and the City of Oakland.

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)

Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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III-H. POPULATION, EMPLOYMENT AND HOUSING**Less Than Significant Impacts For Which No Mitigation Measures Are Suggested**

III-H-1 Population growth associated with continuation of existing activities, including continued implementation of the 1987 LRDP, is not expected to have a significant adverse impact.

III-H-2 Population growth associated with continuation of existing activities, including renewal of the contract term could create an impact on the availability of both owned and rented housing.

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-I. TRAFFIC, CIRCULATION AND PARKING			
III-I-1 Incremental increases in traffic are expected due to projected increases in the number of employees and visitors at LBL.	LS	III-I-1a Discourage single occupant vehicle use and encourage the use of other transportation options. LBL will continue to implement its Transportation System Management Program. The specific features of this program include: Establishing transportation modal-split goals for LBL which will result in a reduction in the number and percentage of single-occupant automobiles being driven to and from LBL;* Assigning a transportation planner to coordinate the design and implementation of TSM programs;* Promoting carpools by creating a carpool matching program;* Providing preferential carpool parking;* Developing a vanpooling program through funding support of Berkeley TRIPS;* Permitting staggered (flex-time) work hours;*	LS

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
		Developing an annual monitoring program to evaluate the programs in relation to established goals and identify new elements which should be added to the program;* Promoting the TSM programs by giving orientation briefings to new employees, providing information aids to be distributed to LBL employees, organizing an information center, and selling transit tickets on-site at LBL;* Reviewing LBL shuttle service and transit interface facilities; and* Reviewing bicycle routes and storage facilities for improvements.*	
	III-I-1b	LBL will conduct bi-annual peak hour traffic counts in and around LBL. In particular, the bi-annual count will include the Gayley Road corridor between Hearst Avenue and Bancroft/Piedmont.*	

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-I-2	S	III-I-1c If and at such time as the level of service at intersections along the Gayley Road corridor reaches "D", a review of necessary improvements will be conducted with UC Berkeley.* III-I-1d LBL will pay for its fair share of allowable and necessary signalization improvements along the Gayley Road corridor proportional to LBL's share of increase in traffic.* III-I-1e Details of the Gayley Road corridor improvements, including environmental assessment of the improvements, will be reviewed at the time the thresholds are reached.* III-I-2 LBL will continue to implement and monitor the implementation of its Transportation System Management Program.*	LS
The ratio of parking spaces to LBL employees will decrease during the LRDP implementation period.			

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-J. AIR QUALITY			
III-J-1 Construction of new facilities project in the 1987 LRDP would generate short-term emissions of air pollutants.	S	III-J-1 Construction contract specifications would require that during construction exposed surfaces would be wetted twice daily or as needed to reduce dust emissions. In addition, contact specifications would require covering of excavated materials.	LS
III-J-2 The proposed project at LBL would generate long term emissions of criteria air pollutants.	S	III-J-2 LBL will design building ventilation systems to minimize emissions of criteria air pollutants following compliance with all applicable regulatory requirements (e.g., NSR). This mitigation measure would not reduce the impact to less than significant.	SU
III-J-3 The increases in toxic air contaminants (TACs) associated with the proposed project would result in an increased cancer risk of 0.6 in one million and increases in hazard and exposure indices of 0.0003 and 0.002, respectively.	LS	III-J-3a None required.	LS

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts		Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-J-4	The proposed project would result in an increase in emissions in radionuclides predicted to cause an increased cancer risk of 0.12 in a million for the maximally exposed individual (MEI).	LS	III-J-4 None required.	LS
III-J-5	The proposed project may produce a total increase in both radionuclides and toxic air contaminants (TACs) that could cause an excess cancer risk of 0.7 in a million to the maximally exposed individual (MEI).	LS	III-J-5 None required.	LS

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-K. NOISE			
III-K-1 Ambient noise levels from the University's continued operation of LBL will generate noise levels which could conflict with applicable noise ordinances and standards.	LS	III-K-1 Projected noise levels will be compared with ambient noise levels and the Berkeley Noise Ordinance limits, or other applicable regulations. Acoustical performance standards would be included in future construction contract documents.* LBL will continue to design, construct and operate buildings and building equipment taking into account measures to reduce the potential for excessive noise transmission.	LS
III-K-2 Construction activities resulting from continued implementation of the 1987 LRDP could create significant adverse noise impacts on-site.	S	III-K-2 Noise-generating construction equipment will be located as far as possible from existing buildings. If necessary, windows of laboratories or offices will be temporarily covered to reduce interior noise levels on-site.*	LS

Less Than Significant Impacts For Which No Mitigation Measures Are Suggested

- III-K-3** Since construction periods are of a short term, approximately one to two years for site work and exterior return construction, the overall off-site construction noise impacts are not expected to be significant.

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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III-L. PUBLIC SERVICES**Less Than Significant Impacts For Which No Mitigation Measures Are Suggested**

- III-L-1** The construction of additional facilities and any increased population, would not cause increased impacts on local return police and fire protection services.
- III-L-2** The construction of additional facilities and any increase in population according to the 1987 LRDP would not cause significant impacts on local school systems.
- III-L-3** Development proposed under the 1987 LBL LRDP would increase demand for recreational services. This increase is not considered significant.

