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DRAFT AND FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

FOR THE PROPOSED RENEWAL
OF THE CONTRACT BETWEEN
THE UNITED STATES DEPARTMENT OF ENERGY
AND THE REGENTS OF
THE UNIVERSITY OF CALIFORNIA
FOR OPERATION AND MANAGEMENT
OF THE

LAWRENCE BERKELEY LABORATORY

September 1992

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UNIVERSITY OF CALIFORNIA, LAWRENCE BERKELEY LABORATORY

DRAFT AND FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

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September 1992

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LAWRENCE BERKELEY LABORATORY
SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT (SEIR)

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F-I INTRODUCTION TO THE FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

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F-I. INTRODUCTION TO THE FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

A. About this Final SEIR

This final Supplemental Environmental Impact Report (SEIR) for the Proposed Renewal of the Contract between the United States Department of Energy (DOE) and The Regents of the University of California, for the Operation and Management of the Lawrence Berkeley Laboratory, has been prepared by the University of California, Lawrence Berkeley Laboratory (LBL). The purpose of the SEIR is to provide information to all interested parties on the assessment of the potential impacts on the environment if the contract between UC and DOE is renewed for another five-year period.

The renewal of the contract would make LBL's continued implementation of the Lawrence Berkeley Laboratory Site Development Plan the reasonably foreseeable result. In 1987, LBL completed a comprehensive review of the environmental impacts of Plan implementation. This SEIR updates the information and analysis set forth in the 1987 Plan EIR. The Plan is the translation of long-term program plans into physical elements such as office and research space, open space, roads, parking and landscape. The Plan is intended to show in general terms the location of various physical elements and their intended use, within the LBL main site. It is important to note that not all of the projects shown in the Plan are funded, and that implementation of the Plan may take considerably more time than indicated, or may not occur at all. Specific projects included in the Plan are subject to further environmental review processes when they are considered for implementation.

This Final SEIR and Mitigation Monitoring Plan have been prepared in accordance with the provisions of the California Environmental Quality Act (CEQA), as amended and the Amended University of California Procedures for Implementation of the California Environmental Quality Act.

B. Organization of this SEIR

This SEIR is organized in two separate parts: the first reprints and responds to comments on the draft SEIR, dated April 1992. These materials, which are bound in this volume, are entitled final SEIR, dated September 1992, and are numbered pages F-I-1 through F-V-3 (Sections F-I through F-V). The second document, numbered pages I-1 through VIII-3 (plus appendices), is the draft SEIR itself, dated April 1992. These two documents comprise the University's final supplemental environmental impact report for the Proposed Renewal of the Contract between the United States Department of Energy and The Regents of the University of California for Operation and Management of the Lawrence Berkeley Laboratory.

For persons who have not received the draft SEIR, both the final and the draft SEIR are provided; for those persons who previously received the draft SEIR, it is to be used in conjunction with the comments and responses contained in this final SEIR. The final SEIR document will be distributed to everyone who has received a copy of the draft SEIR.

C. Review of the Draft Supplemental Environmental Impact Report

In April 1992, the University published the draft SEIR on this project.

The draft SEIR described potential impacts on the environment if a proposed extension of the contract of the University of California with the United States Department of Energy (DOE) to manage the Lawrence Berkeley Laboratory is executed. The current contract expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of DOE sponsored research and development programs in general, energy, and life sciences.

Pursuant to state law, the University forwarded copies of the draft environmental impact report and the Notice of Completion-Draft SEIR to the State Clearinghouse on April 3, 1992. The State Clearinghouse acknowledged the draft supplemental environmental impact report and established a 45-day state review

period for the proposed project. This 45-day review period began on April 3, 1992 and ended on May 18, 1992.

The University held a public hearing on the draft SEIR on May 7, 1992 at Room 22 Warren Hall, on the UC Berkeley campus.

Public notice of the hearing was made by placing ads in *The Berkeley Post* and *The Oakland Tribune* on Wednesday, April 22, 1992 and again on Wednesday, May 6, 1992. Ads were also placed in *The Daily Californian* on Thursday, April 23, 1992 and Wednesday, May 6, 1992. Sample newspaper advertisements appear in Section F-V.

Additionally, a notice of the hearing was placed on the first page of the draft SEIR which was mailed in April 1992 to persons who had expressed interest in the draft or who might be interested in the proposed project.

The purpose of the public hearing was to provide an opportunity for citizens to comment on the objectivity and completeness of the draft SEIR and to submit testimony about the proposed extension of the LBL contract with DOE.

It was indicated at the hearings that written comments on the draft SEIR would be received until May 18, 1992, the end of the draft SEIR 45-day public review period. The hearing, attended by approximately six persons, including five University staff and consultants, was recorded by a certified shorthand reporter. A copy of the complete transcript of the hearing prepared by the reporter is contained in Section F-IV. No testimony from the public was offered at the hearing.

D. Responses to Comments on the Draft SEIR

Under state law, it is the University's responsibility to evaluate comments on the proposed project raised during the public review process on the draft SEIR and to respond to these comments.

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

Written comments on the draft SEIR were received from an individual and two agencies. Section F-III contains the letters. The University's responses to the comments contained in these letters are in Section F-II.

The environmental impacts resulting from implementation of the proposed project, as identified by the environmental evaluation in this final SEIR, are summarized in the draft SEIR (April 1992) on pages I-15 to I-38 under "Summary." Mitigation measures for each of these potential impacts are also presented. In each instance, the proposed mitigation measure(s) would reduce the environmental impact to a level of insignificance, with the exception of air quality for the reasons noted below.

For purposes of this SEIR, proposed project air emissions are assumed to increase by 8.5 percent. Using this assumption, the resulting pollutant levels associated with the proposed project are shown in draft SEIR Table III-J-9 (April 1992, p. III-J-31). Typically in reviewing proposed projects, the Bay Area Air Quality Maintenance District (BAAQMD) considers a net increase in emissions of one percent over existing county-wide emissions, or a net increase of 150 pounds per day of CO, POC, NOx, SO_2, or PM_{10} to be thresholds of significance. As shown in draft SEIR Table III-J-9, projected emissions from the proposed project would not exceed the one percent of countywide emissions threshold. However, for purposes of this SEIR, since the Bay Area remains non-attainment for ozone under the federal and state Clean Air Acts, any increase in ozone-related emissions is considered significant and unavoidable.

This final SEIR and the Mitigation Monitoring Plan (see page F-I-6) is scheduled to be presented to The Regents of the University of California during their meeting in September 1992. At this meeting, The Regents will consider approval of the proposed DOE contract renewal based on review and consideration of the final SEIR.

If the final SEIR is approved and certified, it will be certified in accordance with the procedures for implementation of CEQA adopted by The Regents of the University. The project approval would include the finding that the final SEIR has been completed in compliance with the California Environmental Quality Act and the University's CEQA procedures, and that The Regents considered its objectives, its consequences, and the available alternatives.

If the final SEIR is certified, the University of California will file a Notice of Determination-Final SEIR with the State Office of Planning and Research indicating that the project has been approved and the final SEIR has been certified.

This final SEIR is divided into six sections:

F-I.	Introduction to the Final Supplemental Environmental Impact Report
F-II.	Responses to Comments Contained in Letters Received During the Public Review Period
F-III.	Letters Received During the Public Review Period
F-IV.	Transcript of Public Hearing
F-V.	Newspaper Advertisements
F-VI.	Draft SEIR (April 1992)

A description of each section follows.

The Introduction (Section F-I) notes the purposes and content of the final SEIR, the CEQA process, and how to use the report.

(The Summary of Environmental Impacts and Mitigation Measures section, which is contained in the Draft SEIR (April 1992), pages I-15 to I-38, lists in the form of a Summary Table all of the potential impacts of the project and the proposed mitigation measures to reduce or eliminate identified impacts. The level of significance of each impact, with and without mitigation, is identified.)

The Response to Comments (Section F-II) includes 28 separate comments from the letters received during the public review process. Following each comment is the response. Comments were received from the State of California - Environmental Protection Agency, the City of Berkeley, Planning and Community Development Department, and an individual, Mr. Raymond Mathis.

The Letters Received During the Public Review Period (Section F-III) includes a listing of both agencies and the individual who submitted written comments to LBL on the draft SEIR, and copies of these letters.

The Transcript of the Public Hearing (Section F-IV) contains the transcript of the public hearing held on Thursday, May 7, 1992, at 7:00 p.m. in Room 22, Warren Hall, on the University of California, Berkeley campus.

Newspaper Advertisements (Section F-V) contains copies of the ads for the public hearing, as described above in Section F-I-C.

The draft SEIR (Section F-VI) is the complete draft SEIR (April 1992) as distributed for public review.

E. Mitigation Monitoring Plan

In compliance with AB 3180, the Mitigation Monitoring Plan for the Supplemental Environmental Impact Report (SEIR) has been prepared as a separate document, and is available for public review at the LBL Office of Assessment and Assurance and at the LBL Building 50 library.

F-II RESPONSES TO COMMENTS CONTAINED IN LETTERS RECEIVED DURING THE PUBLIC REVIEW PERIOD

F-II. RESPONSES TO COMMENTS CONTAINED IN LETTERS RECEIVED DURING THE PUBLIC REVIEW PERIOD

This section lists comments on the Draft SEIR (April 1992) as contained in letters received during the public review period and responses to each comment.

To provide a complete series of responses, each separate topic contained in a letter was identified as a separate comment. A total of 28 comments are included. The comments are numbered Item F-1 through Item F-28. Responses to each comment immediately follow the item. Where the individual comments were part of a larger paragraph or section in the letter, a description identifying where in the letter the comment was taken from is also included.

The letters in their entirety are reproduced in Section F-III of this Final SEIR.

ITEM F-1

Letter from Raymond Mathis, May 14, 1992

The noise we clearly hear on Canyon Road coming from the southern portion of the LBL is a steady 24 hr. per day whine or hum. Since this distinctive noise can even be heard over daytime traffic, it should have been described by your acoustical consultant. I can hear it and am practically deaf in one ear.

RESPONSE

With Mr. Mathis' cooperation, 24-hour noise measurements were made from instruments placed on the deck at Mr. Mathis' home June 2, 1992. The noise from LBL equipment noticeable at the outdoor deck of 39 Canyon Road contains an audible tone (or hum). This tone was noticeable to both acoustical consultants who visited the site on June 2. Narrow band analysis of the noise indicates that the tone has a frequency of 206 Hz, traceable to equipment inside LBL Building 37.

LBL has begun an acoustical treatment project at Building 37 in an effort to address this concern. This treatment, which is scheduled to be completed in January 1993, will reduce the noise transmission from Building 37. As stated in the draft SEIR, the existing LBL original laboratory site is not a quiet area and continued operation of LBL has the potential to conflict with applicable noise ordinances; however, LBL is committed to implementing measures to reduce the potential for excessive noise generation from building and equipment operations.

Source: Report from Charles Salter and Associates, Inc. to Ira Fink and Associates, Inc., dated June 19, 1992.

ITEM F-2

Letter from Raymond Mathis, May 14, 1992

The City of Berkeley noise ordinance was extensively referred to; however, the 5 dBA reduction in permissible noise levels due to noise coming from mechanical equipment (whines, hums etc) was not included. See 13.40.050 "B. CORRECTION FOR CHARACTER OF SOUND", you will find it directly above the EXTERIOR NOISE LIMITS table 13.40-1. A straight forward reading of the city ordinance would indicate 40 dBA as maximum during evening hours, not 45 dBA.

RESPONSE

While the City of Berkeley noise ordinance was discussed in the draft SEIR, it was not reprinted in its entirety and sections were thus omitted. The ordinance does provide a lower standard for audible tones, but only under specified conditions: a lowered standard applies only when a sound is judged as audible by the Noise Control Officer. While LBL is unaware of any determination by the City of Berkeley Noise Control Officer or his/her agent regarding compliance of LBL with this section of the ordinance, LBL made noise measurements at Mr. Mathis' home which indicated that LBL Building 37 projects an

audible tone with a frequency of 206 Hz. As stated in response to Item F-1, LBL has begun an acoustical treatment project at Building 37 to address this concern.

ITEM F-3

Letter from Raymond Mathis, May 14, 1992

Page III-K-5 (inaccurate 1st paragraph): The ambient for Canyon Road in Appendix A was taken March 16 to 18, 1990 before the March 31st McCartney rock event (not ". . . . during the concert. . . ." March 16 to 18 was a noisy weekend due to an unusual amount of traffic on Rim Road during the day – evening sound levels were typical for this canyon.

RESPONSE

The ASUC SUPERB Organization, which co-sponsored the Paul McCartney concert, confirmed the concert was held in UC Berkeley Greek Theatre on the weekend of March 30-31, 1990. LBL regrets the error in text which appeared in the Draft SEIR (April 1992, page III-K-5).

ITEM F-4

Letter from Raymond Mathis, May 14, 1992

Page III-K-7 (2nd Paragraph): 55 dBA and 45 dBA should be reduced to 50 dBA and 49 dBA because of the nature of the equipment noise we experience (see letter item 2).

RESPONSE

Mr. Mathis is referring to the City of Berkeley Noise Ordinance. Please see Item F-2 for the LBL response.

ITEM F-5

Letter from Raymond Mathis, May 14, 1992

We believe the lab desires to minimize noise intruding on adjacent residential areas north and south of LBL. Perhaps the most direct and cheapest way to find the location of the offending equipment would be to simply ask your mechanical foreman or building manager, in any case, equipment noise clearly heard and obviously disturbing to adjacent neighborhoods should be specifically identified and mitigated in the final EIS.

RESPONSE

Acoustical testing was conducted as summarized in the draft SEIR pages III-K-1 to III-K-6 and more recently at an opportune period during scheduled equipment maintenance at LBL. As a result, LBL is better able to identify equipment and facilities which contribute to ambient noise levels in the vicinity. Full speed operation of cooling tower fans and operation of various water pumps are among the major noise sources at LBL. As stated in the draft SEIR, the existing LBL original laboratory site is not a quiet area and continued operation of LBL has the potential to conflict with applicable noise ordinances; however, LBL is committed to implementing measures to reduce the potential for excessive noise generation from building and equipment operations. For example, LBL has begun an acoustical treatment of Building 37 to address the concern of a 206 Hz audible tone being generated at Building 37. This work is scheduled to be completed in January 1993.

ITEM F-6

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Employees and Transportation

Issue

The City recommends that LBL participate in Berkeley's First Source program which targets Berkeley residents as potential employees as one trip reduction measure to reduce the impact of future population growth at LBL.

RESPONSE

The Berkeley First Source program was created six years ago by the City of Berkeley to link Berkeley residents with employment opportunities available through Berkeley businesses. One purpose of the City's program is to identify qualified Berkeley residents and then to work with employers to interview these residents when job opportunities exist. Currently, the City of Berkeley and the University of California, Berkeley have agreed to work together on this program.

The personnel director at Lawrence Berkeley Laboratory will meet with the City's First Source program staff to explore opportunities for Lawrence Berkeley Laboratory to participate in this program. LBL must also ensure that LBL participation in the program would not violate federal laws regarding equal opportunity in employment programs required at LBL.

In response to the City's interest in this program as a trip reduction measure, the draft SEIR (April 1992, p. III-H-3), indicates that both the number and percentage of LBL employees who reside in the City of Berkeley has declined. For example, between 1980 and 1991, the number of LBL employees living in the City of Berkeley declined from 602 to 356, while the percentage declined from 22.6 percent to 18.1 percent. More Berkeley residents employed at LBL would likely result in a slight reduction in the number of single occupant vehicles driven to LBL.

Also as noted in the draft SEIR (April 1992, pp. III-I-15 and III-I-16), LBL has implemented a number of measures to reduce single occupant automobile use including, promoting carpools by creating a carpool matching program, providing funding to Berkeley TRIP to assist in their vanpooling program, permitting staggered (flex-time) work hours, providing preferential parking for car and vanpools, reviewing LBL shuttle service and transit interface facilities, and providing bicycle racks on all LBL shuttle buses.

ITEM F-7

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Compliance Specifications

Issue

LBL is required to comply with all City, State, and Federal regulations concerning hazardous materials and hazardous waste. The SEIR neglects the City's Hazardous Materials Disclosure Ordinance requirements (Berkeley Municipal Code Chapter 11.52) with which LBL must comply. (See attached copy of the Disclosure Ordinance.)

RESPONSE

It is correct that LBL must comply with all applicable City, State, and Federal regulations concerning hazardous materials and hazardous wastes. LBL submits annually to the City of Berkeley a business plan that includes both an inventory of hazardous materials stored at LBL and emergency response plans and procedures LBL will follow in the event of a release or threatened release of a hazardous material. As noted in Section IV-B 1.b.2. of the SEIR (April 1992, page IV-B-5), on January 2, 1992 LBL submitted to the City of Berkeley its most recent business plan in compliance with the City's Hazardous Materials Disclosure Ordinance.

ITEM F-8

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Compliance Specifications

Mitigations

Where LBL is out of compliance with City, State, and Federal regulations governing hazardous materials and hazardous waste, LBL shall submit a compliance schedule to the City which establishes realistic compliance timelines and resource allocations.

RESPONSE

In the event that LBL is out of compliance with an applicable City, State, or Federal regulation requiring submission of a compliance schedule, LBL submits a compliance schedule to the agency designated to receive it by the applicable regulation. In addition, LBL is required by DOE to conduct self-audits and prepare reports based upon DOE procedures, as described in the draft SEIR (April 1992, Section IV).

For example, underground storage tanks are included in the City of Berkeley's permit program. As required by the California Underground Storage Tank regulations, quarterly reports are submitted to the City of Berkeley which show the compliance status of these underground tanks. All of these tanks are also monitored for leaks, as required by the California Underground Storage Tank regulations. If monitoring results indicate that a leak exists, the City of Berkeley and the Regional Water Quality Board are notified within 24 hours. Within five working days of detecting the release, an Underground Storage Tank Unauthorized Release (Leak)/Contamination Site Report is submitted. This report includes a report of initial corrective or remedial actions taken, and a time schedule for implementing any corrective or remedial action necessary, to clean up and abate the effects of any unauthorized release.

ITEM F-9

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Compliance Specifications

Mitigations

LBL shall pay hazardous materials and hazardous waste permit fees in accordance with the City's fee schedules based upon the quantities of materials stored and the wastes generated. The Hazardous Waste Management Facility will not be included in these calculations if it is successfully permitted by the State.

RESPONSE

As a federal facility, LBL is exempt from taxes that are levies against the federal government, which is immune from such taxation. LBL pays fees that are imposed or authorized by federal law. To date, LBL is not authorized to pay hazardous materials or hazardous waste permit fees to the City of Berkeley.

LBL is, however, authorized to pay reasonable charges for services rendered by the City of Berkeley, so long as these services are available to all other tax-exempt property owners, and these owners are also charged for services.

ITEM F-10

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Compliance Specifications

Mitigations

LBL shall submit disclosure information which reports all hazardous materials stored on site, based on threshold reporting quantities established in the City's Disclosure Ordinance. This disclosure information must be updated within 15 days of any significant change, as defined by the Ordinance.

RESPONSE

As noted in the response to Item F-7, LBL complies with all applicable City, State, and Federal regulations concerning hazardous materials and hazardous wastes. LBL submits annually to the City of Berkeley a business plan that includes both an inventory of hazardous materials stored at LBL and emergency response plans and procedures LBL will follow in the event of a release or threatened release of a hazardous material. As noted in Section IV-B 1.b.2. of the SEIR (April 1992, page IV-B-5), on January 2, 1992 LBL submitted to the City of Berkeley its most recent facility-wide business plan and inventory, in compliance with the City's Hazardous Materials Disclosure Ordinance.

ITEM F-11

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Compliance Specifications

Mitigations

Acutely Hazardous Materials stored above the Threshold Planning Quantities must also be reported to the City and a Risk Management and Prevention Program prepared and submitted for City review and comment.

RESPONSE

LBL reported storage of five acutely hazardous materials above Threshold Planning Quantities to the City as part of its January 2, 1992 inventory submission. (See response to Item F-7). The City has not requested that LBL prepare a Risk Management and Prevention Program in response to this submission nor in these circumstances is LBL required to submit such a program.

ITEM F-12

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Issue

LBL's spill response procedures remain in need of improvement.

RESPONSE

As noted in the draft SEIR (April 1992, Section IV-H), LBL has set out a number of emergency response procedures. Because spill response is an integral component of LBL's environmental health and safety program, the procedures are regularly reviewed and updated. LBL is at present devoting substantial efforts toward improving its spill response procedures.

In particular, both the Spill Prevention Control and Countermeasure Plan are to be evaluated and updated as part of LBL's ongoing EH&S program activities.

ITEM F-13

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Issue

In addition, the SEIR should discuss in some detail the annual exercise of LBL's emergency preparedness plans and coordination of this exercise with City and County responders.

RESPONSE

LBL discussed emergency preparedness and response planning in the draft SEIR (April 1992, Section IV-H, pp. IV-H-1 to IV-H-15). As noted, LBL conducts at least one site-wide exercise annually to test emergency response plans and procedures. The Lab also conducts drills which are more frequent and have limited objectives. The City of Berkeley has participated in some of these drills and a formal system of coordination has been established.

Some examples of coordinated drills and exercises are listed below:

Contaminated Patient Exercises

LBL, Alta-Bates Hospital and the Berkeley Fire Department have collaborated on drills involving hypothetically radioactive contaminated patients. As part of the exercise scenario, the City of Berkeley Fire Department has responded to LBL and transported patients to Alta-Bates. This has been an on-going cooperative effort since the late 1970s.

Coordinated Fire Department Training

LBL and the City of Berkeley Fire Department routinely train together on specific scenarios. One such scenario was the urban-wild land fire interface training and the ventilation and drill training conducted in February 1992 at UC Berkeley. This training would support actual emergency response.

Future Drill and Exercise Coordination

To enhance communication between the City of Berkeley and LBL, the respective emergency coordinators for the City and for LBL are members of an organization known as the "Town and Gown Preparedness Team". The mission of the Team is to bring together emergency planning elements and related agencies in the Berkeley community. The Team has an ultimate objective of developing improved public service in disaster response and recovery following major emergencies affecting the community. One of the significant goals of this Team is to conduct a Berkeley community exercise in April 1993. As a minimum, participants will be the City of Berkeley, UCB and LBL. Goals and objectives will be developed by a committee of the three participants using a common disaster scenario.

ITEM F-14

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall familiarize local emergency responders with the LBL facility (California Code of Regulations (CCR) Section 67126).

RESPONSE

As noted in the draft SEIR (April 1992, Section IV-H), LBL has an established emergency response framework and plan. LBL also has its own on-site Fire Department which is staffed 24 hours a day, seven days a week. As noted in the draft SEIR (April 1992, p. IV-H-7), the LBL Fire Department is staffed and trained to deal with emergencies occurring at all on-site locations including the Hazardous Waste Handling Facility as well as LBL facilities located on the UCB Campus. The university has its own, permanently staffed, police force that handles law enforcement functions. (See Draft SEIR, April 1992, p. 111-L-1.)

Other potential first responder requirements such as maintenance and utilities are also handled on-site at LBL leaving little, if any, requirement for local jurisdiction support. In the rare event that outside help would be requested, it would be most likely through the Fire Department Mutual Aid System. To this end and in compliance with 22CCR Section 66264.37, the LBL Fire Department has established an on-going relationship with the City of Berkeley Fire Department through drills, exercises and meetings. [22CCR Section 67126 was repealed, effective July 1, 1991.]

ITEM F-15

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall establish the position of Emergency Coordinator (CCR 67144).

RESPONSE

The position of LBL Emergency Coordinator has been established within the context of 22CCR Section 66264.55. [22CCR Section CCR 67144 was repealed, effective July 1, 1991.] For minor spills, the LBL Emergency Coordinator is the operations supervisor for the LBL Hazardous Waste Handling Facility. For larger spills, the LBL Fire Department Incident Commander assumes the responsibilities of the LBL Emergency Coordinator with support from the Operations Supervisor for the LBL Hazardous Waste Handling Facility.

The Emergency Coordinators are thoroughly familiar with all aspects of the LBL Contingency Plan, facility layouts, operations and activities, hazards, and notification responsibilities. Notification includes activation of facility alarms and communication systems, where applicable, and contact with appropriate federal, state or local agencies.

ITEM F-16

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall submit written reports within 15 days of each spill incident (CCR 67145).

RESPONSE

The code cited in this response deals with hazardous waste management activities but was repealed on July 11, 1991. Numerous other laws and regulations also require that spills be reported promptly and in writing, as discussed in the draft SEIR (April 1992, p. IV-H-5). Depending upon the nature of the spill incident, appropriate agencies may include Cal/EPA, EPA, the State Office of Emergency Services, the City of Berkeley, the State Water Resources Control Board and the National Response Center. LBL is already required to comply with these spill reporting requirements, and thus these requirements are not specifically identified as mitigation measures for CEQA purposes. As a practical matter, however, environmental laws and regulations serve as important mitigations for hazardous material handling activities.

ITEM F-17

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall conduct employee training and preparation for implementation of the contingency or spill response plan (CCR 67140 et. seq.).

RESPONSE

Existing LBL emergency training and spill response plans are described in detail in the draft SEIR (April 1992, pp. IV-H-3 through IV-H-13). These training programs and spill response procedures are periodically reviewed and updated.

ITEM F-18

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall submit immediate Unauthorized Release notifications to the appropriate agencies (CCR 67140 et. seq.).

RESPONSE

Please refer to response Item F-16.

ITEM F-19

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Spill Response

Mitigations

LBL shall adhere to the employee training requirements of the California Health and Safety Code.

RESPONSE

LBL does adhere to all applicable employee training requirements mandated by the California Health and Safety Code, including those required in relation to its Hazardous Waste Handling Facility.

ITEM F-20

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Medical Waste

Issue

The SEIR states that the Medical Waste Management Act is enforced by the County. In fact, the State regulates Medical Waste in the City of Berkeley.

RESPONSE

LBL agrees that the State currently regulates medical waste in the City of Berkeley. Although the Medical Waste Management Act provides for and encourages local agency implementation, at the time the draft SEIR was prepared local agency implementation of this recent Act was uncertain due to funding constraints at state and local levels.

ITEM F-21

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Stormwater

Issue

The SEIR omits the fact that the County and the City are developing the Non-point Discharge or Clean Stormwater permitting program within the City. This program is slated to begin permit inspections July 1, 1992.

RESPONSE

As discussed in the draft SEIR (April 1992, p. IV-C-7), amendments to the Clean Water Act resulted in LBL becoming subject to state and federal regulation of its stormwater discharges. As noted in the draft SEIR (April 1992, p. IV-C-12), LBL on March 27, 1992 submitted to the State Water Resources Control Board a Notice of Intent (NOI) for inclusion in the State of California's General Permit to Discharge stormwater associated with industrial activity. The primary regulatory agency with jurisdiction over LBL's stormwater discharges is the Regional Water Quality Control Board. LBL provided the City with a copy of its NOI on March 27, 1992.

ITEM F-22

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Stormwater

Issue

The SEIR does not adequately address the potential cross contamination of Strawberry Canyon Creek with contaminants through existing leaks in the collection system.

RESPONSE

This statement as written is unclear as to what collection system the City makes reference. Many types of collection systems exist on-site at LBL: sanitary sewers, storm drains, sumps, storage tanks, hydraugers. Assuming the system in question refers to breaks in the sanitary sewers, any leaks from the sewers would first impact ground water and local soils. Contaminated ground water could then potentially discharge to Strawberry Creek. To address this possibility, and as noted in the draft SEIR (April 1992, pp. IV-I-5 to IV-I-14), the LBL Site Restoration Program is developing plans to install monitoring wells and collect soil and ground water samples to identify any potential releases from sewer line breaks. The objective is to identify suspected and potential contaminant releases requiring further investigation. Included within this phase are the drilling of soil borings, the installation of monitoring

wells, and the collection of soil, soil gas and ground water samples. The next phase will focus on defining the source and extent of contamination from identified releases. Planning and review of the need for any environmental documentation for any necessary remedial actions with regard to releases from sewer lines to Strawberry Creek will follow after completion of the investigation phase. Interim actions will be taken if warranted. Full implementation of the plan will take place over the next 10 to 15 years as DOE funds this activity.

ITEM F-23

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Hazardous Waste Reduction

Issue

The City should be made aware of waste minimization efforts undertaken by LBL. LBL should send the City copies of the hazardous waste reduction documents described in the SEIR, including the SB 14 compliance plan and the EBMUD plan. Waste minimization efforts described should include plans to minimize medical waste as well as hazardous waste.

RESPONSE

A copy of the updated SB 14 Report will be forwarded to the City.

In addition, a copy of the LBL Waste Minimization Opportunity Assessment Report which was prepared for the Easy Bay Municipal Utility District will be forwarded to the City. This report focuses on waste minimization activities in the LBL Building 77 plating shop and the LBL Building 25 printed circuit board shop.

Medical waste is included in LBL's waste minimization efforts and described in these Reports. One example is an effort to minimize mercury from thermometers since mercury is considered an extremely hazardous waste.

ITEM F-24

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Hazardous Materials Transportation

Issue

The SEIR neglects the City's transportation ordinances regulating hazardous materials transportation routes and the transport of radioactive wastes (Berkeley Municipal Code Chapters 19.48.049 and 12.84).

RESPONSE

As described in the SEIR, LBL complies with, and requires independent contractors transporting its hazardous and radioactive materials to comply with, all applicable federal, state and local laws and regulations governing the transportation of hazardous and radioactive materials.

The laws and regulations concerning hazardous materials transportation are described in the draft SEIR (April 1992, pp. IV-E-1 to IV-E-2).

ITEM F-25

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Underground Storage Tanks

Issue

The SEIR does not adequately address the existing and potential impacts of the facility's leaking underground storage tanks or contaminated sites.

RESPONSE

The LBL Site Restoration Program addresses this topic. This program is discussed in the Draft SEIR (April 1992, pages IV-I-1 to IV-I-19). In the current phase, suspected and potential contaminant releases and sources which require further investigation are being identified. Activities included in this phase are the drilling of soil borings, the installation of monitoring wells, and the collection of soil, soil gas and ground water samples. In the next phase, a more detailed investigation will be conducted which focuses on defining the source and extent of contamination from identified releases, and will also address known or potential releases from existing or already removed underground tanks. Planning and review of the need for environmental documentation for any necessary remedial actions with regard to contaminated sites will follow after completion of the investigation phase.

(See also response to Item F-22.)

ITEM F-26

Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992

Radioactive Waste Storage

Issue

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

The SEIR should include a Community Health Risk Assessment addressing the potential or existing threats to the environment and the community created by both the long and short term storage of radioactive and hazardous waste at the hazardous waste storage facilities and satellite storage facilities.

RESPONSE

LBL conducts risk assessments of proposed activities in compliance with DOE Orders on Safety Analysis Reviews and requirements of NEPA and CEQA. In addition, a risk assessment of air toxics which included long- and short-term storage of radioactive and hazardous materials has been completed as indicated in the Draft SEIR (April 1992, pages III-J-32 through III-J-46). These risk assessments have confirmed that LBL's operations do not pose any significant health risk to the community.

ITEM F-27

Letter from the State of California - Environmental Protection Agency, Department of Toxic Substances Control, May 14, 1992

The SEIR should study the reduction of hazardous waste generation at LBL as mitigation of the facility's future environmental impacts.

In particular, the SEIR should provide for increased recycling of laboratory materials for reuse at LBL. The draft SEIR's discussions of regulatory restrictions on recycling, as found on page IV-C-3, are not entirely accurate. In fact, many types of recycling for onsite reuse are exempt from permitting requirements, as provided by Health and Safety Code Section 25143.2. LBL should look closely at its waste generation patterns to identify opportunities to recycle lab materials.

RESPONSE

LBL agrees with this comment. LBL waste minimization activities are spelled out in detail in the draft SEIR (April 1992, pp. IV-D-3 to IV-D-7).

Ongoing recycling programs at LBL include: all non-hazardous waste (including paper, cans, cardboard, etc.), copy machine toner cartridges, refrigerants, fluorescent light tubes, carbon adsorption drums, automotive batteries, antifreeze, packing materials, cleaning solvents, and photo processing chemicals.

Planned recycling programs at LBL include: waste oil, organic debris, photo processing equipment, alkaline batteries, shop towels/rags, metal shavings/chips, sandblast abrasive, and paint and aerosol cans.

As noted in the Draft SEIR (April 1992, page III-M-7), it is estimated that each employee at LBL generates, on average, 280 pounds of solid waste material per year. In 1990, the approximately 3,940 employees and guests at LBL generated an estimated 550 tons of solid (office type) waste. In 1990, LBL also generated approximately 750 tons of construction and grounds waste. Of the office waste materials approximately 500 tons are recycled. UC Berkeley, which collects LBL's non-hazardous solid waste, takes LBL's dumpster contents to a private recycling service in Oakland. Recyclable materials are

sorted, with the result that about 90 percent of the materials are reused, and only ten percent (by volume) are baled and sent to a landfill. The approximately 750 tons of construction and grounds waste are hauled by Oakland Scavenger Company under contract to UC Berkeley. These non-recyclable materials are sent to the Altamont land fill in Livermore.

A Process Waste Assessment training program is being developed by LBL to provide facilities with the ability to evaluate waste streams and possible alternatives.

A waste generation baseline database is planned to be developed at LBL in 1992, and the necessary information gathered. This database will enable LBL to review more closely its waste generation patterns to identify waste reduction opportunities.

ITEM F-28

Letter from the State of California – Environmental Protection Agency, Department of Toxic Substances Control, May 14, 1992

LBL should further reduce the environmental impacts of its operations by identifying additional means to reduce the quantity of hazardous waste it generates. The SEIR should discuss opportunities and limitations of mitigating impacts to the environment through waste reduction.

RESPONSE

Each year the LBL EH&S Division Waste Management unit completes an SB14 Report. The Part 2, Source Reduction Plan Summary as indicated in the draft SEIR (April 1992, pp. IV-D-3 to IV-D-7), will be evaluated to ensure that the highest priority waste streams are being addressed. Modifications and updates will occur annually.

F-III LETTERS RECEIVED DURING THE PUBLIC REVIEW PERIOD

F-III. LETTERS RECEIVED DURING THE PUBLIC REVIEW PERIOD

This section lists letters received during the public review period.

1. Letter from Raymond Mathis, May 14, 1992
2. Letter from the City of Berkeley, Planning and Community Development Department, May 15, 1992
3. Letter from the State of California – Environmental Protection Agency, Department of Toxic Substances Control, May 14, 1992

14 May 1992

RECEIVED
MAY 15 1992
ENVIRONMENT AND SAFETY
COMPLIANCE DEPARTMENT
LBL

Dr. Martha Krebs
Bldg 50A/4112 LBL
#1 Cyclotron Road
Berkeley, California 94720

RE: DRAFT SEIR - UC LBL

We were very pleased to find the NOISE discussion was much improved over past EIS efforts by finally being site specific rather than general using standard paragraphs.

I offer the following observations:

1) The noise we clearly hear on Canyon Road coming from the southern portion of the LBL is a steady 24 hr. per day whine or hum. Since this distinctive noise can even be heard over daytime traffic, it should have been described by your accoustical consultant. I can hear it and am practically deaf in one ear.

2) The City of Berkeley noise ordinance was extensively referred to; however, the 5 dBA reduction in permissible noise levels due to noise coming from mechanical equipment (whines, hums etc) was not included. See 13.40.050 "B. CORRECTION FOR CHARACTER OF SOUND", you will find it directly above the EXTERIOR NOISE LIMITS table 13.40-1. A straight forward reading of the city ordinance would indicate 40 dBA as maximum during evening hours, not 45 dBA.

3) Page III-K-5 (inaccurate 1st paragraph): The ambient for Canyon Road in Appendix A was taken March 16 to 18, 1990 before the March 31st McCartney rock event (not "....during the concert....". March 16 to 18th was a noisy weekend due to an unusual amount of traffic on Rim Road during the day - evening sound levels were typical for this canyon.

4) Page III-K-7 (2nd Paragraph): 55 dBA and 45 dBA should be reduced to 50 dBA and 49 dBA because of the nature of the equipment noise we experience (see letter item 2).

We believe the lab desires to minimise noise intruding on adjacent residentual areas north and south of LBL. Perhaps the most direct and cheapest way to find the location of the offending equipment would be to simply ask your mechanical foreman or building manager, in any case, equipment noise clearly heard and obviously disturbing to adjacent neighborhoods should be specifically identified and mitigated in the final EIS.

Sincerely,

Raymond Mathis
39 Canyon Road 94704-1815

cc: Michael F. Brown, City Manager
Fred Collegnon, Councilmember

STATE OF CALIFORNIA — ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, Governor

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
REGION 2
700 HEINZ AVE., SUITE 200
BERKELEY, CA 94710-2737
(510) 540-3508

May 14, 1992

Dr. Martha Krebs
Associate Director for Planning and Development
Building 50A/4112
Lawrence Berkeley Laboratory
#1 Cyclotron Road
Berkeley, California 94720

Dear Dr. Krebs:

COMMENTS ON DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED RENEWAL OF THE CONTRACT FOR OPERATION AND MANAGEMENT OF THE LAWRENCE BERKELEY LABORATORY (SCH # 91093068)

Thank you for the opportunity to comment on this draft Supplemental Environmental Impact Report (SEIR). The Department of Toxic Substances Control (Department) is responsible for regulating hazardous waste management in California. Lawrence Berkeley Laboratory (LBL) currently holds a Hazardous Waste Facility Permit from this Department.

The SEIR should study the reduction of hazardous waste generation at LBL as mitigation of the facility's future environmental impacts.

In particular, the SEIR should provide for increased recycling of laboratory materials for reuse at LBL. The draft SEIR's discussions of regulatory restrictions on recycling, as found on page IV-C-3, are not entirely accurate. In fact, many types of recycling for onsite reuse are exempt from permitting requirements, as provided by Health and Safety Code Section 25143.2. LBL should look closely at its waste generation patterns to identify opportunities to recycle lab materials.

LBL could further reduce the environmental impacts of its operations by identifying additional means to reduce the quantity of hazardous waste it generates. The SEIR should discuss opportunities and limitations of mitigating impacts to the environment through waste reduction.

If you have any questions, please call Valerie Heusinkveld of my staff at (510) 540-3742.

Sincerely,

Howard K. Hatayama
Regional Administrator

Printed on Recycled Paper

City of Berkeley

Planning and Community Development Department
Martin Luther King, Jr.
Civic Center Building
2180 Milvia Street — 2nd Floor
Berkeley, California 94704

(415) 644-6534

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MAY 18 1992

ENVIRONMENT AND SAFETY
COMPLIANCE DEPARTMENT
LBL

May 15, 1992

Dr. Martha Krebs
Associate Director for Planning and Development
Building 50A/4112
Lawrence Berkeley Laboratory
#1 Cyclotron Road
Berkeley, CA 94720

Subject: RESPONSE TO DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED RENEWAL OF THE CONTRACT BETWEEN THE UNITED STATES DEPARTMENT OF ENERGY AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA FOR OPERATION AND MANAGEMENT OF THE LAWRENCE BERKELEY LABORATORY

Dear Dr. Krebs:

Thank you for sending the City of Berkeley Planning Department the Draft Supplemental Environmental Impact Report (SEIR) for the University of California proposed extension of its contract with the United States Department of Energy to manage the Lawrence Berkeley Laboratory (LBL).

The City's major concerns with regard to the SEIR are related to the areas of transportation and hazardous materials. This letter requests that you address certain impacts in greater detail and provides recommended mitigation measures.

The City recommends that LBL participate in Berkeley's First Source program which targets Berkeley residents as potential employees as one trip reduction measure to reduce the impact of future population growth at LBL.

The following hazardous materials concerns and mitigation measures should be incorporated into the SEIR:

Compliance Specifications

1) **Issue:** LBL is required to comply with all City, State, and Federal regulations concerning hazardous materials and hazardous waste. The SEIR neglects the City's Hazardous Materials Disclosure Ordinance requirements (Berkeley Municipal Code Chapter 11.52) with which LBL must comply. (See attached copy of the Disclosure Ordinance).

Mitigations: Where LBL is out of compliance with City, State, and Federal regulations governing hazardous materials and hazardous waste, LBL shall submit a compliance schedule to the City which establishes realistic compliance timelines and resource allocations. LBL shall pay hazardous materials and hazardous waste permit fees in accordance with the City's fee schedules based upon the quantities of materials stored and the wastes generated. The Hazardous Waste Management Facility will not be included in these calculations if it is successfully permitted by the State. LBL shall submit disclosure information which reports all hazardous materials stored on site, based on threshold reporting quantities established in the City's Disclosure Ordinance. This disclosure information must be updated within 15 days of any significant change, as defined by the Ordinance. Acutely Hazardous Materials stored above the Threshold Planning Quantities must also be reported to the City and a Risk Management and Prevention Program prepared and submitted for City review and comment.

Spill Response

1) **Issue:** LBL's spill response procedures remain in need of improvement. In addition, the SEIR should discuss in some detail the annual exercise of LBL's emergency preparedness plans and coordination of this exercise with City and County responders.

2) **Mitigations:** LBL shall familiarize local emergency responders with the LBL facility (California Code of Regulations (CCR) Section 67126). LBL shall establish the position of Emergency Coordinator (CCR 67144). LBL shall submit written reports within 15 days of each spill incident (CCR 67145). LBL shall conduct employee training and preparation for implementation of the contingency or spill response plan (CCR 67140 et. seq.). LBL shall submit immediate Unauthorized Release notifications to the appropriate agencies (CCR 67140 et. seq.). LBL shall adhere to the employee training requirements of the California Health and Safety Code.

Medical Waste

1) **Issue:** The SEIR states that the Medical Waste Management Act is enforced by the County. In fact, the State regulates Medical Waste in the City of Berkeley.

Stormwater

1) **Issue:** The SEIR omits the fact that the County and the City are developing the Non-point Discharge or Clean Stormwater permitting program within the City. This program is slated to begin permit inspections July 1, 1992. The SEIR does not adequately address the potential cross contamination of Strawberry Canyon Creek with contaminants through existing leaks in the collection system.

Hazardous Waste Reduction

1) **Issue:** The City should be made aware of waste minimization efforts undertaken by LBL. LBL should send the City copies of the hazardous waste reduction documents described in the SEIR, including the SB 14 compliance plan and the EBMUD plan. Waste minimization efforts described should include plans to minimize medical waste as well as hazardous waste.

Hazardous Materials Transportation

1) **Issue:** The SEIR neglects the City's transportation ordinances regulating hazardous materials transportation routes and the transport of radioactive wastes (Berkeley Municipal Code Chapters 19.48.040 and 12.84).

Underground Storage Tanks

1) **Issue:** The SEIR does not adequately address the existing and potential impacts of the facility's leaking underground storage tanks or contaminated sites.