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)**Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-M. UTILITIES			
III-M-1 Projected development according to the 1987 LRDP may create demands with regard to existing waste water and sanitary sewer systems.	LS	III-M-1 Prior to the construction of any project which may add significant sewer load to the city sanitary sewer system, LBL will investigate the potential impacts of the project on the city system. LBL will identify mitigation measures to accommodate the sewer load if the impact investigation indicates that the city system could not accommodate the additional sewage.* LBL will reimburse the City of Berkeley and/or EBMUD for its fair share of allowable and necessary sewer improvement capital costs which are needed to accommodate increased demand and mitigate sewer impacts resulting from implementation of the LBL LRDP.	LS
III-M-4 The development of the LBL East Canyon site as currently planned will require rerouting of the PG&E 120 KV service into LBL.	LS	III-M-4 New rights-of-way for the 120 KV lines will be recommended to PG&E to minimize visual impact. The recommended routing will be selected so as to obviate the need for future rerouting. A minimum of trees and/or existing planting will be removed during construction of the new 120 KV lines.*	LS

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Lawrence Berkeley Laboratory Supplement Environmental Impact Report (SEIR)

Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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Less Than Significant Impacts For Which No Mitigation Measure Are Suggested

- III-M-2** Development proposed under the 1987 LBL LRDP would increase the demand for domestic water. This demand is well within the capacity of the existing ties to EBMUD and the LBL water distribution system. This demand is not considered significant.
- III-M-3** Development proposed under the 1987 LBL LRDP would increase the usage of natural gas. The projected usage is within the capacity of the existing PG&E and LBL systems, except for the main extensions required for new buildings. This increased usage is not considered significant.
- III-M-5** Development proposed under the 1987 LBL LRDP would increase the usage of electrical power. PG&E has the capacity to supply this power. This increased usage is not considered significant.

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SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts		Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
III-N. ENERGY				
III-N-1	Increased energy demand from new facilities will occur in conjunction with continued implementation of the 1987 LRDP.	LS	III-N-1 Building will employ optimum energy strategies and efficiency features to include building envelope insulation, solar control, automated ventilation and climate control, and passive or active solar energy systems, where feasible.*	LS

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts		Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
IV. HAZARDOUS MATERIALS				
IV-K-1	Continued UC operation of LBL, including proposed increases in laboratory and facility space, may result in impacts from the increased use of hazardous materials in research, facility construction, and facility maintenance activities.	S	IV-K-1 LBL will prepare an annual self-assessment summary report. The report will summarize environmental health and safety program activities, and identify any areas which LBL is not in compliance with laws and regulations governing hazardous materials, hazardous waste, hazardous materials transportation, regulated building components, worker safety emergency response, and remediation activities.	LS
IV-K-2	Continued UC operation of LBL, including proposed increases in laboratory and facility space, is expected to result in the increased generation and discharge of hazardous wastes, including offsite disposal of hazardous, radioactive and medical wastes, from research, facility construction, and facility maintenance activities.	S	IV-K-2a Prior to shipping any hazardous materials to any hazardous waste treatment, storage or disposal facility, LBL will confirm that the facility is licensed to receive the type of waste LBL is proposing to ship to that facility. IV-K-2b LBL will continue its waste minimization programs and strive to identify new and innovative methods to minimize hazardous waste generated by LBL activities.	LS

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Impacts		Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
IV-K-3	Continued UC operation of LBL, including proposed increases in laboratory and facility space, will result in the increased transportation of hazardous materials and wastes.	LS	IV-K-3 LBL will require hazardous waste haulers to provide evidence that they are appropriately licensed to transport the type of wastes being shipped from LBL.	LS
IV-K-4	Continued UC operation of LBL, including proposed increases in laboratory and facility space, will result in the upgrading or removal of regulated building components.	LS	IV-K-4 None required, since upgrading or removing regulated building components will be done in conformance with requirements designed to protect public health and the environment and since the upgrading and removal operations will result ultimately in reductions in the likelihood of potential harm to human health or the environment from potential incidents relating to underground storage tanks, above ground storage tanks, asbestos-containing building materials and electrical equipment containing polychlorinated biphenols.	LS

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IV-K-5 Continued UC operation of LBL, including proposed increase in laboratory and facility space, will result in increased numbers of employees and thus increase the potential for exposures to hazardous or radioactive materials.	S	IV-K-5 In addition to implementation of the numerous employee communication and training requirements included in regulatory programs, LBL will undertake the following additional measures as ongoing reminders to workers of health and safety requirements: Posting in areas where hazardous materials are handled, of phone numbers of LBL offices which can assist in proper handling procedures and emergency response information. Continuing to post "Emergency Response and Evacuation Plans" in all LBL buildings. Continuing to post all sinks in areas where hazardous materials are handled with signs reminding users that hazardous wastes cannot be poured down the drain. Continuing to post dumpsters and central trash collection areas where hazardous materials are handled with signs reminding users that hazardous wastes cannot be disposed of as trash.	LS

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Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
IV-K-6 Continued UC operation of LBL, including proposed increases in laboratory and facility space, will result in a need to continue emergency preparedness and response programs to minimize impacts which may result from actual or potential release of hazardous materials in the workplace or the environment.	LS	IV-K-6 LBL will update its emergency preparedness and response program on an annual basis, and will provide copies of this program to local emergency response agencies and to members of the public upon request.	LS
IV-K-7 Continued UC operation of LBL, including proposed increase in laboratory and facility space, may affect ongoing activities to characterize and remediate prior spills of hazardous materials and leaching of these materials into the soil and groundwater.	LS	IV-K-7 In addition to implementing its site characterization and remediation program, LBL will continue to maintain copies of the results of its environmental and workplace monitoring programs. LBL will continue to make this information available for review at the request of employees or members of the public, as permitted by law.	LS

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SUMMARY OF ENVIRONMENTAL IMPACTS**

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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***** = Included in 1987 LRDP EIR

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