Radioactive Waste Storage

1) **Issue:** The SEIR should include a Community Health Risk Assessment addressing the potential or existing threats to the environment and the community created by both the long and short term storage of radioactive and hazardous waste at the hazardous waste storage facilities and satellite storage facilities.

Thank you for your consideration of the concerns raised in this letter. You may contact Karen Haney-Owens, Associate Planner, in the Planning Department if you have any questions regarding this response to the SEIR.

Sincerely,

Michael F. Brown, City Manager

Attachment: City of Berkeley Hazardous Materials Disclosure Ordinance

cc: Gil Kelley, Acting Planning Director
Lois Jones, Environmental Review Officer
Karen Haney-Owens, Associate Planner

ORDINANCE NO. 5662 N.S.

HAZARDOUS MATERIALS DISCLOSURE ORDINANCE

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF BERKELEY as follows:

Section 1. There is hereby added to the Municipal Code of Berkeley Chapter 11.52.010 through 11.52.130 as follows:

11.52.010. Findings and Purpose.

The council finds and declares:

A. Hazardous substances and hazardous wastes which are present in the community may pose acute and chronic health hazards to individuals who live, visit and work in the City of Berkeley and who are exposed to such substances as a result of fires, spills, industrial accidents, or other types of releases or emissions.

B. The people who live, visit and work in the City of Berkeley have a right and need to know of the use, handling, storage and dangers of hazardous materials in the community in order to plan for and respond to potential exposure to such materials.

C. Basic information on the location, type, and the health risks of hazardous materials, used, stored or disposed of in Berkeley is not now available to firefighters, health officials, planners, elected officials and residents.

D. It is the intent of the council to recognize the community's right and need for basic information on the use, handling, storage and disposal of hazardous materials in Berkeley and to establish an orderly system for the provision of such information.

E. It is further the intent of the council that the system of disclosure set forth herein shall provide the information essential to firefighters, health officials, planners, elected officials, workers and their representatives and residents in meeting their responsibilities for the health and welfare of community in such a way that the statutory privilege of trade secrecy is not abridged.

11.52.020. Definitions.

For the purpose of this Chapter the terms listed in this Section shall be defined as follows:

A. "Business" means an employer, self-employed individual, trust, firm, joint stock company, corporation, partnership, association. A business shall include both for-profit and non-profit businesses.

B. "Carcinogen" means a substance:

(1) for which the International Agency for Research of Cancer currently states that there is sufficient evidence of carcinogenicity in animals or that there is a potential of human carcinogenicity, or that the substance is a confirmed human carcinogen; or,

(2) for which the National Toxicology Program currently finds in an animal bioassay that there is sufficient evidence of

carcinogenesis (e.g. positive in two species) in animals or humans.

C. "CAS number" means the unique identification number assigned by the Chemical Abstracts Service to specific chemical substances.

D. "Chemical name" means the scientific designation of a substance in accordance with the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.

E. "Common name" means any designation or identification such as code name, code number, trade name, or brand name used to identify a substance other than by its chemical name.

F. "Disclosure form" means the written request for information prepared by the Chief of Environmental Health pursuant to Section 11.52.060.

G. "EPA Waste Stream Code" means the identification number assigned pursuant to the regulations of the U.S. Environmental Protection Agency to specific types of hazardous waste.

H. "Handle" means to generate, treat, store or dispose of a hazardous waste in any fashion.

I. "Hazardous material" means any substance or hazardous waste as defined in subsection (J) or (K), or any material designated pursuant to Section 11.52.030.

J. "Hazardous substance" means any substance or product:

(1) for which the manufacturer is required to prepare an MSDS for the substance or product purusant to the Hazardous Substance Information and Training Act; (commencing with Section 6360, Chapter 2.5, Part 1 of Division 5 of the California Labor

Code) or pursuant to any applicable Federal law or regulations; or

(2) which is listed as a radioactive material set forth in Chapter 1, Title 10, Appendix B, maintained and updated by the Nuclear Regulatory Commission; or

(3) which is known by the business in which it is found to present a significant risk of personal injury or illness as a result of foreseeable use, handling, release, exposure or contamination, except that no business shall be required to compile or generate new data for the purposes of this subdivision.

K. "Hazardous waste" means hazardous or extremely hazardous waste as defined by Sections 25115 and 25117 of the California Health and Safety Code.

L. "MSDS" means a Material Safety Data Sheet prepared pursuant to Section 6390 of the California Labor Code. For any hazardous substance for which a Material Safety Data Sheet is not required to be prepared pursuant to Section 6390 of the California Labor Code, a Material Safety Data Sheet which contains the information specified in Section 6391 of the California Labor Code shall satisfy the definition of an MSDS under this Chapter.

M. "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.

N. "Reproductive toxin" means any substance or agent which can affect reproductive functions causing congenital defects or impairments, spontaneous abortions, impaired spermatogenesis, reduced fertility and/or intrauterine growth retardation which is included in the appendix compiling human and animal evidence for adverse reproduction effects of chemicals and chemical processes in

Chemical Hazards of Human Reproduction by Ian T. Nesbit and Nathan J. Karch, Noyes, 1983, or the current revision thereof and for which an MSDS is required.

O. "SIC code" means the identification number assigned by the Standard Industrial Classification code to specific types of businesses.

P. "Use" includes the handling, processing or storage of a hazardous substance.

Q. "User" means any business which uses, handles, processes or stores a hazardous substance or a hazardous waste.

11.52.030 Designation of a Hazardous Material.

A. A material may be added to the list of hazardous materials set forth in Section 11.52.020 upon a finding by the Chief of Environmental Health after holding a public workshop on the matter, that, while not otherwise listed, it satisfies the following criteria: the material, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if it is released into the community.

B. A material added to the list of hazardous materials pursuant to subsection A shall be designated as either a hazardous substance or hazardous waste by the Chief of Environmental Health.

11.52.040. Filing of a Hazardous Materials Disclosure Form.

A. Any business which uses, handles, processes, or stores a hazardous material must annually submit a completed disclosure form to the Division of License and Collection.

B. Beginning six (6) months after the enactment of this Chapter, but in no event later than one 1 year from enactment of this Chapter, all businesses using hazardous materials shall submit a completed disclosure form.

C. A business operating a City licensed business shall thereafter submit a completed disclosure form with its annual renewal of the City business license as a condition of renewal.

D. A business not operating a City licensed business and using a hazardous substance shall thereafter submit a completed disclosure form by January 1 of each year.

E. Beginning six (6) months after the enactment of this Chapter, within 15 days of any:

(1) new incidence or significant change in the use, handling, processing or storage of a hazardous material (including quantity), where a significant change in the quantity of a previously disclosed hazardous material means an increase of 50% or more of such material at any given time, excepting a new use or significant change which is otherwise exempted by Section 11.52.070;

(2) use, handling, processing or storage of a previously undisclosed hazardous material;

(3) change of business address;

(4) change of business ownership;

(5) change of business name; or

the user shall submit to the Chief of Environmental Health a disclosure form detailing the new use, handling, processing or storage, or other appropriate information.

11.52.050. Administrative Procedure.

A. Upon receipt of a disclosure form, the Division of License and Collection shall ensure that the name and address on the form are correct and shall forward the disclosure form to the Chief of Environmental Health.

B. The Chief of Environmental Health shall review each disclosure form and shall either accept the disclosure form only if it provides complete and adequate information needed for the protection of safety and health or of the environment, or return the form to the user describing what additional information must be included in the form before it may be accepted. The Chief of Environmental Health shall maintain files of all disclosure forms received or copies thereof at least thirty (30) years, shall index the disclosure forms by street address and parcel number, and shall cross reference them by SIC numbers and the CAS number(s) or EPA waste stream code(s) listed on the disclosure form. The Chief of Environmental Health may, for purposes related to this Chapter, undertake actions, including, but not limited to, the maintenance and verification of its files relating to the hazardous materials disclosure ordinance, the acquisition of additional information on hazardous materials and their handling, public education regarding hazardous materials and the promotion of recycling of wastes and of compliance with this Chapter.

C. Subject to the provisions of Section 11.52.100, relating to trade secrets, the disclosure form will be publicly available during normal business hours in the Department of Health and Human Services in accordance with the following procedures:

(1) Written application for the information shall be submitted to the Chief of Environmental Health, on a form provided by the City which shall include name, address telephone number, and verification of the applicant's identity. The written application shall also include the identification of the specific file requested for disclosure.

(2) The information requested shall be provided within ten (10) working days after the submission of the application, except for trade secret information, which shall be subject to the provisions of Section 11.52.100.

11.52.060. Content of the Disclosure Form.

A. The disclosure form shall be prepared by the Chief of Environmental Health, with the assistance of the Hazardous Materials Advisory Subcommittee, established pursuant to BMC Section 3.44.070 after holding a public workshop on the matter. The disclosure form shall include, but not be limited to, requests for the following:

(1) A copy of the MSDS for every hazardous substance used by the business completing the disclosure form, except that a copy of the MSDS need not be submitted for a hazardous substance if the Chief of Environmental Health certifies that he or she has available a suitable MSDS or suitable equivalent information regarding that hazardous substance.

(2) A listing of the chemical name, any common names, and the CAS number of every hazardous substance used by the business completing the disclosure form.

(3) The EPA waste stream code of every hazardous waste

handled by the business completing the disclosure form.

(4) Information on the method of storage used for the materials disclosed herein.

(5) The maximum aggregate amount of each hazardous material disclosed in either subdivision (2) or (3) which is handled or used at any one time by the user over the course of the year. In addition, the form shall allow the user optionally to provide the expected average yearly amount of each hazardous material.

(6) Sufficient information on how and at what location within the business the hazardous materials disclosed in subdivision (2) or (3) are handled or used by the user to allow fire and safety personnel to prepare adequate emergency responses to potential releases of the hazardous materials. This information shall include a map of the business establishment drawn at a scale and in a format and detail deemed sufficient by Chief of Environmental Health. This map shall not be available to the public.

(7) Sufficient information on any releases of the hazardous materials disclosed in subdivisions (2) and (3) into the air, water, sewers, or land to permit the community to understand the sources and content of hazardous materials releases.

(8) The SIC code of the business, if applicable.

(9) The name and phone number of the person representing the business and able to assist emergency personnel in the event of an emergency involving the business during non-business hours.

B. Upon request, each user must provide information beyond that specifically requested in the disclosure form to the Chief of

Environmental Health upon the determination that such information is necessary to protect health and safety or the environment. Such additional information shall be subject to the trade secret provisions of Section 11.52.100.

11.52.070. Exemptions to Disclosure.

A. A substance designated as a hazardous substance by this Chapter solely by its presence on the Nuclear Regulatory Commission list of radioactive materials, shall be exempt from the requirement that the MSDS be submitted with the disclosure form.

B. Hazardous substances contained solely in consumer products packaged for distribution to, and use by, the general public shall be exempt from disclosure under this Chapter unless the Chief of Environmental Health has provided notice that the storage of certain quantities of specified consumer products requires disclosure under this Chapter in response to public health concerns.

C. Any business using, handling, processing or storing less than eight (8) pounds, or one (1) gallon, or 200 cubic feet in gaseous state at standard temperature and pressure, per month, whichever is the lesser, of the product or formulation containing a hazardous material, shall be exempted from the requirement of disclosure of that use, handling, processing or storage unless:

1. the Chief of Environmental Health after holding a public workshop has provided notice that he or she has lowered the weight or volume limits of this exemption for a specific hazardous material in response to public health concerns, or,

2. that the substance is a carcinogen or reproductive toxin, as defined in Section 11.62.020.

11.52.080. Fees.

A. Within two months of the enactment of this Chapter, the Chief of Environmental Health shall prepare a report for the city council describing the anticipated city cost of receiving, verifying, maintaining, providing education and training regarding, and making available to other city agencies, people who work in the city and their representatives, and city residents, the information covered by the hazardous materials disclosure ordinance. The report shall include the estimated cost to the Chief of Environmental Health of obtaining from a manufacturer or producer of a hazardous substance a MSDS in the event that user fails to supply the appropriate MSDS with the disclosure form, or of obtaining information to supplement that provided in the MSDS if that information is deemed insufficient by the Chief of Environmental Health to provide for the safety and health of the community.

B. Upon receipt of the report and comment from interested parties, the council will establish a schedule of fees and penalties for late filing of the disclosure form to be paid by businesses using or handling hazardous materials which is sufficient to cover the costs to the city of administering the hazardous matetrials information ordinance.

11.52.090. Enforcement.

A. Any business which negligently violates any provision of

Section 11.52.040 shall be civilly liable to the city in a sum not to exceed $250.00 per day for each day in which such violation occurs, depending upon the seriousness of the violation; and, if such violation results in or significantly contributes to an emergency including a fire, to which the city must respond, that business may be assessed the full cost of the city's response, as well as the cost of cleaning up and disposing of such hazardous materials.

B. Any business which intentionally violates any provision of Section 11.52.040 shall be civilly liable to the city in a sum not less than $500.00 or more than $5,000.00 for each day in which such violation occurs, depending upon the seriousness of the violation; shall have its business license revoked; and if such violation results in or significantly contributes to an emergency, including a fire, that business shall be assessed the full cost of the city's response, as well as the cost of cleaning up and disposing of such hazardous materials.

C. The city may petition the Superior Court to impose, assess and recover such sums referred to in subsection (a) and (b). The remedy provided in this Section is cumulative and not exclusive, and shall be in addition to any other appropriate penalty provisions of the Municipal Code of Berkeley, and all other remedies available to the city.

D. Any person negligently violating any provision of Section 11.52.040, or negligently failing to comply with any orders issued pursuant to Section 11.52.040, where such negligence has not resulted in nor significantly contributed to personal injury, shall

be deemed guilty of an infraction and such person shall be guilty of a separate offense for each and every day or portion thereof during which any such violation or lack of compliance is continued.

E. Any person intentionally or willfully violating, or negligently violating where such negligence has resulted in or significantly contributed to personal injury, any provision of Section 11.52.040, or intentionally or willfully failing to comply, or negligently contributed to personal injury, with any orders issued pursuant to Section 11.52.040, shall be deamded guilty of a misdemeanor and such person shall be guilty of a separate offense for each and every day or portion thereof during which any such violaiten or lack of compliance in continued.

F. A civil action may be instituted against any employer or by an employee who has been discharged, demoted, suspended, or in any other manner discriminated against in terms or conditions of employment, or threatened with any such retaliation, because such employee has, in good faith, made any oral or written report or complaint related to the enforcement of this Chapter to any company official, public official or employee representative, or has testified in any proceeding in any way related thereto. In addition to any actual damages which may be awarded, damages shall include costs and attorney's fees. The court may award punitive damages in a proper case.

11.52.100. Trade Secrets.

A. If a user believes that a request for information made by either the disclosure form or pursuant to subsection (b) of Section 11.52.060 involves the release of a trade secret, the user

shall notify the chief of environmental

information which the user believes involves the release of a trade secret. As used herein, trade secret shall have the meaning given to it by Section 6254.7 of the Government Code and Section 1060 of the Evidence Code.

B. Subject to the provisions of this Chapter, the Chief of Environmental Health shall protect from disclosure any and all trade secrets coming into his or her possession, as defined in subdivision (d) of Section 6254.7 of the California Government Code and Section 1060 of the Evidence Code, when requested in writing by the user.

C. Any information reported to or otherwise obtained by the Chief of Environmental Health, or representative or employee, which is exempt from disclosure pursuant to subsection (b), shall not be disclosed to anyone except:

1. any officer or employee of the City, Alameda County, the State of California, or the United States of America, in connection with the official duties of such officer or employee under any law for the protection of health or to contractors with the City and their employees if in the opinion of the Chief of Environmental Health such disclosure is necessary and required for the performance of work, or to protect the health and safety of the employees of the contractor; or

2. to any physician or registered nurse where the physician or registered nurse determines that such information is necessary to the medical treatment of

his or her patient.

D. For the purposes of this Section, fire and emergency response personnel and city health personnel operating within the jurisdiction of the city shall be considered employees of the city.

E. Information claimed as a trade secret must be disclosed to a physician or registered nurse by the Chief of Environmental Health for purposes of treating a patient. Any physician or registered nurse who by virtue of his or her obtaining possession of or access to this information and, who knowing that disclosure of this information is prohibited, knowingly and willfully discloses the information in any manner to any person not entitled to receive it, shall be guilty of a misdemeanor.

F. Any officer or employee of the city or former officer or employee who by virtue of such employment or official position has possession of or has access to information the disclosure of which is prohibited by this Section, and who knowing that disclosure of this information is prohibited, knowingly and willfully discloses the information in any manner to any person not entitled to receive it, shall be guilty of a misdemeanor. Any contractor with the city and any employee of such contractor, who has been furnished information as authorized by this Section, shall be considered to be an employee of the city for purposes of this Section.

G. Information certified by appropriate officials of the United States, as necessarily kept secret for national defense purposes, shall be accorded the full protections against disclosure as specified by such officials or in accordance with the laws of the United States.

H. Upon receipt of a request for the release of information to the public which includes information which the user has notified the Chief of Environmental Health pursuant to subsection (a) of this Section, the Chief of Environmental Health shall notify the user in writing of said request by certified mail. The Chief of Environmental Health shall release the information forty-five (45) days after the day of mailing said notice, unless, prior to the expiration of said forty-five (45) days, the user institutes an action in an appropriate court for a declaratory judgment that said information is subject to protection under subsection (b) of this Section and/or an injunction prohibiting disclosure of said information to the general public is issued. The user and the public requesting the information shall be considered the real parties in interest in any such aciton and the City of Berkeley, if named, will be the disinterested party.

I. The provisions of this Section shall not permit a user to refuse to disclose information required pursuant to this Chapter to the Chief of Environmental Health.

11.52.110. Hazardous Materials Advisory Sub-Committee.

The Chief of Environmental Health shall provide monthly reports to the Hazardous Materials Sub-Committee of Community Health Advisory Committee (CHAC) established in accordance with Section 3.44.070 of the Berkeley Municipal Code. These reports shall provide the number of disclosure forms submitted each month and summary information on the distribution of quantities of, and number of different types of hazardous materials for which forms have been submitted, progress being made to provide disclosed

information to emergency personnel and the public, compliance and noncompliance with the Chapter, and such other information deemed useful. The chief shall provide staff assistance to the HMAC in fulfillment of its responsibilities set forth in Section 3.44.080 of the Berkeley Municipal Code.

A. This disclosure of hazardous materials information pursuant to the provisions of the hazardous materials disclosure ordinance shall not in any way affect any other liability or responsibility of a business with regard to safeguarding the health and safety of any employee or any other persons.

B. The degree of protection required by this Chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. The standards set forth herein are minimal standards and this Chapter does not imply that compliance will ensure that ther will be no improper release of hazardous materials. This Chapter shall not create liability on the part of the City, any officer or employee thereof for any damages that result from reliance on this Chapter or any administrative decision lawfully made thereunder. All persons handling, storing, using or processing hazardous materials within the city should be and are advised to determine to their own satisfaction the level of protection in addition to that required by this Chapter necessary or desirable to ensure that there is no improper release of hazardous materials.

11.52.120. Effective Dates.

A. The reporting and disclosure requirements set forth in Section 11.52.040 shall become effective beginning six (6) months

after enactment of this Chapter.

B. Enforcement of this Chapter, in accordance with Section 11.52.090, shall commence beginning one (1) year after enactment of this Chapter.

11.52.130. Partial Invalidity.

If any provision of this ordinance or any application thereof is held invalid, such invalidity shall not affect any other provision or application of this ordinance which can be given effect without the invalid provision or application, and to this end the provisions of this ordinance are declared to be severable.

Section 2. Copies of this Bill are hereby ordered published by posting with the vote thereon for two (2) days at the ten (10) prominent places in the City of Berkeley as designated by Chapter 1.08 of the Berkeley Municipal Code.

At a regular meeting of the Council of the City of Berkeley, held on the twenty-first day of May, 1985, this Bill was passed to print and ordered published by posting by the following vote:

Ayes: Councilmembers Chandler, Denton, Fukson, Hestor, Jalinek, Shirek, Skinner, and President Newport.

Noes: None.

Absent: Councilmember Lashley.

ATTEST: EDITHE CAMPBELL
City Clerk and Clerk of the Council

In effect: July 18, 1985

F-IV TRANSCRIPT OF PUBLIC HEARING

PUBLIC HEARING

UNIVERSITY OF CALIFORNIA

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

ROOM 22, WARREN HALL, THURSDAY, MAY 7, 1992, 7:00 P.M.

HEARING OFFICER: JAMES (BUCK) KOONCE

ORIGINAL

REPORTER: PAUL SCHILLER, CSR #1268

(The hearing was called to order at 7:10 p.m.)

HEARING OFFICER KOONCE: We are going to begin our hearing. Thank you for attending tonight.

This is the public hearing on the Draft Supplemental Environmental Impact Report for the proposed renewal of the contract between the United States Department of Energy and the Regents of the University of California for operation and management of the Lawrence Berkeley Laboratory.

The hearing record for tonight is now open.

I am James Koonce, Head, Office of Assessment and Assurance at LBL, the Lawrence Berkeley Laboratory. I will be conducting the hearing this evening.

I would like to call attention to several materials that we have. They are available at the table in front of the room.

First is a one-page sheet that explains both the purpose and the procedures for the hearing tonight.

Next, there are white speaker cards on the corner at the front table. We ask that you fill out and return one of these cards to Ms. Diane Bradley if you wish to speak this evening.

Also, there is a sign-up list on a clipboard that we will circulate during the meeting tonight, if you have not already signed it. On this list you can also

1 indicate if you would like to receive a copy of the Final
2 Supplemental Environmental Impact Report when it is
3 published, probably in June 1992.
4 Anyone who has already received a copy of the
5 Draft Supplemental Environmental Impact Report will
6 automatically receive the final report, so you need not
7 sign up again.
8 This hearing is part of the University's
9 procedures to implement the California Environmental Quality
10 Act and to assure that environmental factors are taken into
11 consideration in any proposed project.
12 This hearing is to provide the public with the
13 opportunity to make comments on both the content and the
14 completeness of the Draft Supplemental Environmental Impact
15 Report on the proposed extension of University of California's
16 contract with the United States Department of Energy (DOE)
17 to manage the Lawrence Berkeley Laboratory. The current
18 contract expires on September 30, 1992. The proposed
19 extension would cover the period from October 1, 1992 through
20 September 30, 1997 and will involve the continuation of
21 DOE sponsored research and development programs in energy,
22 general and life sciences.
23 All of the environmental issues that you identify
24 tonight will be considered and responded to in the Final
25 Supplemental Environmental Impact Report, which will be the

1 document the Regents of the University of California will
2 review in their evaluation incident to their decision on
3 the proposed project.
4 The written record for this hearing will be
5 kept open until May 18, 1992. Those of you who do not wish
6 to speak tonight or who wish to add to your testimony may
7 submit additional remarks in writing until that date.
8 Also, all of the written comments received,
9 as well as the oral comments that any of you make this
10 evening, will be responded to in the Final Supplemental
11 Environmental Impact Report.
12 All written letters and comments should be sent
13 to the address included in the procedures for tonight's
14 meeting; that is:
15 Dr. Martha Krebs
16 Associate Director for Planning and Development
17 Building 50A/4112
18 Lawrence Berkeley Laboratory
19 #1 Cyclotron Road
20 Berkeley, California 94720
21 The hearing is being tape-recorded and also
22 recorded by a Certified Shorthand Reporter. In order that
23 your testimony is properly recorded and so that we might
24 respond adequately in the Final Supplemental Environmental
25 Impact Report, I would ask that each speaker come forward

when called and use the microphone.

I will call on speakers in turn as I receive the cards of those of you who wish to speak. Please state your name slowly.

If there appears to be a number of speakers, to assure that everyone has the opportunity to speak, we generally ask that persons representing groups be permitted five minutes and individuals, about three minutes.

After everyone has had an opportunity to speak, those who wish to speak a second time can do so.

Testimony will not be responded to at this hearing. Questions raised at this hearing regarding the Draft SEIR will be responded to in writing in the Final Supplemental Environmental Impact Report.

Before proceeding further, I would like to ask if there are any procedural questions about the hearing which have not yet been clearly explained?

Since there are no questions and it is 7:15, we will wait until 7:20 and see if anyone arrives; and then we will close the hearing, if no one is present who wishes to speak.

(Whereupon the hearing remained open until 7:20 p.m.)

HEARING OFFICER KOONCE: All right, because no speakers have come forward to offer comment on the Draft

SEIR and it is 7:20 p.m., I am closing the hearing at this time.

(Whereupon the hearing closed at7:20 p.m.)

1
2 CERTIFICATE OF REPORTER
3
4 I, PAUL SCHILLER, a duly Certified Shorthand
5 Reporter No. 1268, do hereby certify:
6 That the foregoing transcript constitutes a
7 true, full and correct transcript of my shorthand notes
8 taken as such reporter of the proceedings herein and reduced
9 to typewriting under my supervision and control to the best
10 of my ability.
11
12
13 May 9, 1992 Paul Schiller
14 (Date) Paul Schiller
15
16
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18
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21
22
23
24
25

F-V NEWSPAPER ADVERTISEMENTS

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

Berkeley Tri-City Post
Serving Albany, Berkeley, Kensington and Emeryville
Cpvs Wednesday, April 22, 1992, 28th Year No 92 WED./THURS./FRI./SAT. 25c

THE POST, Wednesday, April 22, 1992 Page 9

1 SPECIAL NOTICES

1 SPECIAL NOTICES

NOTICE OF DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT AND PUBLIC HEARING
University of California, Lawrence Berkeley Laboratory

The University of California, Lawrence Berkeley Laboratory, has prepared a Draft Supplemental Environmental Impact Report (SEIR) on the proposed extension of its contract between the United States Department of Energy (DOE) and The Regents of the University of California to manage the Lawrence Berkeley Laboratory. The current contract expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of DOE sponsored research and development programs in energy, general and life sciences.

The Draft SEIR will be available for public review through May 18, 1992 at the Doe Library on the UC Berkeley Campus, aat the main branch of the City of Berkeley Public Library, and at the main branch of the City of Oakland Public Library, or can be obtained from the LBL Associate Director for Planning and Development at the address below. As part of the review period, a public hearing on the Draft SEIR will take place as follows:

Thursday, May 7, 1992
7:00 p.m.
Room 22, Warren Hall
UC Berkeley Campus

Comments in writing will also be received during the public review period through May 18, and may be addressed to Dr. Martha Krebs, Associate Laboratory Director, Office for Planning and Development, Building 50A/4112, Lawrence Berkeley Laboratory, One Cyclotron Road, Berkeley, California 94720.

THE DAILY CALIFORNIAN
Berkeley's Independent Daily; Established 1871
VOLUME CXXI, NO. 68 THURSDAY, APRIL 23, 1992 BERKELEY, CALIFORNIA

5 LEGALS

THE DAILY CALIFORNIAN
Classifieds 548-8405

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Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

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C-10 *Wednesday, May 6, 1992*

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NOTICE OF DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT AND PUBLIC HEARING

University of California
Lawrence Berkeley Laboratory

The University of California, Lawrence Berkeley Laboratory, has prepared a Draft Supplemental Environmental Impact Report (SEIR) on the proposed extension of its contract between the United States Department of Energy (DOE) and the Regents of the University of California to manage the Lawrence Berkeley Laboratory. The current contract expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of DOE sponsored research and development programs in energy, general and life sciences.

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Thursday, May 7, 1992
7:00 p.m.
Room 22, Warren Hall
UC Berkeley Campus

Comments in writing will also be received during the public review period through May 18, and may be addressed to Dr. Martha Krebs, Associate Laboratory Director, Office for Planning and Development, Building 50A/4112, Lawrence Berkeley Laboratory, One Cyclotron Road, Berkeley, California 94720.

SCH 91093068

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

FOR THE PROPOSED RENEWAL
OF THE CONTRACT BETWEEN
THE UNITED STATES DEPARTMENT OF ENERGY
AND THE REGENTS OF
THE UNIVERSITY OF CALIFORNIA
FOR OPERATION AND MANAGEMENT
OF THE

LAWRENCE BERKELEY LABORATORY

April 1992

UNIVERSITY OF CALIFORNIA,
LAWRENCE BERKELEY LABORATORY

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

FOR THE PROPOSED RENEWAL OF THE CONTRACT BETWEEN THE UNITED STATES DEPARTMENT OF ENERGY AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA FOR OPERATION AND MANAGEMENT OF THE LAWRENCE BERKELEY LABORATORY

Attached is a copy of the Supplemental Environmental Impact Report (dated April 1992) for the University of California proposed extension of its contract with the United States Department of Energy (DOE) to manage the Lawrence Berkeley Laboratory. The current contract expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of DOE sponsored research and development programs in energy, general and life sciences.

The Draft Supplemental Environmental Impact Report is being circulated for public review during the period from April 3, 1992 through May 18, 1992. A public hearing, during which recorded testimony will be taken, is scheduled for May 7, 1992, at 7:00 p.m. in Room 22, Warren Hall on the UC Berkeley Campus (near the intersection of University Avenue and Oxford Avenue.)

Comments on the Draft Environmental Impact Report may be made at the public hearing and/or sent prior to May 18, 1992 to:

Dr. Martha Krebs
Associate Director for Planning and Development
Building 50A/4112
Lawrence Berkeley Laboratory
#1 Cyclotron Road
Berkeley, California 94720.

UNIVERSITY OF CALIFORNIA, LAWRENCE BERKELEY LABORATORY

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

FOR THE PROPOSED RENEWAL OF THE CONTRACT BETWEEN THE UNITED STATES DEPARTMENT OF ENERGY AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA FOR OPERATION AND MANAGEMENT OF THE LAWRENCE BERKELEY LABORATORY

April 1992

State Clearinghouse No. 91093068
(Supplement to State Clearinghouse No. 85112610)

Prepared by:

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LAWRENCE BERKELEY LABORATORY
SITE DEVELOPMENT PLAN SEIR

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Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

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I. INTRODUCTION AND SUMMARY

This Supplemental Environmental Impact Report (SEIR) has been prepared in conformance with the California Environmental Quality Act (CEQA) and the University of California Procedures for the Implementation of CEQA (UC Procedures) to evaluate the potential environmental impacts associated with the University of California's operation of the Lawrence Berkeley Laboratory (LBL) for the next five years. The specific project under consideration in this SEIR is the renewal of a five-year contract between the University and the United States Department of Energy (DOE) to manage and operate the Lawrence Berkeley Laboratory. As the California agency responsible for carrying out the proposed project, the University is the lead agency responsible for CEQA compliance.

While no other state agency has a direct role in approving the renewal of the UC/DOE LBL operating contract, many federal, state and local agencies have regulatory authority over various ongoing LBL activities. These agencies include the federal Environmental Protection Agency (US/EPA), the California Environmental Protection Agency (Cal/EPA), the Bay Area Air Quality Management District (BAAQMD), the Regional Water Quality Control Board (RWQCB), the East Bay Municipal Utility District (EBMUD), the City of Berkeley and Alameda County.

A. BACKGROUND ON UC/DOE CONTRACT AND LRDP PROCESS

1987 LRDP and LRDP EIR

The UC/DOE LBL operating contracts have historically been renewed for five year terms. In 1987, in conjunction with the University's consideration of the existing operating contract, LBL also completed a comprehensive, long term institutional site planning process. The 1987 LBL Long Range Development Plan (LRDP) and the accompanying programmatic Site Development Plan EIR (referred to in the text as the LRDP EIR) were approved by the University and continue to guide the siting and development of facilities at LBL. With the implementation of the mitigation measures identified in the LRDP EIR, all environmental impacts resulting from the LRDP were reduced to a less than significant level.

Subsequent EIRs

Since 1987, in conformance with CEQA and UC Procedures, LBL has prepared subsequent "tiered" EIRs for specific building projects which are undertaken to implement the LRDP. Where the LBL LRDP EIR addressed the broad impacts resulting from general land use development plans and employee growth projections, tiered project EIRs focus on impacts resulting from the specific site, design, and operational features of the particular building proposal.

Project

Similarly, The Regent's review and consideration of another five-year extension of its operating contract for LBL is a "project" for purposes of CEQA. The UC/DOE operating contract provides the framework within which DOE funds and oversees, and UC manages, the activities, facilities and development at LBL. The contract includes general provisions relating to the role and responsibilities of UC and DOE, but the contract does not identify or implement specific development plans for research activities. While the specific provisions of this most recent contract renewal agreement continue to be negotiated by UC and DOE, the reasonably foreseeable consequence of the contract renewal is the University's ongoing implementation of the approved LRDP.

Environmental Analysis Under CEQA

Like a specific building proposal, the University's contract renewal project requires an environmental analysis under CEQA. Also like a building proposal, the focus of the environmental analysis is on potentially significant impacts or areas of public concern which were not addressed in the LRDP EIR. In particular, the environmental analysis for the contract renewal project requires an examination of three questions:

1. **Changes to the Circumstances Under Which the Project is Undertaken:** Have there been changes in the circumstances under which the University is managing LBL, including changes in the circumstances in which the LRDP is being implemented, such that the LRDP could cause significant new impacts which were not identified and mitigated in the LRDP EIR?

2. **New Information Regarding Significant Environmental Impacts:** Is there new information which is now available which reveals that the University's operation of LBL, including its ongoing

implementation of the LRDP, could cause significant new impacts which were not identified and mitigated in the LRDP EIR?

3. **Changes to the Project:** Have there been changes to the University's management responsibilities regarding LBL which could cause significant new impacts which were not identified and mitigated in the LRDP EIR?

If the answer to any of these questions is affirmative, then a supplemental EIR (SEIR) is required.

B. BACKGROUND ON SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT (SEIR) PROCESS

Background

Under CEQA, the purpose of this SEIR is to inform The Regents of any new significant environmental impacts which may be caused by The Regents' approval of the contract renewal and which were not previously identified and mitigated to a less than significant level in the LRDP EIR. Following a preliminary review of the contract renewal project and the LRDP EIR, the answer to two of the three questions presented above was affirmative. Each of these questions is briefly addressed in turn below.

1. **Changes to the Circumstances Under Which the Project is Undertaken:** Development in the area surrounding LBL has changed, principally due to the recent approval of the LRDP for the adjacent UC Berkeley campus. These changed circumstances have raised questions regarding the adequacy of the cumulative impacts analysis presented in the LRDP EIR, particularly with respect to traffic, hydrology, and visual impacts. To answer these questions, this SEIR examines and updates the cumulative impacts analysis for these and other impact areas presented in the LRDP EIR.

2. **New Information Regarding Significant Environmental Impacts:** The laws and regulations affecting the handling of chemicals and other materials at LBL have expanded since 1987, as has federal, state and local government agency oversight of LBL's compliance with these environmental health and safety requirements. The environmental, health and safety impacts of handling hazardous materials in research activities is also a matter of significant public concern. To respond to these concerns, this

SEIR examines and updates the setting, impacts and mitigation measures in the area of air quality and hazardous materials handling.

3. **Changes to the Project:** As noted above, the University's management responsibilities for LBL under the contract renewal agreement will not affect the LRDP and thus the contract renewal document will not itself cause any significant new environmental impacts. While the proposed contract between DOE and the University has not yet been finalized, as a general matter the new contract will require the University to exercise a greater degree of management oversight of LBL's operations. The University will also assume more direct responsibility for LBL's activities. Over the contract term, the University would continue to implement the LRDP. Within the framework of increased development and staffing levels already approved in the LRDP, the availability of funding will continue to determine the specific timing and scope of any future development projects, and advances in scientific research will continue to determine the specific types of research activities which are undertaken at LBL pursuant to the LRDP. At present, LBL's actual facility development and employment levels are below the levels which were approved -- and mitigated to a less than significant level -- in the LRDP EIR.

Role of LRDP and Restatement of Impacts and Mitigation

The environmental analysis included in the LRDP EIR, in conjunction with an analysis of changed circumstances and new information, is used as a basis for determining whether the contract renewal project will have any significant new impacts and serves to focus this SEIR on potentially significant new environmental impacts. The LRDP EIR is also incorporated by reference into this SEIR.

While not required by CEQA, for the convenience of the reader this SEIR also summarizes information presented in the LRDP EIR which is not affected by changed circumstances or the availability of new information. Consistent with current University policy, this restatement of impacts and mitigation measures expressly identifies the standards for measuring the significance of project impacts. To provide a context for this restatement of impacts and mitigation measures, this SEIR also presents LBL's actual growth in population and facilities, which has been less than what has already been approved -- and mitigated to a less than significant level -- in the 1987 LRDP and LRDP EIR.

Alternatives

This SEIR includes a comprehensive examination of alternatives to the contract renewal project, including two "no project" alternatives (discontinuation of the University's management of LBL and the shutdown and decommissioning of LBL), and three different physical development alternatives (no new development at LBL, less development at LBL than what has been previously approved in the LRDP, and the same level of development at offsite locations). The purpose of this analysis is to determine whether there are any alternatives which are capable of satisfying most or all of the project objectives in a manner which eliminates or substantially reduces a significant adverse environmental impact.

Mitigation Monitoring Plan

Finally, consistent with recent CEQA legislation and University policy, the University will prepare a mitigation monitoring plan for all mitigation measures identified in this SEIR, including the restated mitigation measures from the LRDP EIR and the new mitigation measures which are presented in this SEIR. The mitigation monitoring plan will be part of the Regents' findings on the SEIR and contract renewal project.

C. LBL GROWTH AND RESEARCH DIRECTIONS

For the interest of the reader this SEIR identifies research directions and planned activities at LBL. While it is impossible to predict with certainty the types of activities a premier research institution such as LBL will engage in over time, the SEIR briefly describes LBL's new research directions and confirms that LBL's planned research activities are likewise within the "envelope" of previously-approved employee and facility levels.

1. **Research Directions:** As a research institution, LBL's programs continue to evolve in response to scientific discoveries and directions. For example, over the next five years, LBL will continue its leadership role in the nationwide human genome effort by developing a human genome research facility.

The human genome program plans are being developed in collaboration with the DOE Office of Health and Environmental Research, with other national laboratories, and with the life sciences and computer science departments at UC Berkeley and other University of California campuses. LBL research and

development in this area currently employ 50 staff and will grow to approximately 100 staff during the following three years.

The experimental activities are expected to be conducted in a proposed new 41,000 square feet light laboratory building dedicated to the conduct of mapping, cloning, and sequencing activities along with integrated instrumentation, computation, and all required environmental safety and health support facilities.[1]

This research program is consistent with and will complement LBL's existing research mission. The construction of the human genome facility was identified in the 1987 LRDP and is within the "envelope" of new research space which was approved in the 1987 LBL LRDP. A project-specific EIR will be prepared to inform The Regents' consideration of all major new development projects, including the human genome facility.

A more complete listing of LBL's research program projections and requirements is shown in Section II-D and II-E of this SEIR. These research directions in materials science, chemical science, high energy and nuclear physics are similar to those identified in the 1987 LRDP.

2. **Enhanced Environmental Programs:** In response to a detailed 1990 DOE study of the LBL environmental compliance program, LBL has developed comprehensive environmental programs to ensure that research and operational activities are conducted safely, in compliance with applicable law, and in a manner which is fully protective of human health and the environment. These programs are described and analyzed in detail in Section II, Project Description, Section III-J, Air Quality, and Section IV, Hazardous Materials. Many environmental program improvements are already being implemented as part of an ongoing process to improve the University's management and oversight functions.

D. PUBLIC REVIEW AND COMMENT

The SEIR process began in the fall of 1991 with the publication of the Notice of Preparation. (A copy of the SEIR Notice of Preparation is reproduced in Appendix A of this document.)

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

The University received several responses from the Notice of Preparation including letters from the City of Berkeley and an individual living in the vicinity of LBL. These letters were utilized to help scope issues of concern for this SEIR.

The next step in the public review process is the issuance of the Draft SEIR. This Draft SEIR will be circulated for review and comment by the public and interested parties, agencies, and organizations for a 45-day review period.

The 45-day public comment period on the SEIR will begin on April 2, 1992 and will end on May 18, 1992. There will be a public hearing on the SEIR on May 7, 1992 at 7:00 p.m., in Room 22, Warren Hall on the UC Berkeley campus (near the intersection of University Avenue and Oxford Avenue).

Following the public hearing on this document and after the close of the written public comment period, responses to written comments and oral comments on the environmental effects of the project will be prepared. The SEIR will be revised as appropriate. The Regents will then consider the Final SEIR, the proposed contract renewal, and related documents. For further information about the SEIR process, the SEIR, or documents referred to or incorporated by reference in this SEIR, please call Dr. Martha A. Krebs at (510) 486-4361.

All comments or questions about the SEIR should be addressed to:

Dr. Martha A. Krebs
Lawrence Berkeley Laboratory
University of California
One Cyclotron Road
Building 50A, Room 4112
Berkeley, California 94720

Upon review and consideration of the Final SEIR, The Regents may certify the Final SEIR and approve the proposed project. Approval of the project would be accompanied by written findings for each significant adverse environmental effect identified in the SEIR. Findings would be accompanied by a brief explanation of the rationale for each finding and would indicate: (1) that mitigation measures to reduce adverse impacts to less than significant levels have been adopted; (2) that measures to mitigate specific effects are not within the jurisdiction of the agency making the findings; or, (3) that specific

effects are unavoidable and substantially unmitigatible but are considered acceptable because the other project benefits outweigh the adverse environmental effects.

An additional requirement is that when making findings, LBL must adopt a monitoring program for mitigation measures to be incorporated into the approved project which reduce or avoid significant effects on the environment. The reporting or monitoring program (Public Resources Code 21081.6) was added to CEQA in 1988 by Assembly Bill 3180.

After certification of the Final SEIR and approval of the project, the University must file a Notice of Determination. The Notice of Determination is a formal, legal notification of the approval of the project. Filing of this notice initiates a 30-day statute of limitations period for challenging approval of the proposed project under CEQA.

E. REPORT ORGANIZATION

This SEIR is organized to provide readers with a description of the project, an analysis of project impacts and mitigation measures, and an analysis of project alternatives. The following is a summary of the format of this SEIR:

Chapter I, Introduction and Summary, discusses the purpose, organization, process and sources of information of the SEIR. The summary provides an overview of the project and its potential environmental effects. The summary table contained in this chapter lists environmental impacts along with their potential degree of significance and the mitigation measures which have been identified to reduce or avoid potential adverse effects.

Chapter II is a project description. This chapter describes the project objectives and provides a background and description of LBL and LBL's institutional goals to be achieved through implementation of the project, provides a background and description of LBL, includes an overview of the LBL mission and programs, provides program projections and requirements, indicates the implementation status of the 1987 LBL LRDP and the 1987 LBL LRDP EIR, states the objectives of site planning at LBL, and notes LBL site planning management issues.

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Chapter III addresses each environmental impact area to determine whether the contract renewal project will cause any new or significant environmental impacts which were not identified and mitigated to a less than significant level in the LRDP EIR. Following an introduction, each section in this chapter is organized in three subsections: first, a summary of the environmental setting; second, an assessment of impacts and a description of mitigation measures which includes standards for measuring the significance of environmental impacts; and, third, an assessment of cumulative impacts.

The level of detail in each of these sections varies depending upon whether there are changed circumstances or whether significant new information has become available since the LRDP EIR. For example, little new analysis is presented in the geology, soils and seismicity section because the analysis of impacts and mitigation measures in the LRDP EIR remains accurate and no new information or changed circumstances has occurred which are relevant to this section. For this and similar sections, the information presented in the LRDP EIR is simply summarized for the convenience of the reader. For other sections, such as traffic and air quality, new data has been developed, due to actual or potential new concerns and these sections integrate both the LRDP EIR analysis and the new analysis.

Finally, in each section the cumulative impacts analysis has been updated due to the recent approval of the UC Berkeley campus and other development projects in the vicinity of LBL.

Chapter IV addresses new information on hazardous materials in detail. This chapter includes an introduction and overview of the analytical approach, handling of hazardous materials, disposal of hazardous materials, transportation of hazardous materials, regulation of building components, worker safety and health, emergency preparedness and response, remediation activities, and a summary of hazardous materials, impacts and mitigation measures.

Chapter V, CEQA Considerations, covers growth inducing impacts, describing the way the proposed project could generate economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Also included is a summary of cumulative impacts and a discussion of significant irreversible environmental changes and the relationship between short-term uses of the environment and long-term productivity.

Chapter VI discusses project alternatives. Included in this chapter are the alternatives of no project (i.e., shutdown and decommissioning), modification of operations (i.e., less development), no new development, discontinuation of UC management, and potential use of offsite locations for the development of future LBL programs.

The remaining chapters contain a bibliography, a list of the authors of the environmental document, and appendices.

The appendices include (a) the notice of preparation and responses; (b) a list of permanent buildings, trailers and temporary structures on the main LBL site and other facilities used or leased by LBL; (c) a list of hazardous chemicals used at LBL; (d) a list of extremely hazardous materials used at LBL; (e) the Executive Summary of a recent DOE inspection report on environmental issues at LBL; and (f) a list of acronyms and abbreviations used in this SEIR.

F. SOURCES OF INFORMATION

Information contained in this SEIR is based on a number of reports and studies, including information contained in the *Lawrence Berkeley Laboratory Long Range Development Plan (LRDP)* (August 1987)[2], the *Lawrence Berkeley Laboratory Site Development Plan Draft and Final EIR* (December 1986 and August 1987, State Clearinghouse Number 85112610[3,4], referred to in the text as the LRDP EIR), the *LBL Draft FY 1992 Site Development Plan* (February 1992)[5] and the *LBL Institutional Plan, FY 1992-1997* (November 1991)[6], the *U.S. Department of Energy, Office of Environment, Safety and Health, Tiger Team Assessment of the Lawrence Berkeley Laboratory* (February 1991)[7], the *LBL Tiger Team Assessment Corrective Action Plan* (November 8, 1991)[8] the *LBL Construction of Replacement Hazardous Waste Handling Facility Draft (November 1989) and Final Environmental Impact Reports* (May 1990)[9], [10], the *LBL 1991 Business Plan* (which includes an inventory of hazardous materials used at LBL)[11], the *University of California, Berkeley, Long Range Development Plan, 1990-2005* (May 1991)[12] and the *University of California, Berkeley, Long Range Development Plan, Draft and Final Environmental Impact Reports* (January 1990)[13,14], which are hereby incorporated by reference, and additional information provided by LBL personnel. Copies of the above named documents are available for review at the LBL Office of Assessment and Assurance.

G. SUMMARY

1. Background

This Supplemental Environmental Impact Report (SEIR) has been prepared pursuant to the renewal of a five year contract between the University of California and the United States Department of Energy to manage and operate the Lawrence Berkeley Laboratory.

In 1987, in conjunction with the University's consideration of the existing operating contract, LBL completed a comprehensive, long-term institutional site planning process. The 1987 LBL Long Range Development Plan (LRDP) and the accompanying programmatic EIR (LRDP EIR) were approved by the University and continue to guide the siting and development of facilities at LBL.

The current contract between the University of California and the United States Department of Energy regarding Lawrence Berkeley Laboratory expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of DOE sponsored research and development programs in basic and applied research.

The analyses in this SEIR are based on the University's continued implementation of the LRDP during the current contract renewal period and beyond. The LRDP provides for an addition in gross square footage (gsf) of approximately 380,000 gsf to the existing 1,620,000 gsf at the main LBL site (1992) for a total of approximately 2,000,000 gsf if all projects proposed in the 1987 LRDP were constructed. The LRDP EIR is a "build-out" plan for the site; accordingly, during the proposed contract renewal period of 1992 through 1997, only some limited portion of the new development identified in the LRDP would occur. The remainder of the development in the LRDP would be implemented over time until site build-out. For purposes of this SEIR that build-out period is considered the year 20xx, an indication that the build-out would occur some time after the year 2000.

Population estimates are included in the LRDP and discussed in this SEIR. These indicate that the current 1991 population of the LBL hill area would increase from 3,055 persons to 3,590 by the year 1997 while other LBL population on the UC Berkeley campus, and in off-site areas in Berkeley and

Emeryville, would decrease slightly from the 1991 population of 885 in 1991 to 800 in 1997. Overall, total LBL population would increase from 3,940 to 4,390 from 1991 to 1997.

This SEIR examines and identifies measures to mitigate significant adverse impacts that may result from renewal of the operating contract. In addition, this SEIR analyzes cumulative impacts and impacts that would result from alternatives to the proposed project.

2. Summary of Impacts

The summary provides an overview of the analysis contained in Section III, Environmental Setting, Impacts and Mitigation Measures. CEQA requires that a summary include discussions of (a) areas of controversy; (b) significant impacts; (c) unavoidable significant impacts; (d) secondary impacts; (e) implementation and mitigation measures; and, (f) alternatives to the project.

a. Areas of Controversy

No areas of controversy surrounding the SEIR were raised during the Notice of Preparation process. Questions to be addressed in the EIR were raised by the City of Berkeley, which requested that the SEIR provide information regarding hazardous materials, waste handling and disposal; cumulative air quality impacts, UC Berkeley LRDP cumulative analysis; and traffic/parking impacts update. One resident requested that the SEIR address noise. These areas are addressed in detail in the SEIR.

b. Significant Impacts

Implementation of the 1987 LRDP has the potential to generate environmental impacts in a number of areas. Impacts in the following areas would be significant without the implementation of mitigation measures, but would be reduced to a less-than-significant level by the mitigation measures identified in the LRDP EIR and this SEIR: geology, soils and seismicity; hydrology and water quality; biological resources; visual quality; land use; traffic, circulation and parking; air quality; noise; utilities; energy; and hazardous materials.

c. Unavoidable Significant Impacts

Project-specific impacts in the following areas would be significant and unavoidable: air quality. The proposed project at LBL would generate long-term emissions of criteria air pollutants. Since the Bay Area remains a non-attainment area for ozone under federal and state Clean Air Acts, any increase in ozone related emissions is considered significant and unavoidable. In addition, regional air quality and transportation impacts are considered significant and unavoidable cumulative impacts.

d. Secondary Impacts

Secondary impacts are those impacts generated by those who provide goods and services to the LBL population. Since it is expected that the total population of LBL would increase by approximately 450 persons from 3,940 in 1991 to 4,390 in 1997, implementation of the 1987 LRDP would result in some growth-inducing effects; however, these impacts are not considered significant.

e. Mitigation Measures

This SEIR provides the opportunity to restate the previously adopted mitigation measures from the 1987 LRDP EIR that continue to be implemented by LBL. These mitigation measures are described in the summary which follows and in more detail in Section III. This SEIR also includes new mitigation measures for newly identified impacts particularly those involving hazardous materials handling activities (Section IV). Although not required by CEQA, mitigation measures are also identified for some less-than-significant impacts to further reduce levels of impact on the environment.

f. Alternatives to the Project

The five alternatives to the project that are analyzed in this SEIR include:

No project (shutdown and decommissioning)

No project (discontinuation of UC management)

Modification of operations (less development)

No new development

Off-site development alternatives

While one of the no project alternatives (shutdown and decommissioning of LBL) and one of the development alternatives (less development) would cause fewer impacts than the proposed project, neither would result in the elimination of the one unavoidable significant adverse project impact (air quality) since both would result in some level of air emissions that would contribute to the region's failure to attain applicable ozone standards. Accordingly, while these alternatives are technically environmentally superior to the proposed project, neither can eliminate or substantially reduce the sole significant adverse impact caused by the project. In addition, neither of these alternatives is capable of achieving all or most of the project objectives.

Each of these alternatives is discussed in detail in Section VI, Alternatives.

3. Summary Tables

Information in the following Table I-1, Summary of Environmental Effects, has been organized to correspond with environmental issues discussed in Sections III and IV. The tables are arranged in four columns: (a) environmental impact; (b) level of significance prior to implementation of mitigation measures; (c) recommended mitigation measures; and, (d) the level of significance after implementation of mitigation measures. A series of mitigation measures is noted where more than one mitigation measure may be required to achieve a less-than-significant impact. Restated mitigation measures for the LRDP EIR are noted with an asterisk. For a complete description of potential impacts and recommended mitigation measures, please refer to the specific issue section in Section III or IV.

Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

	Impacts	Potential Significance without Mitigation		Mitigation Measures	Potential Significance with Mitigation
III-B. GEOLOGY, SOILS 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 impact 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 followed to ensure that the effects of landsliding, lurching, and liquefaction potential will not represent a significant adverse impact 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 soils 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 landslides during construction.*	

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
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.*	

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

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.

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
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, *Cotoneaster*, 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.*	

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
		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 to cause any existing fish or wildlife populations to drop below self-sustaining levels.

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
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.*	

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
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 as 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

S = Significant
LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
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 suburban-scale 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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LS = Less than Significant
SU = Significant Unavoidable Impact
* = Included in 1987 LRDP EIR

Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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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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 (flextime) work hours;*	**LS**

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* = Included in 1987 LRDP EIR

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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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

	Impacts	Potential Significance without Mitigation		Mitigation Measures	Potential Significance with Mitigation
			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 increases 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	The ratio of parking spaces to LBL employees will decrease during the LRDP implementation period.	**S**	**III-I-2**	LBL will continue to implement and monitor the implementation of its Transportation System Management Program.*	**LS**

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Table I-1
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 projected 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, contract 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 exposures indices of 0.0003 and 0.002, respectively.	**LS**	**III-J-3a**	None required.	**LS**

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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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Table I-1
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 construction, the overall off-site construction noise impacts are not expected to be significant.

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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
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 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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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 impact 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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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

Impacts	Potential Significance without Mitigation	Mitigation Measures	Potential Significance with Mitigation
Less Than Significant Impacts For Which No Mitigation Measures 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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Table I-1
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**	Buildings 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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Table I-1
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.	**LS**
			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.	

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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

	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 project 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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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

	Impacts	Potential Significance without Mitigation		Mitigation Measures	Potential Significance with Mitigation
IV-K-5	Continued UC operation of LBL, including proposed increases 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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Table I-1
SUMMARY OF ENVIRONMENTAL IMPACTS

	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 increases 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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Notes for Section I:

1. *Lawrence Berkeley Laboratory, Institutional Plan FY 1992-1997.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, November 1991, p. 4-15.

2. *Lawrence Berkeley Laboratory, Long Range Development Plan.* Prepared by the Office of Planning and Development, Lawrence Berkeley Laboratory, August 1987, 90 pp.

3. *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, various paginations.

4. *Lawrence Berkeley Laboratory, Site Development Plan, Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, various paginations.

5. *Lawrence Berkeley Laboratory, FY 1992 Site Development Plan.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, February 1992, various paginations.

6. *Lawrence Berkeley Laboratory, Institutional Plan FY 1992-1997.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, November 1991, various paginations.

7. *U.S. Department of Energy, Office of Environment, Safety and Health, Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991.

8. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991.

9. *Lawrence Berkeley Laboratory, Construction of Replacement Hazardous Waste Handling Facility, Draft Environmental Impact Report.* Prepared by Plant Engineering, Lawrence Berkeley Laboratory, with the assistance of EIP Associates, November 1989, various paginations.

10. *Lawrence Berkeley Laboratory, Construction of Replacement Hazardous Waste Handling Facility, Final Environmental Impact Report.* Prepared by Lawrence Berkeley Laboratory, with the assistance of EIP Associates, May 1990, various paginations.

11. *Lawrence Berkeley Laboratory, Hazardous Materials Management Plan. Volumes 1 and 2: Emergency Response and Training; Volumes 1 through 5: Chemical Inventory.* Prepared by Lawrence Berkeley Laboratory, December 18, 1991.

12. *University of California, Berkeley, Long Range Development Plan, 1990-2005.* Prepared by the UC Berkeley Campus Planning Office, May 1991, 78 pp. plus appendices.

13. *University of California, Berkeley, Long Range Development Plan, Draft Environmental Impact Report.* Prepared by the UC Berkeley Campus Planning Office, January 1990, various paginations.

14. *University of California, Berkeley, Long Range Development Plan, Final Environmental Impact Report.* Prepared by the UC Berkeley Campus Planning Office, May 1990, Volumes I to IV, various paginations.

PROJECT DESCRIPTION

Project Objective and Institutional Goals

Background and Description of LBL

Overview of the LBL Mission and Programs

Program Projections and Requirements

Implementation Status of 1987 LBL LRDP and 1987 LBL LRDP EIR

Site Planning

II. PROJECT DESCRIPTION

The proposed project involves the renewal of the contract between the University of California and the United States Department of Energy (DOE) to manage and operate the Lawrence Berkeley Laboratory. The current contract expires on September 30, 1992. The proposed extension would cover the period from October 1, 1992 through September 30, 1997, and will involve the continuation of DOE- sponsored research and development programs in basic and applied research.

This section includes the project description, including the project objectives and institutional goals, provides a background and description of LBL, includes an overview of the LBL mission and programs, provides program projections and requirements, outlines program directions, indicates the implementation status of the 1987 LRDP and the 1987 LRDP EIR, describes the objectives of site planning at LBL, and notes LBL site planning management issues.

A. PROJECT OBJECTIVE AND INSTITUTIONAL GOALS

The Lawrence Berkeley Laboratory was established in 1931 by Ernest O. Lawrence as a single purpose accelerator-based university research facility. Today, LBL is a multiprogram national laboratory operated by the University of California for the DOE.

The objective of this project is to continue the University's management of LBL to: (1) ensure continuity of management, research program direction, and personnel at LBL; (2) continue to conduct basic and applied research in conformance with the policies and objectives discussed below; and (3) fulfill in part the University's research management mission as a public service for California and the nation.

Overall program and institutional guidance and funding are provided by the DOE's Office of Energy Research. The mission of the Laboratory is to provide national scientific leadership and support technological innovation to:

1. **Perform leading multidisciplinary research in the energy sciences, general sciences, and life sciences in a manner that ensures employee and public safety and the protection of the environment.** The energy sciences at LBL include materials research, chemistry, geology, and conservation and renewable energy research; the general sciences include nuclear physics and high-energy physics as well as accelerator research and development; the life sciences include cell and molecular biology, genetics, and biomedical research.

2. **Develop and operate unique national experimental facilities for use by qualified investigators from throughout the world.** These facilities at LBL include the Bevalac, the 88-Inch Cyclotron, the National Center for Electron Microscopy, and the National Tritium Labeling Facility. In addition, the Advanced Light Source is now under construction and is scheduled for completion in 1993.

3. **Educate and train future generations of scientists and engineers.** Approximately 500 graduate students are supported to pursue research at LBL with about 100 students receiving advanced degrees every year. Undergraduate and precollege programs are also conducted for science educators and students.

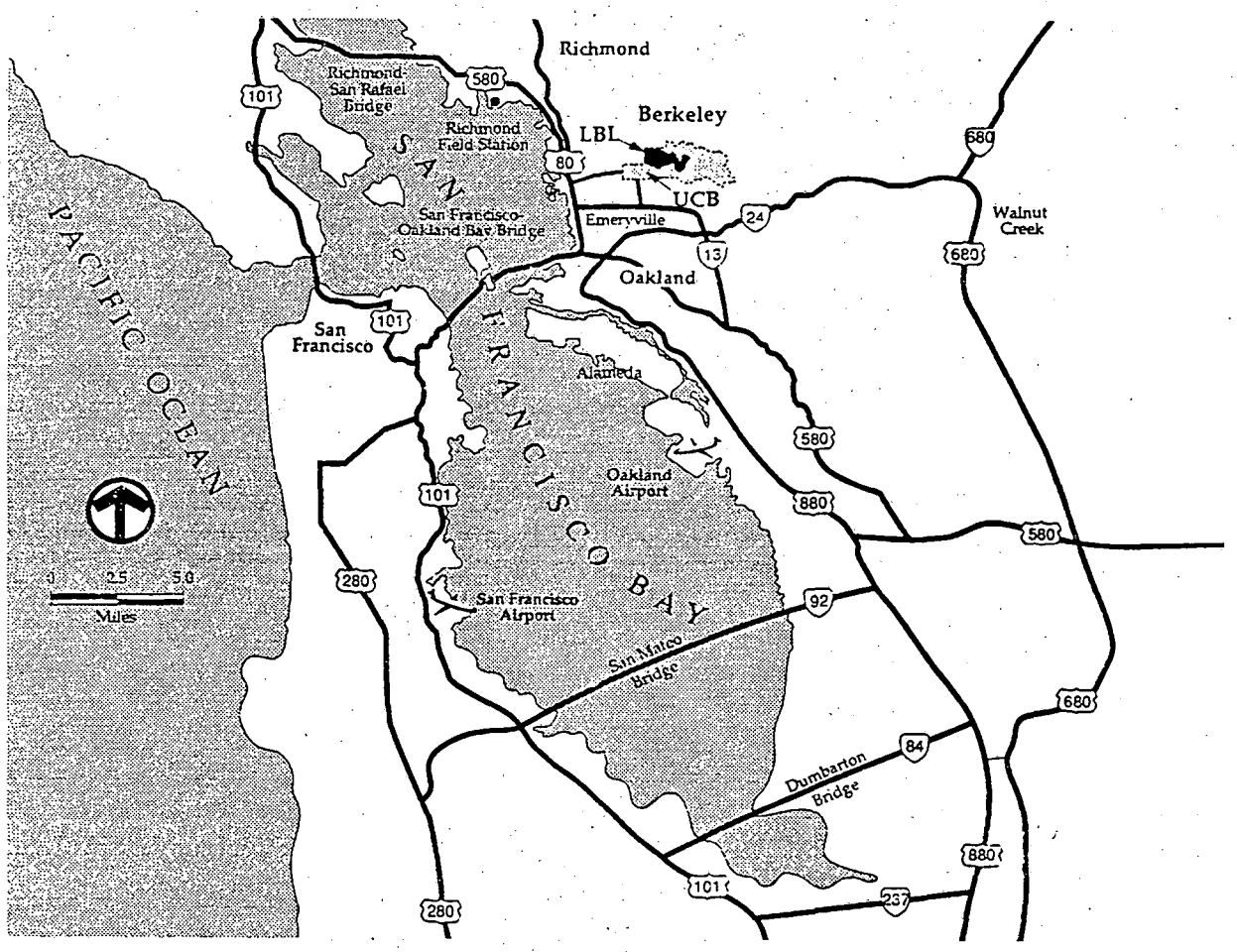
4. **Transfer knowledge and technological innovations and foster productive relationships between LBL research programs and industry.** The Center for Advanced Materials and the Center for X-ray Optics are examples of LBL collaborations with industry; technology transfer programs also promote application of research results.[1]

B. BACKGROUND AND DESCRIPTION OF LBL

1. **Location:** The 134-acre Lawrence Berkeley Laboratory site, located within 1,180 acres of University of California land, is leased to DOE from The Regents through a series of 50-year lease agreements.

The laboratory is in Alameda County, with the eastern section in the City of Oakland and the western section in the City of Berkeley. The location of LBL is shown in Exhibit II-1. The area to the west of LBL is largely urban and is served by interstate highways and an extensive public transit system.

Exhibit II-1
LBL LOCATION



Source: Lawrence Berkeley Laboratory

The Laboratory site itself is a hill site with areas of steep slopes and vegetation that give LBL a rural character. The University's land, within which the LBL site is contained, is bordered on the north by predominantly single-family homes and on the west by multiunit dwellings, student residence halls, and commercial districts. The university-owned area to the south and east is maintained in a largely natural state and includes recreational facilities and the University Botanical Garden.

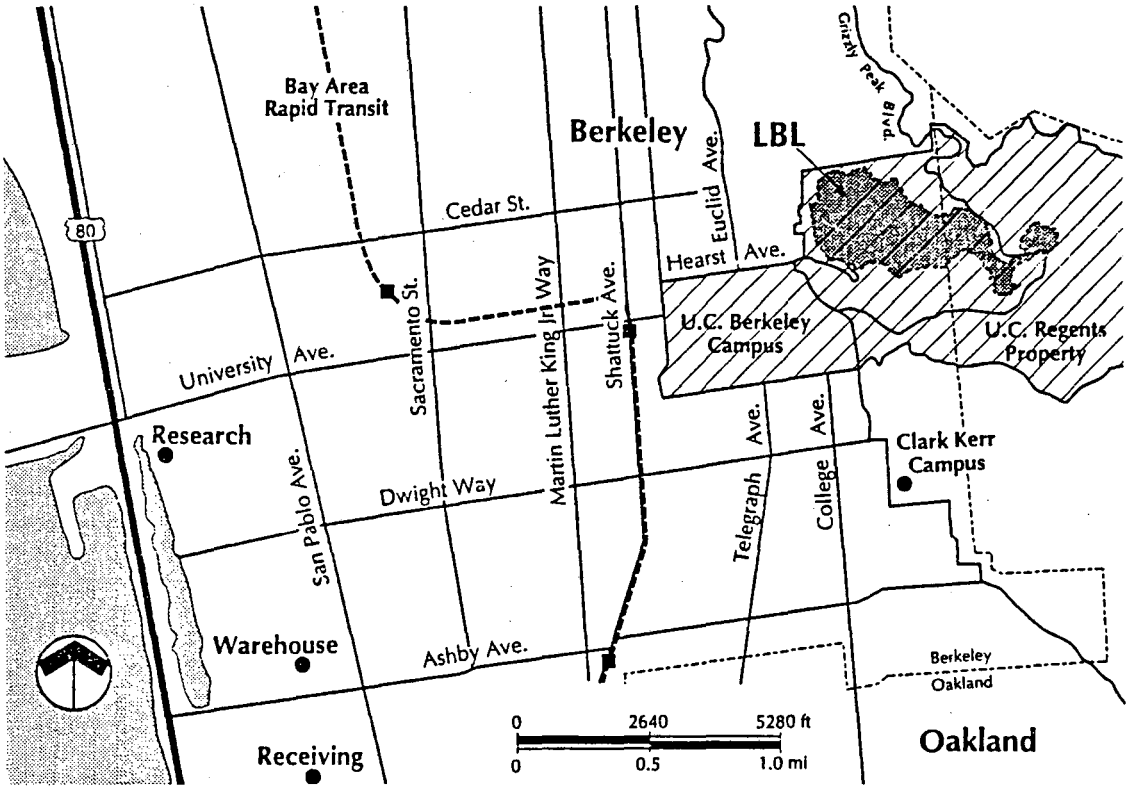
2. **Land Use and Topography:** The Laboratory site is zoned governmental and institutional by the cities of Berkeley and Oakland. On all sides of the Laboratory is a buffer zone of University land as shown in Exhibit II-2. The steep topography limits new building sites and makes building rehabilitation, replacement, and siting for efficient land use a priority. Exhibit II-3 shows the LBL site.

3. **Transportation Systems:** The Laboratory and the cities of Oakland and Berkeley are served by a network of public transit systems, three major airports (San Francisco, Oakland, and San Jose), two railroads, and a network of interstate freeways and state highways. In addition, LBL operates shuttle buses around the site and between the Laboratory and the UC Berkeley Campus and the downtown Berkeley Bay Area Rapid Transit (BART) station.

4. **Public Utilities and Community Services:** Electricity and natural gas are provided to the LBL site by the Pacific Gas and Electric Company (PG&E). Water is supplied by the East Bay Municipal Utilities District (EBMUD). Reservoirs adjacent to LBL and onsite storage tanks provide water for emergency needs. LBL has its own police protection and fire suppression services, and provides emergency assistance to the University and the cities of Berkeley and Oakland under mutual aid agreements. LBL also coordinates other activities with the surrounding communities including: (1) a Hill Area Fire Safety Program and (2) an LBL Traffic and Parking Management program.

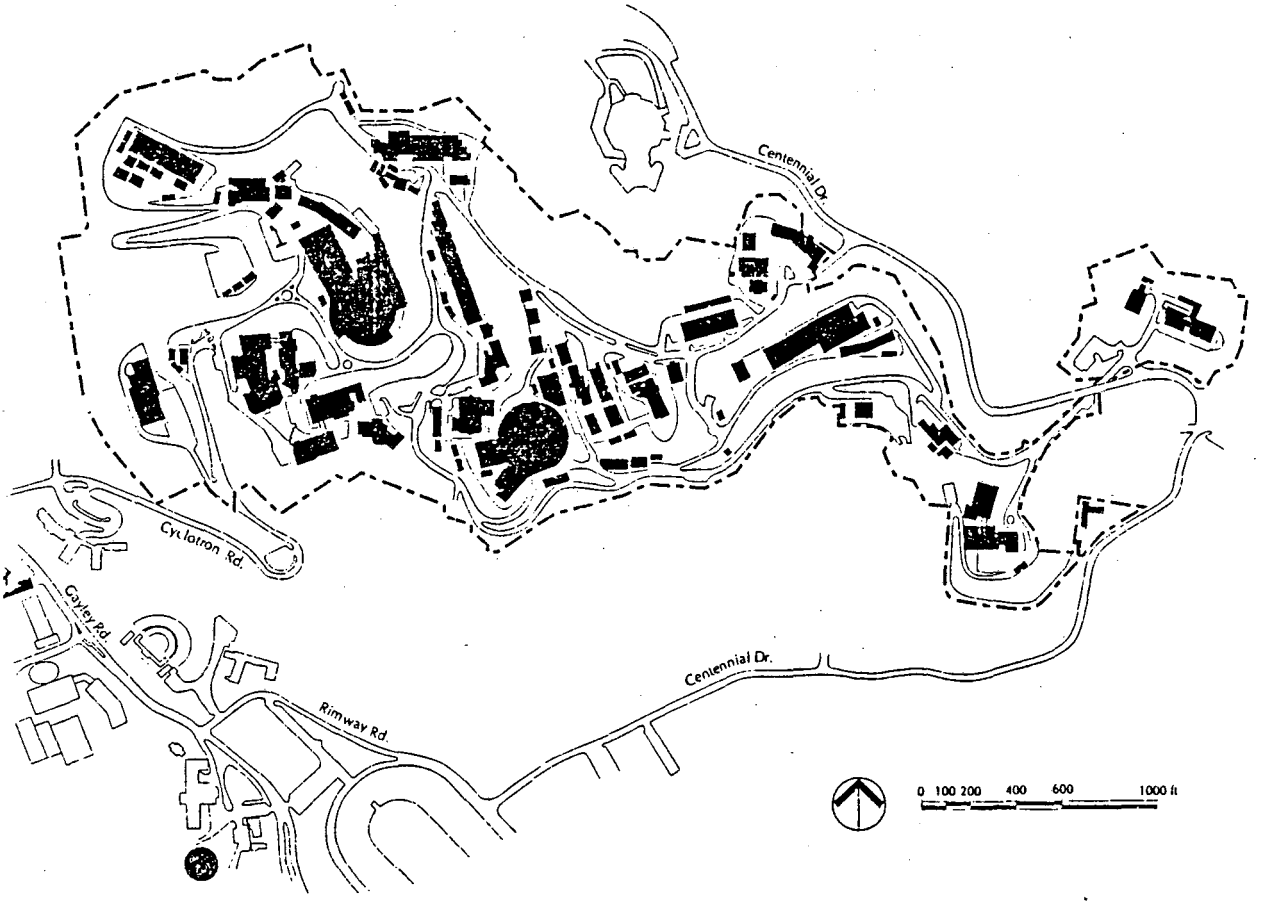
5. **Facilities:** LBL research and support activities are conducted in structures totaling 1.93 million gross square feet (gsf). This includes 81 permanent buildings and 110 trailers and temporary structures on the main LBL site encompassing 1.62 million gsf (see Appendix B), 0.17 million gsf on the UC Berkeley Campus and the UC Richmond Field Station, and 0.14 million gsf leased in the East Bay, in the cities of Berkeley and Emeryville.

Exhibit II-2
LBL VICINITY MAP



Source: Lawrence Berkeley Laboratory

Exhibit II-3
LBL SITE MAP



Source: Lawrence Berkeley Laboratory

In FY 1992, the average age of the main-site buildings was 30 years. The inventory of main-site building space, including current construction, is 1,621,100 gsf. Because both the age and continued programmatic utility of building space changes over time, LBL has rated the foreseeable quality of its existing space as follows: (a) adequate, 595,300 gsf; (b) substandard, can be made adequate, 811,200 gsf; and (c) substandard, cannot be made adequate 214,600 gsf (see Appendix B). Improvements in the condition of the substandard buildings, a part of LBL's long-term rehabilitation and modernization program, would enhance conditions for safely and efficiently achieving the laboratory's mission.

C. OVERVIEW OF THE LBL MISSION AND PROGRAMS

1. **History and Stewardship:** The Lawrence Berkeley Laboratory had its origin on the Berkeley campus of the University of California, where a laboratory was set up in 1931 to pursue Ernest Lawrence's invention of the cyclotron in 1929. In 1940, the Laboratory moved to its present hillside site just to the east of the University campus, where the first major facility, the 184-Inch Cyclotron (Building 6), was built.

From 1948 to 1972, the Laboratory was operated by the University of California for the U.S. Atomic Energy Commission. During this period, pioneering discoveries were made in nuclear and elementary particle physics, nuclear chemistry, biology, and nuclear medicine. It was at LBL that three of the basic modern types of accelerator -- the cyclotron, the Alvarez linear accelerator, and the synchrotron--were invented and developed.

In 1972, the Lawrence Radiation Laboratory became the Lawrence Berkeley Laboratory with major funding from the Federal Energy Research and Development Administration (ERDA), which replaced the Atomic Energy Commission. ERDA later was incorporated into the Department of Energy.

2. **National Laboratory:** The Laboratory today is operated as one of nine multiprogram national laboratories of the U.S. Department of Energy. Operated under Contract No. DE-AC03-76SF00098 between The Regents of the University of California and the Department of Energy, LBL is a distinct unit within the University. The LBL Director reports to the University President.

As a national laboratory, LBL develops and houses a number of large and internationally important facilities and their support functions, including the Advanced Light Source (under construction), the Bevalac Complex, the 88-Inch Cyclotron, the National Center for Electron Microscopy, and the National Tritium Labeling Facility. These facilities yield great advances in nuclear physics, nuclear chemistry, materials science, and health research. Many of the elementary particles and artificial radioisotopes were discovered at LBL, as were nearly all the transuranium elements. Radioactive substances were synthesized and used in unlocking fundamental metabolic pathways, including the mechanism of photosynthesis.

Indispensable to this productive work was Ernest Lawrence's emphasis on multi-disciplinary team research. This is the effective management of highly integrated, multidisciplinary research teams to attack formidable problems with leading scientists and engineers and effective technical resources. Such large-scale research has yielded dividends in both fundamental and applied science. Throughout its first five decades, LBL has given the nation scientific and technological leadership of the highest order. Nine of its researchers have been honored with Nobel Prizes, and 52 other staff are members of the national academies of science, engineering, or medicine.

3. **Relationship to UC:** LBL's close relationship with the University of California's academic campuses also enables it to provide outstanding research opportunities to large numbers of science and engineering students. Approximately 500 resident graduate students are supported at LBL, and many more use LBL facilities or perform collaborative research.

Participation in DOE-supported energy research programs at LBL provides these students with skills in great demand by the nation's high technology industries. The flow of graduates to industry is one of many forms of technology transfer that allows Lawrence Berkeley Laboratory to maintain supportive relationships with industry. Another is found in the Center for Advanced Materials, whose research program is aimed at solving fundamental materials research problems identified in discussions with industry.

LBL is also active in the cooperative development of national experimental facilities located at other laboratories. These include individual detectors, such as the Collider Detector at Fermilab (Illinois) superconducting magnets, and beam transport and detector systems for new accelerators, such as the Superconducting Super Collider (Texas), and the Relativistic Heavy-Ion Collider (New York).

D. PROGRAM PROJECTIONS AND REQUIREMENTS

1. **Program Projections:** LBL's research and support trends are described in the LBL *FY 1992-1997 Institutional Plan*. The major programs to implement LBL's mission are 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. These primary areas of support are the same as those identified in the 1987 LRDP.

In response to national needs for high-brightness synchrotron radiation facilities, LBL is constructing the Advanced Light Source (ALS), which will be completed in FY 1993. The ALS will provide the world's brightest beams of soft x-ray and ultraviolet light for use in materials science research, chemistry, biology, and other fields. When completed and fully operational, the ALS will provide ports for up to 55 end stations, including use by up to 200 guests at any one time. LBL will provide the research and facilities infrastructure to support this user community.

LBL, in coordination with other national laboratories, has prepared conceptual designs for a Chemical Dynamics Research Laboratory for advanced studies in reaction science and combustion chemistry. Other future projects include improvements to the National Center for Electron Microscopy and strengthened programs in the Center for Advanced Materials, and in the life sciences.

2. **Energy Sciences:** The following are program activity areas in the energy sciences:

Materials science research growth areas will support key materials of national interest, including materials with reduced dimensionality, high-temperature superconductors, semiconductors, composites, ceramics, light alloys and polymers. The LBL Advanced Light Source, Center for Advanced Materials, National Center for Electron Microscopy, and Center for X-Ray Optics will be important elements of a national program directed toward improved materials synthesis and processing, including advanced x-ray lithography.

Chemistry of inorganic and complex organic molecules will require advanced techniques using intense photon beams, nuclear magnetic resonance (NMR) spectroscopy, and laser spectroscopy. The defined programmatic needs for these techniques, including infrared free-electron laser

facilities required for reactivity studies of molecular dynamics, is an important programmatic projection in the master plan.

Earth sciences research will include geophysical investigations of the continental crust and physical and chemical studies of geological materials, including petroleum and geothermal reservoirs, and processes involving the transport and transformation of chemicals in complex geological structures.

Energy-use research important to national energy security will emphasize advanced high-efficiency combustion, energy storage, electric lighting, energy-intensive chemical processes, and energy flows through walls and windows. Additional research facilities at LBL would improve the ability to meet these research goals. Continued reliance on fossil fuels and nuclear power will intensify problems with emissions and waste disposal and will be subjects of study at the national and international level, including developing countries.

3. **General Science:** LBL's general sciences programs are developed in conjunction with the high-energy and nuclear physics communities and with Federal programs in fusion research. LBL's general sciences includes the following developments:

Nuclear physics research will emphasize techniques that probe or alter the state of nuclei to explore nucleonic, hadronic, and quark-gluon matter. The national Gammasphere project at the LBL 88-Inch Cyclotron is essential to understand the physics of nuclear structure. The Bevalac's nuclear physics operating program will be phased out in the middle of the decade. Collaborative experiments are being planned at the Relativistic Heavy Ion Collider under construction at Brookhaven National Laboratory and experimental facilities for studying unstable nuclei within an isospin laboratory are being considered at LBL.

LBL will continue its high-energy physics research programs at the Tevatron and Stanford Linear Collider (SLC) and at a proposed B-Factory upgrade at the Positron-Electron Project (PEP). Further progress will become possible through the construction of the SSC including the selection of the Solenoidal Detector Collaboration lead by LBL.

LBL will continue its leading research in developing heavy-ion prototype accelerators for fusion in support of a technology that would ultimately employ accelerated beams of ions to ignite fusion fuel pellets. These research studies include the Induction Linac Systems Experiment. (The fuel pellet research will be conducted by other laboratories). The development of neutral beam testing facilities to evaluate supplemental plasma heating will continue in support of the magnetic-fusion program for the International Thermonuclear Experimental Reactor (ITER).

4. **Life Sciences:** In health and environmental research, LBL was designated by the Secretary of Energy in 1987 as a DOE Human Genome Center. The existing support for human genome research is expected to grow, requiring an expansion of life-sciences-related facilities, and specifically the construction of a proposed Human Genome Laboratory, as identified in the 1987 LRDP. In addition, LBL supports DOE's structural biology initiative through the Laboratory's proposed ALS Life Sciences Center, which will occupy existing buildings. Programmatic growth areas are the following:

Physical mapping and eventual sequencing of the human genome will be emphasized, including determination of human genome structure and expression, clonal library preparation, robotics, novel instrumentation, development of advanced computation and pattern-recognition techniques, and medical genetics.

Basic research in the molecular and cellular aspects of the control of gene expression, differentiation, DNA repair and carcinogenesis, and genomic stability in human as well as animal models systems will provide tools for an understanding of environmentally related disorders.

Structural biology research will be directed toward determining the relationship between the structure of biological macromolecules and their functions. The application of synchrotron radiation and advanced computational techniques will allow the determination of the three-dimensional structure of proteins and nucleic acids.

Biomedical research will continue the application of advanced technology to study, diagnose, and treat human disease through innovations in positron emission tomography (PET), NMR, and charged-particle radiation therapy and radiosurgery. A Biomedical Isotope Facility is under

construction at an existing building to advance PET research. Radiobiology research at the Bevalac is proposed to continue through the decade in support of the nation's Space Exploration Initiative.

Environmental and health-effects research will include atmospheric chemistry and transport, deposition, and ecological effects of combustion products. Studies of sources and transport of chemicals from the subsurface environment will cover contamination of groundwater, radon exposure and other pollutants. Research will include studies of potential global environmental changes.

5. **Projected Trends:** The most likely research trends would include several initiatives, primarily in DOE's Office of Energy Research. Some programs will grow substantially, such as materials science and structural biology research associated with the Advanced Light Source, chemical sciences research at the Chemical Dynamics Research laboratory, Human Genome Center research, and Heavy Ion Fusion Accelerator Research program. Bevalac nuclear physics operations are expected to be significantly reduced in mid-decade. NASA support for the national Space Exploration Initiative is expected to grow during this time.

These trends indicate the continued development of LBL to a multiprogram energy research laboratory with complementary research programs and supporting infrastructure. The proposed initiatives encompass the five-year planning period and span most of DOE's research program areas appropriate to this multiprogram national laboratory. These initiatives are identified in Table II-1.

LBL has also projected a comprehensive, enhanced environmental restoration and waste management program. On global, regional, and local scales, strengthened environmental protection, improved waste management, and thorough safety practices are receiving increasing emphasis. DOE's national facilities are reviewing their policies and procedures to ensure full accountability and to set priorities to emphasize environment and safety. LBL has been actively involved in the formulation of environmental protection and safety plans and programs for improved compliance.

LBL's programs are in part the outcome of a comprehensive environmental study of LBL. On June 27, 1989, James D. Watkins, the Secretary of Energy, announced a ten-point initiative to strengthen the safety, environmental protection, and waste management activities at the Department of Energy (DOE)

Table II-1
LBL PROGRAM INITIATIVES SUMMARY

1. **Basic Energy Sciences**

   Combustion Dynamics Initiative
   Atomic Scale Synthesis of Advanced Materials
   Advanced Transmission Electron Microscopes
   High Performance Computing and Communications
   Advanced Light Source Second Complement

2. **High Energy and Nuclear Physics**

   B Factory at PEP (at the Stanford Linear Accelerator Center, California)
   SSC Solenoidal Detector Collaboration (at the SSC, Texas)
   Relativistic Heavy-Ion Collider Program (at the Brookhaven National Laboratory, New York)

3. **Health and Environmental Research**

   Human Genome Laboratory
   ALS Life Sciences Center
   Global Change Research Program

4. **Conservation and Renewable Energy**

   Advanced Energy Design and Operations Technologies

5. **Fusion Energy**

   Induction Linac Systems Experiments
   Accelerator Test Facility for ITER

6. **Multilaboratory Collaboration**

   Energy Technologies for Developing Countries

7. **Work for Others**

   Space Exploration Initiative
   Advanced Lithography Initiative

Source: *LBL Institutional Plan, FY 1992-97*, November 1991, pp. 4-2 to 4-25.

production, research, and testing facilities. In support of the ten-point initiative, the Secretary established "Tiger Teams" to conduct environment, health and safety compliance assessments at DOE facilities.

The LBL Tiger Team Assessment was conducted during FY 1991 and is discussed in Section III-J, Air Quality, and Section IV, Hazardous Substances, of this SEIR. LBL has prepared an Action Plan that provides a formal written response to each of the findings cited in the Tiger Team report. This Action Plan includes descriptions of the actions to be taken at the site; shows the schedules and due dates for each activity; and identifies the parties responsible for implementing the Action Plan. The document also identifies the estimated costs for implementing the action plan.

LBL has also developed plans to improve safety practices and environmental protection and for facilities modernization. LBL is working with the DOE Office of Energy Research and the DOE Office of Environmental Restoration and Waste Management to implement these programs. The Laboratory is structuring its plans to allocate the necessary resources to implement new DOE policies in safety, environmental restoration, and waste management. Implementation of the DOE Five-Year Environmental Restoration and Waste Management Site Specific Plan is central to this effort. This plan — widely reviewed by state and local agencies — forms the basis for full compliance with environmental standards.[2]

6. **LBL Support:** LBL programs are primarily supported by the DOE Office of Energy Research. The largest programs are in basic energy sciences, nuclear physics, high energy physics, and health and environmental research. DOE Conservation and Renewable Energy funding supports studies in building energy conservation, energy storage, and solar and geothermal energy. Other DOE-sponsored programs include research on the Superconducting Super Collider, radioactive waste disposal studies at other locations, and fossil energy. Work for other agencies and institutions is primarily for the National Institutes of Health, Department of Defense, states, and private industry. Total operating costs for FY 1992 are projected to be $218 million.[3]

7. **Current Laboratory Population:** The Laboratory's employee population consists of 3,330 full- and part-time employees. These employees include 795 staff scientists, 220 faculty scientists; 1,610 technical staff and administrative staff; and 705 graduate students, undergraduates, and postdoctoral fellows.

There are 2,570 full-time equivalent (FTE) positions. LBL maintains a register of official guests, updated monthly, which contains 1,400 registered guests. About 610 of these guests are onsite at any one time, so that the total Laboratory population is 3,940. Of this total, 3,055 are located on the main site, 765 are located in UC Berkeley Campus buildings, and 120 are located in offsite leased buildings.[4]

8. **Population Projection:** The main LBL hill site population is projected to increase by 535 persons from 3,055 in FY 1992 to approximately 3,590 in FY 1997. The long-term hill-site projected growth, identified in the 1987 LRDP, provides for an average daily main LBL hill site population of 4,100, or 510 persons more than projected for 1997. [The total projected LBL population at all locations is projected to increase by 450 from 3,940 in FY 1991 to approximately 4,390 in FY 1997. While the main hill site is projected to grow by 535 persons, the LBL staff on the UC Berkeley campus is expected to decline by 65 persons, and the other LBL staff off the main site are expected to decline by 20 persons for a total net growth of 450 persons (535 - 65 - 20 = 450). The potential total Laboratory population (includes main site, UC Berkeley campus, and offsite areas) of 4,750, could be obtained within the 20 year master plan (1987 LRDP) if national and regional programs require this growth.]

As shown in Table II-2, the total LBL population in 1991 was 3,940 persons, up from 3,595 in 1987, and below the 4,200 population projected for LBL for 1992. The 4,750 staff projected for the year 20xx remains the projected build-out population.

E. IMPLEMENTATION STATUS OF 1987 LBL LRDP AND 1987 LBL LRDP EIR

1. **1987 LRDP:** The 1987 LBL LRDP is the translation of long-term program plans into physical elements such as offices and research space, open space, roads, parking and landscaping. The plan is intended to show in general terms the location of various physical elements.[5] An Environmental Impact Report (EIR) on the LRDP was approved by The Regents of the University in October 1987. The 1987 LRDP EIR was a programmatic EIR that addressed the potential environmental impacts of proposed future development projects identified in the 1987 LRDP. The implementation status of the 1987 LRDP EIR is updated annually in a LBL Site Development Plan (SDP).[6]

Table II-2
LBL POPULATION

Location	Time Period 1987[a]	1991[a]	1992[b]	1997[c]	20xx[b]
Main Site (Hill Area)	2,845	3,055	3,550	3,590	4,100
UC Berkeley Campus	675	765	640	700	640
Other	75	120	10	100	10
TOTAL	**3,595**	**3,940**	**4,200**	**4,390**	**4,750**
Change in Main Site Population	--	+ 210	--	+ 535	+ 510
Change in Total Population	--	+ 345	--	+ 450	+ 360

Notes:
a = Actual (including full-time and part-time staff scientists, faculty scientists, technical and administrative staff, and students). Rounded to nearest five or ten persons.
b = As projected in 1987 LRDP EIR, pp. 71-72.
c = As currently estimated.

Source = LBL 1987 Draft EIR (December 1986), pp. 71-72, and LBL FY 1992 Site Development Plan (February 1992), p. 1.

The total Laboratory population is projected to experience continued modest growth (approximately 450 persons) in overall size during the planning period 1991 to 1997, consistent with program directions, national needs, and effective supporting infrastructure. This growth will occur in materials and chemical research, energy efficiency and supply, and in the life sciences. Activities that strengthen LBL's historically significant educational and training role will continue to develop. Research guests, technology transfer and educational activities are projected to result in increases in guests and visitors to the Laboratory. LBL does not propose to develop new facilities or add employees beyond the levels identified in the 1987 LRDP.[7]

2. **Potential Development and Land Use:** As noted in the 1987 LRDP, if all projects proposed in the LRDP were constructed, they would result in a net increase of approximately 404,800 gross square feet (gsf) to the 1,591,400 gsf which existed at the main site of the laboratory in 1987, for a total of 1,996,200

gsf at site buildout in 20xx. The 1992 LBL area, including current construction, is estimated at 1,621,100 gsf at the main hill site, as shown in Appendix B.

The 1987 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 are redevelopment of Old Town to eliminate obsolete buildings and enhance the open space, expand the "East Canyon" area by four acres (a proposal first made in the 1962 UC Berkeley Long Range Development Plan), and eliminate the use of 60,000 gsf of trailers. The plan allows for an LBL staff size of 4,750 at all existing activity areas. These areas include 4,100 staff at the main site, 640 on the UC Berkeley campus and at the Richmond Field Station, and about 10 at other off-site locations.

3. **Built Space:** As shown in Table II-3, the 2.02 million gross square feet of built space used for LBL activities in 1992 is the same as the estimated 1987 total of 2.02 million square feet. The actual total of 2.02 million square feet of built space devoted to LBL activities in 1992 is 0.06 million square feet less than the 2.08 million square feet projected in the 1987 LRDP for the year 1992, and 0.38 million square feet less than the 2.40 million projected for LBL in the year 20xx. (Note: The notation "20xx" indicates the year of LBL site build-out, which may occur sometime after the year 2000.)

Currently (1992), the main hill area site of LBL incorporates 1.62 million gross square feet of facilities. If the full programmatic capability of the LBL site is developed to meet anticipated national needs in energy technology and supporting research, the sites and buildings identified in the LBL site development plans would result in a net increase of approximately 0.38 million gross square feet to the existing main site of the laboratory, for a total of approximately 2.0 million gsf.[8]

It should be noted that in Fiscal Year 1990, a survey compiled for the 1991 Site Development Plan found that more than 70 percent of the permanent buildings on the LBL site were more than 25 years old. Table II-4 shows budgeted projects for FY 1992, including maintenance and upgrade projects indicative of the age of LBL facilities and systems. During the period of the late 1980's, the first new laboratories were constructed at LBL since the 1960's, and the Advanced Light Source construction was begun. Although new programmatic facilities are planned at LBL as shown in Table II-4 and Table

Table II-3
LBL SPACE (In Millions of Square Feet)

Location	Time Period				
	1987[a]	1992[a]	1992[b]	1997[c]	20xx[b]
Main Site (Hill Area)	1.59	1.62	1.68	1.81	2.00
UC Berkeley Campus and Richmond Field Station	0.30	0.26[d]	0.30[e]	0.30[e]	0.30[e]
Other	0.13	0.14	0.10	0.10	0.10
Total	2.02	2.02	2.08	2.24	2.40

Notes:
a = Actual.
b = As projected in 1987 LRDP EIR, December 1986, p. 62.
c = As projected in the *Lawrence Berkeley Laboratory FY 1992 Site Development Plan*.
d = LBL facilities currently used on the UC Berkeley campus and Richmond Field Station is estimated at 162,700 net square feet for UC Berkeley and 6,100 net square feet for the Richmond Field Station. With a net to gross square footage ratio of .67, the gross square footage used by LBL would total approximately 0.26 million gsf.
e = For comparative purposes only, the data shown in the 1987 LRDP EIR is repeated here.

Source = LBL 1987 Draft EIR (December 1986), p. 63, and LBL FY 1992 Site Development Plan (February 1992), p. 2.

II-5, over the near-term the total space associated with the proposed modernization projects remains relatively constant as new construction projects are offset by demolition of obsolete facilities.[9]

Of the 1.62 million gross square feet of buildings on the LBL main site in 1992, about 71,300 gsf are in trailers and other temporary structures. The inventory of LBL building space, including funded construction, can be classified as follows:

Adequate: 595,300 gsf that requires maintenance such as painting, repairs, and minor alterations;

Substandard, can be made adequate: 811,200 gsf that does not meet existing performance standards — about 20 percent requires minor rehabilitation (in electrical, structural, and mechanical systems), and the balance requires major rehabilitation (for existing or projected program requirements); and

Table II-4
LBL BUILDING PROGRAM, BUDGETED

FY	Facility Name	GSF
1992 Base	LBL Hill Site	1,621,100
Budgeted (Congressionally Authorized) Projects for FY 1992		
Program:		
1992	Advanced Light Source	(Included Above)
Support:		
1992	East Canyon Electrical Safety Project	NA
1992	Roof Replacements, Phase I	NA

Note: NA = Not Applicable (Does Not Add Space)

Source: Lawrence Berkeley Laboratory

Substandard, cannot be made adequate: 214,600 gsf that cannot be upgraded or rehabilitated at a cost less than new construction.

Overall, 36.7 percent of LBL facilities space is adequate, 50.0 percent is substandard and requires rehabilitation, and 13.3 percent is substandard and requires replacement.

Significant modernization is required in LBL buildings to meet current performance standards and to provide improved systems for materials handling. Older portions of LBL's mechanical and electrical utilities are inadequate and are undergoing partial replacement. Electrical power substations and distribution systems also require improvements.[10]

F. SITE PLANNING

1. Site Planning: Site planning at the Laboratory reflects long-range institutional goals and values based on the University's management of LBL's to support DOE missions. As described in the 1987

Table II-5
LBL CONSTRUCTION PROGRAM, PROPOSED (1993-1997)

FY	Facility Name	Estimated GSF	Net Increase
Proposed Program Related Projects:			
1994	Human Genome Laboratory	41,200[a]	37,800
1994	Chemical Dynamics Research Laboratory	46,600[b]	30,100
1994	Induction Linac Systems Experiment	6,700	6,700
1994	Advanced Light Source Beamline Initiative	(Existing)	0
1994	Building 6 Second Floor Improvements	33,000[c]	33,000
1995	Building 72 Laboratory Addition	5,500	5,500
Proposed General Plant Projects			
1993	Building 88 Second Floor Addition	4,200	4,200
1993	Building 72 Second Floor Office Addition	3,600	3,600
1994	Building 74 Office Annex/Bridge to Building 83	2,200	2,200
1994	Building 50 Library Addition	387	387
1994	Building 25A Second Floor Addition	6,220	6,220
Proposed Multiprogram Energy Laboratory Facilities Support Projects			
1993	Safety and Support Services Facility	42,000[d]	11,300
1993	Fire and Safety Systems Upgrade Project, Phase I	(Existing)	0
1993	Rehab of Site Mech Utilities, Phase II - Sewer Monitoring	NA	0
1993	Hazardous Materials Safeguards, Phase I	(Existing)	0
1994	Environmental Monitoring and Industrial Hygiene Building	32,000[e]	25,400
1994	Roadway Safety and Stabilization, Phase I	NA	0
1994	Sanitary Sewer Restoration, Phase I	NA	0
1994	Electrical Systems, Rehabilitation, Phase IV, Blackberry Switching Station Replacement	NA	0
1994	Medical Services Asbestos Abatement and Rehab	1,400	1,400
1994	Mechanical Equipment Replacement, Phase I	NA	0
1995	Fire and Safety Systems Upgrade Project, Phase II	NA	0
1995	Hazardous Materials Safeguards, Phase II	Existing	0
1995	Administrative Services Addition - Building 50E & 50F 2nd Floor	18,400	18,400
1995	Roadway Safety and Stabilization, Phase II	NA	0
1996	Fire & Safety Systems Upgrade, Phase III	NA	0
1996	Plant Engineering Facility	No Data	
1996	Electrical System Rehabilitation, Phase V - Central Switching Station & Feeders	NA	0
1996	Mechanical Equipment Upgrade, Phase II	NA	0
1997	Maintenance, Building Addition	No Data	
1997	Mechanical Utilities Upgrade, Phase II	NA	0
1997	Sanitary Sewer Restoration, Phase II	NA	0
1997	Seismic Safety Improvement Project	Existing	0

Notes: Existing = Occupies Existing Space.
NA = Not Applicable (Does Not Add Space).
No Data = Project has not been programmed for space requirements yet.
a = 41,200 gsf new building, demolitions totalling 3,400 gsf, net inventory increase of 37,800 gsf.
b = 46,600 gsf, Building 10, at 16,500 gsf will be removed, for a net inventory increase of 30,100 gsf.
c = Includes Life Sciences Center.
d = 42,000 gsf, Building 7 and other demolitions totalling 30,700 gsf, net inventory increase of 11,300 gsf.
e = 32,000 gsf, demolitions totalling 6,600 gsf, net inventory increase of 25,400 gsf.

LRDP and as continued in the FY 1992 Site Development Plan (SDP) the site development planning objectives are to:

Provide research facilities and accommodate changes or growth required for anticipated national scientific needs;

Protect the environment, plan for site amenities and constraints, and buffer activities from adjacent populations;

Ensure a safe, healthful, attractive, and efficient, workplace, improve access and communications with the University community;

Secure and sustain the investment in valuable government-owned research and support facilities;

Improve support and research services through proper siting and consolidations of functions; and,

Promote energy conservation and cost economies through efficient design, location, operation, and maintenance.

Site planning concepts at LBL accommodate the facilities improvement needs within existing geophysical, environmental, and operational conditions. They provide a basis for understanding and evaluating the more detailed elements of specific projects, planned locations, and other site improvement projections. LBL site-planning concepts are structured to:

Consolidate activities within seven functional LBL planning areas to enhance efficiency and effectiveness and to provide specialized research facilities;

Redevelop obsolete buildings and infrastructure, eliminate temporary structures used for permanent functions, and improve building arrangements to increase safety and energy efficiency;

Concentrate development along the east-west circulation and utilities axis to enhance transportation and service systems; e.g., develop off-road parking and improve pedestrian pathways;

Improve and maintain perimeter and internal buffer zones to screen noise-generating activities and minimize potential incompatibility between adjacent operations; and

Provide offsite facilities for receiving, warehousing, and other support and research activities suitable for decentralization.

2. **Design Guidelines:** Design guidelines for LBL site development have been developed to achieve specific improvements while respecting site constraints and have provided coherence between buildings and their surroundings. These guidelines address the following areas: safety considerations; utilities corridors; building mass, orientation, and exteriors; energy and operational efficiency; building use flexibility; circulation and parking; topography and grading; landscaping and open space; and, guideline conformance review.

3. **Facility and Land Requirements:** If the full programmatic capability of the site is developed to meet anticipated national needs in energy technology and supporting research, the sites and buildings identified in the LBL Site Development Plan would result in a net increase of 378,900 gsf to the existing main site of the Laboratory, for a total of approximately two million gsf. For comparison, the 1992 total, including current construction, consists of 1,621,100 gsf at the main hill site.

The Laboratory's onsite space is now 100 percent utilized at an approximate 65 percent net to gross area efficiency. This would result in a usable onsite space of approximately 1,053,700 net square feet. The building utilization efficiency is not projected to change significantly, although the efficiency of land use is expected to improve with the replacement of obsolete single- and two-story buildings with three- to five-story structures.

4. **Future Land Uses:** Of the 134 acres on the LBL site, 80 acres are currently open space and landscape areas; of this amount, 78 acres would be retained as open space and landscape if all projects identified in the Site Development Plan were completed and consolidation proposed in the plan is implemented. In the future the developed area would be comprised of approximately 22 acres of structures and sites, 16 acres of roads and 18 acres of parking and 78 acres of landscape and open space.

5. **Future Major Facility Locations and Functional Areas:** The seven LBL functional planning areas are related groupings of facilities that enhance work efficiency and effectiveness. In general, parking is at the perimeter of these areas, and clusters of buildings form the core. The Site Development Plan identifies changes to all of the functional planning areas to allow for potential research activities and to conform to SDP objectives, planning concepts, and design guidelines. The SDP calls for the removal of 214,600 gsf of buildings and the renovation of 811,200 gsf of building space. Building sites are planned or reserved for approximately 600,000 gsf of new construction, with a potential net long-term addition of approximately 378,900 gsf.

6. **Utilities Systems:** LBL is served by electrical and mechanical utilities systems along the east-west site axis. Many of the utilities systems were initially installed during the 1940s and require upgrades or replacement to achieve improved levels of reliability and service capacity. Many systems have adequate capacity but require extensions or improvements to achieve satisfactory performance and maintenance efficiency.

Electrical Utilities in LBL's power-distribution system consist of 24 substations and 20 miles of 12-kV cable. The electrical power is distributed underground from the centrally located Grizzly Peak Substation, which generally has spare capacity. The PG&E supply consists of two overhead 115-kV, 3-phase, 60-Hz transmission lines with a joint capacity of 100 MVA. The Original Labsite Substation Project replaces facilities in the oldest part of the Laboratory, and the Blackberry Canyon Substation and Feeders Project will increase reliability of the power supply for the Central Research and Administration Area. Improved capacity is needed for the East Canyon Area of the site.

Mechanical Utilities include domestic and cooling water, storm drains and sanitary sewers, natural gas, compressed-air, and vacuum systems. The water distribution system consists of a total of 34,625 lineal feet of line, with pressure alarms, hydrants, flow meters, back flow preventors, and storage tanks. LBL has 400,000 gallons of onsite emergency water storage equipped with automatic starting fire pumps, and two municipal water storage reservoirs are nearby. The sanitary sewer system consists of 18,385 lineal feet of sewers with waste holding tanks and monitoring stations and empties into the EBMUD sewer mains at Hearst Street and in Strawberry Canyon. The natural gas system consists of 15,320 ft of service line, pressure reducing stations, seismic safety shutoff

valves, integrating flow meters and other gas valves and manifolds that interface with the main PG&E supply. Many of the mechanical utilities are up to 40 years old and many are undersized for current laboratory demands.

7. **Planning, Programming, and Implementation.** LBL's site-planning implementation and management activities focus on developing the strategic framework for structures and utilities necessary to achieve the Laboratory's mission safely and to protect the environment. These activities include improving the reliability of utility systems, ensuring a safe working environment, restoring and rehabilitating obsolete buildings, consolidating support functions, and accommodating the increasing numbers of scientific guests and visitors using LBL's national research facilities.

a. **Infrastructure Improvements:** Many of LBL's site-development issues stem from an obsolete infrastructure constructed during World War II and the immediate postwar period. During the past several years, DOE has begun significant investments to improve mechanical and electrical utility systems at LBL and programmatic facilities for materials research. The facilities issues being addressed include:

Building Replacement, Rehabilitation, and Additions: During the next five years LBL's modernization plans call for construction to improve the safety and supply-services infrastructure and to improve general-purpose mechanical- and electrical-engineering facilities. The plan includes removal of obsolete, inefficient, and substandard facilities that cannot be made adequate and replacement of 56,300 gsf of temporary structures for support activities. In FY 1992, the Proposed projects include a Safety and Support Services Facility, Environmental Monitoring and Industrial Hygiene Building, and related support facilities and structures. Changes in the size, cost, number and scope of proposed projects (as shown in Table II-5) occur annually.

Safety Improvements: Safety and health improvements, several of which began in FY 1988, include fire protection upgrades, hazardous materials control upgrades, management and abatement of asbestos and improvements to safety services, medical services, building illumination, radiation protection, and water-pollution control and monitoring. Seismic stabilization of steep slopes began in FY 1991. Road improvements include widening, replacement of base materials, and elimination of acute curves and blind spots.

Environmental Improvements: Environmental projects are needed to correct existing conditions and to improve the management of waste handling operations. Environmental projects address risks of introducing chemicals in soils and groundwater and discharges to sewers. Restoration projects include the characterization of chemical contamination and closure of a waste handling facility, following completion of the new replacement facility now under construction. Effective waste management also requires construction of sewer improvements. These environmental improvements are described in greater detail in Chapter IV, Hazardous Materials.

Mechanical Utilities: Mechanical utilities comprise domestic, low-conductivity and cooling water, storm drains, sanitary sewers, natural gas, compressed-air, and vacuum systems. These utilities are up to 40 years old, and many are undersized for current Laboratory demands. The modernization plans provide for the orderly replacement of these utilities; any delays will engender further deterioration of these essential utilities.

Electrical Utilities: In the next five years, the first four phases of the LBL electrical power system rehabilitation plan will be completed and work proposed to begin on the remaining two phases. This six phase program will result in the complete rehabilitation of the underground 12kV power distribution system and the installation of six new circuit breaker switching stations throughout the site. This upgraded switching and distribution system will provide the reliability, flexibility and expandability necessary for proposed laboratory growth.

b. **Programmatic Facilities:** Programmatic facilities primarily provide capability for DOE's Office of Energy Research. These facilities include the Chemical Dynamics Research Laboratory, Human Genome Laboratory, and facilities to support the Advanced Light Source. Also, renovation and completion within existing structures includes a proposed Life Sciences Center at the ALS, and other additional user facilities. Other programmatic projects include additions for heavy-ion accelerator research, cell and molecular biology, magnetic fusion energy ion source test stands, and electron microscopy facilities. A Conservation and Renewable Energy Research Laboratory is also proposed. Sites are provided for additional research facilities that may be required, as identified in the 1987 Site Long Range Development Plan.

The design, public review and approval process for each programmatic facility, like general purpose facilities, integrates National Environmental Policy Act, (NEPA), California Environmental Quality Act (CEQA), environment, safety and health considerations into design and project review from the early conceptual phases through completion of construction and operation.

ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

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 SETTING, IMPACTS AND MITIGATION MEASURES

A. INTRODUCTION AND OVERVIEW OF ANALYTICAL APPROACH

1. Purpose

The Lawrence Berkeley Laboratory 1987 Long Range Development Plan (LRDP) is a plan for the siting of new facilities at LBL. The LRDP provides a comprehensive physical framework for implementing the laboratory's mission. As a multiprogram national laboratory operated by the University of California for the Department of Energy, LBL's mission includes the conduct of multidisciplinary research in the energy sciences, general sciences and life sciences, development and operation of scientific user facilities, training of scientists and engineers, and transfer of research results to industry.

To support this mission, the 1987 LRDP is motivated by the need to rehabilitate existing obsolete LBL facilities, to identify areas for potential new facilities and to establish a land use and staff planning framework consistent with the LBL site. As a long term guide for development of the main site, the LRDP does not include a construction schedule for buildings, nor does it recommend the initiation of specific building projects.

2. Planning Objectives

Site planning at LBL is based upon long range institutional goals and values that support the conduct of LBL's mission. The long range institutional site planning objectives are summarized as follows:

Evaluate future mission projections and anticipate changes in DOE national research facility needs;

Ensure a safe and healthful workplace in full compliance with building and fire codes;

Protect the environment and provide buffers for activities to enhance adjacent land uses;

Protect the national investment in valuable government-owned research and support facilities;

Consolidate research and support services through proper siting of new buildings;

Improve access and communications within and to the Laboratory; and

Promote energy conservation and cost reductions through efficient building design, location, operation, parking and transportation, and maintenance.

3. **Planning Concepts**

To achieve these objectives, the LBL LRDP is based on various site plan concepts. These concepts accommodate the facilities requirements of LBL within existing geophysical, environmental, and operational conditions. The site plan concepts as noted in Section II-F are:

Consolidate activities within seven functional LBL planning areas to enhance efficiency and effectiveness and to provide specialized research facilities;

Redevelop obsolete buildings and infrastructure, eliminate temporary trailers for permanent functions, and improve building arrangements to increase safety and energy efficiency;

Concentrate development along the east-west circulation and utilities axis to enhance transportation and services systems, e.g., develop off-road parking and improve pedestrian pathways;

Improve and maintain perimeter and internal buffer zones to screen noise-generating activities and minimize potential incapability between adjacent operations; and

Provide off-site facilities for receiving, warehousing, and other support and research activities suitable for decentralization.

4. **Project Impacts and Mitigation Measures:** Under CEQA, the purpose of this SEIR is to inform The Regents of any new significant environmental impacts which may be caused by The Regents'

approval of the contract renewal and which were not previously identified and mitigated to a less than significant level in the LRDP EIR. Accordingly, the environmental analysis included in LRDP EIR is used as a basis for determining whether the contract renewal project will have any significant new impacts and as a method for focusing this SEIR on potentially significant new environmental impacts. The LRDP EIR is also incorporated by reference into this SEIR.

While not required by CEQA, for the convenience of the reader this SEIR also summarizes information presented in the LRDP EIR which is not affected by changed circumstances or the availability of new information. This information includes the impacts and mitigation measures for LBL's ongoing operation, including ongoing implementation of the LRDP. Consistent with current University policy, this restatement of impacts and mitigation measures expressly identifies the standards for measuring the significance of project impacts. To provide a context for this restatement of impacts and mitigation measures, this SEIR also confirms that LBL's actual growth in population and facilities has been considerably less than what has already been approved -- and mitigated to a less than significant level -- in the 1987 LRDP and LRDP EIR.

This SEIR also includes a comprehensive examination of alternatives to the contract renewal project, including two "no project" alternatives (discontinuation of the University's management of LBL and the shutdown and decommissioning of LBL), and three different physical development alternatives (no new development at LBL, less development at LBL, and the same level of development at an offsite location). The purpose of this alternatives analysis is to determine whether there are any alternatives which are capable of satisfying most or all of the project objectives in a manner which eliminates or substantially reduces a significant adverse environmental impact. While one of the no project alternatives (shutdown and decommissioning of LBL) and one of the development alternatives (less development) would cause fewer impacts than the proposed project, neither would result in the elimination of the one unavoidable significant adverse project impact (air quality) since both would result in some level of air emissions that would contribute to the region's failure to attain applicable ozone standards. Accordingly, while these alternatives are technically environmentally superior to the proposed project, neither can eliminate or substantially reduce the sole significant adverse impact caused by the project. In addition, neither of these alternatives is capable of achieving all or most of the project objectives.

Finally, consistent with recent CEQA legislation and University policy, the University will prepare a mitigation monitoring plan for all mitigation measures identified in this SEIR, including the restated mitigation measures from the LRDP EIR and the new mitigation measures which are presented in this SEIR. The mitigation monitoring plan will be part of the Regents' findings on the SEIR and contract renewal project.

5. **Cumulative Impacts Analysis:** CEQA also requires an analysis of the impacts of the proposed project considered in conjunction with impacts caused by other foreseeable future projects which are located in the vicinity of the proposed project. The purpose of this analysis is to determine whether the "cumulative impacts" of the proposed project, in conjunction with these other projects, would create a significant environmental impact or compound or increase other environmental impacts. Cumulative impacts for each environmental issue are discussed in detail at the end of each subsection of SEIR Sections III and IV.

Information about foreseeable future projects and development which could produce cumulative impacts when considered in conjunction with the potential impacts of this project was derived from the 1987 LRDP and from information regarding foreseeable future projects in the Berkeley area, including information from environmental impact reports for recent projects approved in the City of Berkeley.

Table III-A-1 on the following page summarizes the amount and type of proposed development as identified in these reports. The gross square footage for each of the categories shown in Table III-A-1 represents the estimates regarding future development available as of the date of this SEIR. These estimates indicate that through the year 2005/06, up to 5,626,700 gsf of new UC Berkeley campus, LBL, City of Berkeley and Emeryville office and retail space, private development and other public (non-UC) space could be developed. Up to 4,417 dwelling units (student beds and multifamily units) could also be developed in that time.

In addition, major projects in the West Berkeley area, as shown in Table III-A-2 would add 1,392,500 square feet of development to the City. Smaller projects in the West Berkeley area would provide another 274,000 square feet of development, as shown in Table III-A-3. The information for this cumulative development is taken from the *Miles Inc./Cutter Biological Long Range Plan, Final Environmental Impact Report* (October 1991).

Table III-A-1
CUMULATIVE DEVELOPMENT, LBL, UC BERKELEY AND DOWNTOWN BERKELEY AREA

Project Category	**Gross Square Footage (GSF) Dwelling Units (d.u.)**
Lawrence Berkeley Laboratory (LBL)	404,800 GSF
Recent Development in Downtown Berkeley (Existing Buildings Not Fully Occupied)	239,000 GSF
Proposed Private Sector Projects	355,764 GSF 440 d.u.
Potential Future Private Development	1,462,969 GSF 392 d.u.
Proposed (Non-UC) Public Sector Projects	266,000 GSF
UCB Approved Development	820,000 GSF 917 d.u.
UCB 1990 LRDP Category 2 (Proposed Development)	2,239,000 GSF 3,585 d.u.
Total Cumulative Development	**5,787,533 GSF 4,417 d.u.**

Note: The data for the cumulative projects list was coordinated with the city of Berkeley, the Downtown Plan EIR, LBL, and traffic consultants. The gross square footage for each category represents the largest estimates from these sources. These estimates indicate that through the year 2005/06, up to 5,787,533 gross square feet of new campus, LBL, city of Berkeley office and retail space, private development and other public (non-UC) space could be developed. Up to 4,417 dwelling units (student beds and multifamily) are projected to be developed in the city of Berkeley by the year 2005.

Source: *Revised Draft Environmental Impact Report, Computer Science/College of Engineering Building, University of California at Berkeley*. Campus Planning Office, University of California, Berkeley, June 1990.

Table III-A-2
CUMULATIVE DEVELOPMENT FROM MAJOR PROJECTS PROPOSED IN THE WEST BERKELEY AREA

Location	Square Feet	Description	Status
Canned Foods 2000 Fifth Street	40,000	20,000 sq. ft. change from auto sales to retail sales and 20,000 sq. ft. new office space	Approved
1045 Ashby	40,000	Change from warehouse to retail	Approved
Bay Export 209-255 Potter	200,000	R & D/office	Proposed
Colgate Seventh Street and Carleton	587,250	R & D/office and warehouse	Proposed
Yerba Buena and San Pablo[a]	525,000	Mixed use retail and residential	Proposed
Total Area (Sq. ft.)	**1,392,250**		

Note:
a = Emeryville

Source: *Miles Inc./Cutter Biological Long Range Plan, Final Environmental Impact Report Response to Comments on the Draft Environmental Impact Report*, Volume 1, October 1991, p. 4.4-2.

Table III-A-3
CUMULATIVE DEVELOPMENT FROM SMALL PROJECTS PROPOSED IN THE WEST BERKELEY AREA BY LAND USE

Type of Land Use	Total Square Feet
Retail	100,000
Office	96,000
Warehouse	25,000
Other[a]	53,000
Total Area (Sq. ft.)	**274,000**

Note:
a = 20,000 square feet of small business, 21,000 square feet of nursery and retail space, 7,000 square feet of bank space and 5,000 square feet of school space.

Source: *Miles Inc./Cutter Biological Long Range Plan, Draft Environmental Impact Report,* Volume 1, June 1991, p. 5B-13.

B. GEOLOGY, SOILS AND SEISMICITY

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential adverse impacts on people or property due to geology, soil conditions or seismicity could result from continued operations, including facility development as contemplated in the 1987 LRDP.

Most of the LBL site is underlain by complex sedimentary and volcanic rock that has been deformed by ancient folding and faulting. In general, the bedrock is relatively weak and weathers deeply, producing a colluvial cover a few feet thick. Natural rock outcrops are few, although there are many rock exposures in cut slopes.[2]

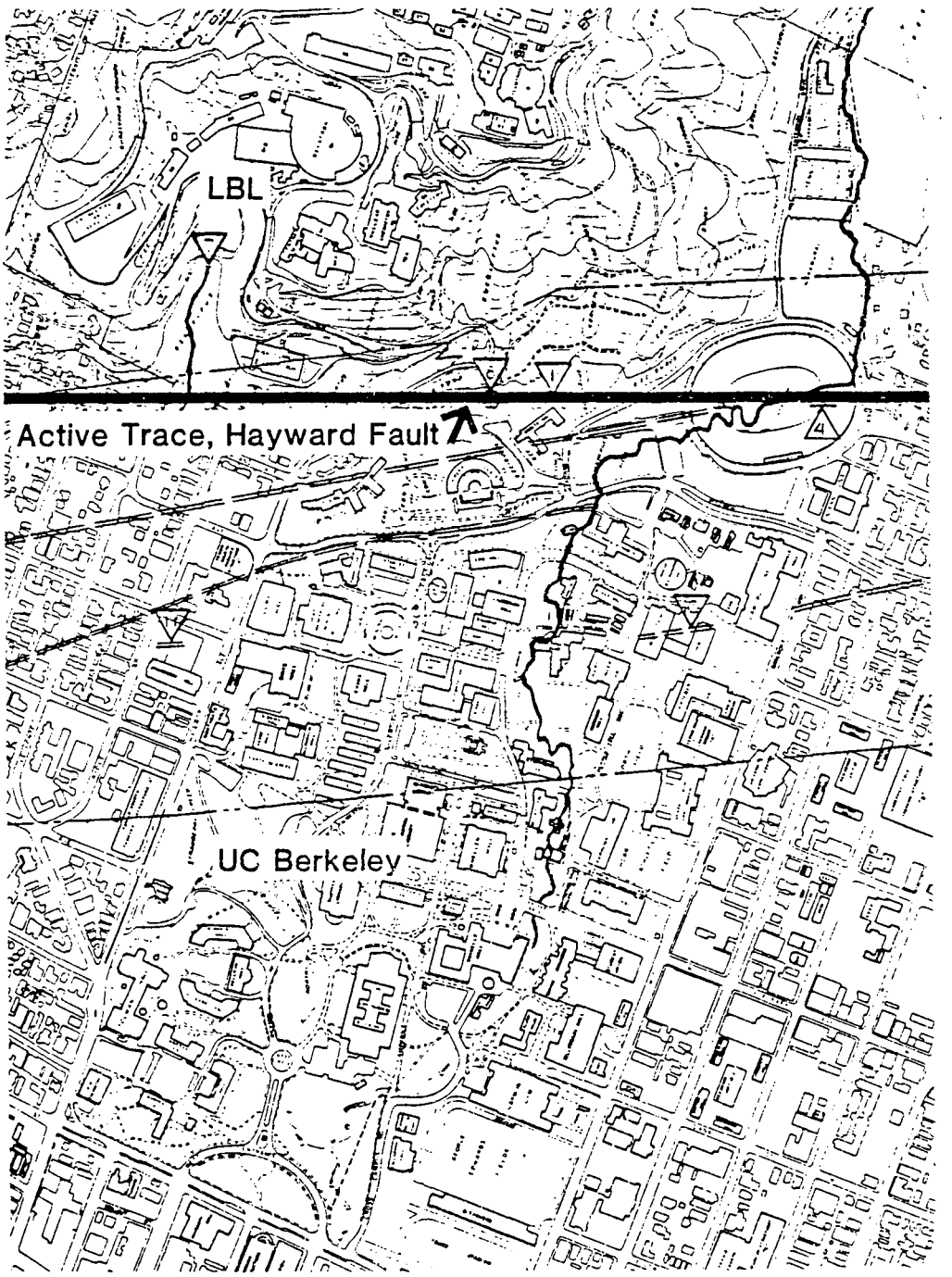
Unstable soil deposits are present in several locations within the LBL site. During the past 20 years, the Laboratory has carried out an aggressive program of slope stabilization to mitigate the risk of property damage due to soil movement.[3]

Because of the hilly terrain, grading and filling has often been necessary to provide suitable building sites. As a result, earth fills up to several tens of feet thick are present in some of the original ravines and depressions. Most of these fills were mechanically compacted during placement, and they have been satisfactory for foundation support.[4]

LBL is located in a region of known and frequent seismic activity. The seismically active Hayward fault, part of the San Andreas Fault System, developed as the Berkeley hills were uplifted. The Hayward fault, shown in Exhibit III-B-1, trends in a northeast-southwest direction along the base of the hills below the Laboratory and has the potential to produce an earthquake of approximately Richter magnitude 7.5.[5]

The San Andreas fault zone, which has a potential for a magnitude 8.3 earthquake, lies about 20 miles west of the site, off-shore beyond the Golden Gate. This fault and the Calaveras fault zone which lies about 15 miles east of the site would produce less intense ground shaking at the site than a magnitude 7.5 earthquake on the Hayward fault.[6]

Exhibit III-B-1
HAYWARD FAULT ZONE, LBL VICINITY



Source: Ira Fink and Associates, Inc., based on "Fault Hazard Study", prepared by Ben J. Lenert, Civil Engineer and Garniss H. Curtis, Geologist, for the University of California, Berkeley, June 1980.

Of considerable geologic importance in this area is a fault structure, known as the Wildcat fault, traces of which traverse LBL and underlie existing Building 74. To determine more about the Wildcat fault, two trenches were dug across the suspected fault in November and December 1979. Based on an analysis of the materials found in the trenches, Harding-Lawson indicates there is no evidence that the Wildcat fault in this area is active.[7]

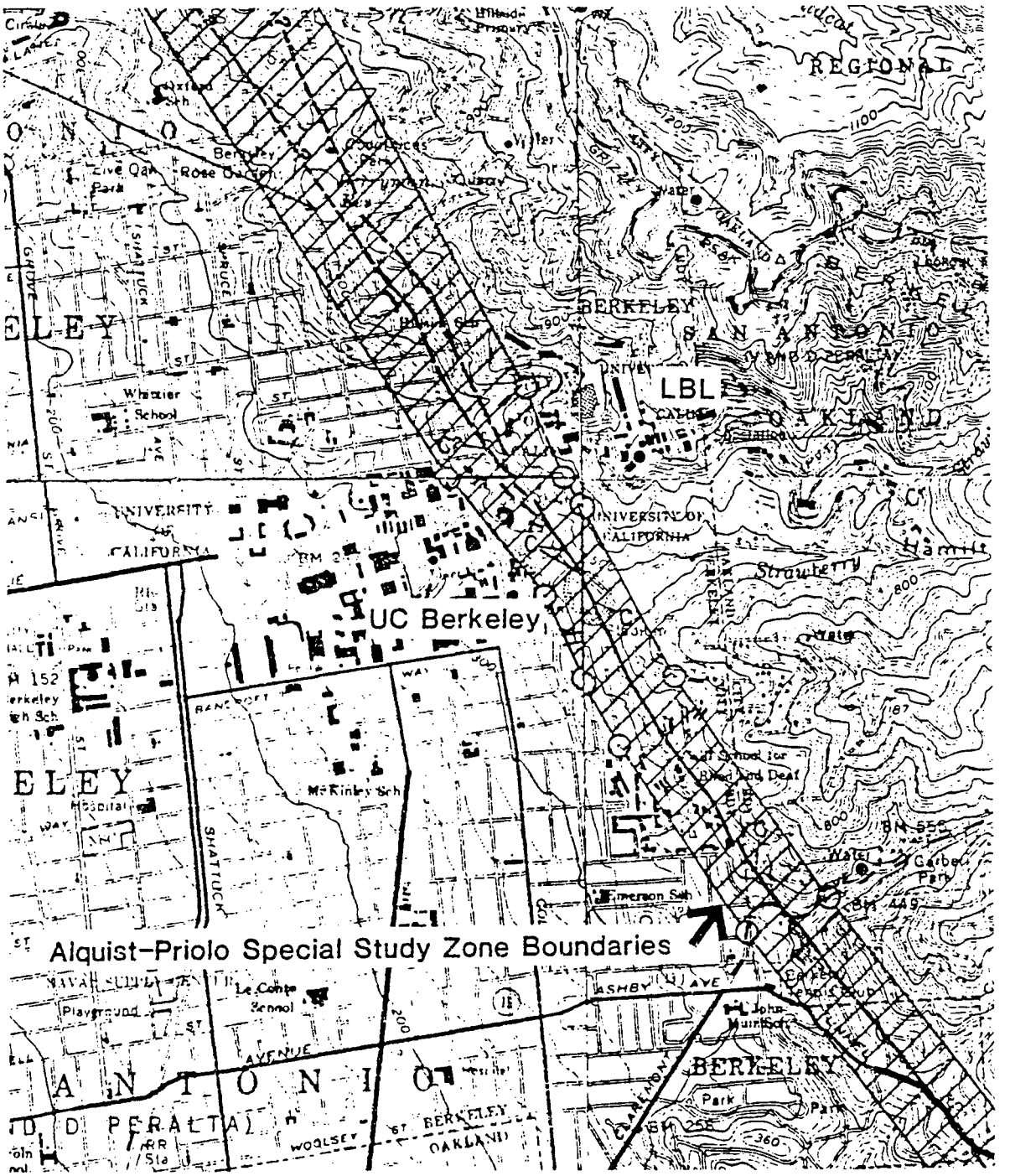
The proposed projects within the LBL site development plan lie outside the area currently reviewed for seismic activity under the State of California Alquist-Priolo Special Study Zones Act, as shown in Exhibit III-B-2.

To mitigate potential damage from seismic activity, LBL has carried out a comprehensive earthquake safety program. All new facilities have been designed and constructed to resist the maximum credible earthquake estimated for the site. All existing LBL buildings have been reviewed and most that require structural strengthening under the new improved risk criteria have been strengthened.[8]

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels or cause any significant new geology, soils and seismicity impacts, no further analysis of these potential project impacts is required under CEQA. The impacts and mitigation measures from the 1987 LRDP EIR are summarized in this SEIR for the convenience of the reader, and these mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the LRDP EIR and other CEQA documentation.

Exhibit III-B-2
ALQUIST-PRIOLO SPECIAL STUDIES ZONES, LBL VICINITY



Source: State of California, Special Study Zones, Official Map, Effective January 1, 1982.

2. Impacts and Mitigation Measures

a. Standards of Significance

Impacts would be significant if UC's continued operation and development of LBL would result in development in areas:

Which are located within an Alquist-Priolo Special Studies Zone, or within a known active fault zone, or an area characterized by surface rupture that might be related to a fault;

Where the substrate consists of material that is subject to liquefaction or other secondary seismic hazards in the event of groundshaking;

Where there is evidence of seismic hazards, such as landsliding or excessively steep slopes, that could result in slope failure;

Which are in the vicinity of soil that is likely to collapse, as might be the case with karst topography, old mining properties or areas of subsidence caused by groundwater drawdown;

Where soils are characterized by shrink/swell potential that might result in deformation of foundations or damage to structures;

Which are located next to a water body that might be subject to tsunamis or seiche waves; and,

Which are located in a Mineral Resource Zone identified by the California Deportment of Mines and Geology or within an area designated as Important Farmland by the Soil conservation Service (U.S Department of Agriculture).

The impacts identified below are considered significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact III-B-1: **There could be significant adverse impacts on people or property due to continued operation and the development of LBL facilities in areas susceptible to surface rupture. There may be potential adverse impact to people and property at the site caused by groundshaking, landsliding, lurching, and differential compaction during a seismic event.**

Discussion: No portion of the LBL site is located within the Alquist-Priolo Special Studies Zone. However, the LBL site is located within an active fault zone. The substrate consists of material that is subject to secondary seismic hazards such as landsliding, lurching and slope failure in the event of groundshaking. Soils are characterized by high shrink/swell potential.[9]

Mitigation 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 followed to ensure that the effects of landsliding, lurching, and liquefaction potential will not represent a significant adverse impact during a seismic event.[10]

Impact III-B-2: **Soil erosion, sedimentation and landsliding caused by construction work may adversely affect the stability of LBL buildings placed on the site.**

Mitigation 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.

Mitigation III-B-2b: Foundations for proposed structures will be designed in accordance with geologic and soils engineering recommendations to minimize the long-term possibilities of landslide.[11]

Mitigation III-B-2c: Excavations will be shored as required by law to preclude minor short-term landslides during construction.[12]

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.

3. Cumulative Impacts

Cumulative development at and in the vicinity of LBL is not expected to result in significant adverse impacts upon people or property as a result of geologic hazards.

Occupancy of proposed structures and proposed cumulative development would expose additional people to hazards related to groundshaking and risks associated with structural damage from seismic events. Development of these new structures must be undertaken in conformance with the provisions of all applicable laws, including current requirements in applicable building codes to ensure seismic safety. In fact, since these new structures must be constructed with more stringent seismic safety designs, they will be more safe than older, existing structures, to the extent that new development replaces older, existing structures. Moreover, the cumulative impact of the replacement facilities will result in a cumulative beneficial impact.

Notes for Section III-B:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI–F of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 101.

3. *Ibid.*, p. 101.

4. *Ibid.*, p. 101.

5. *Ibid.*, p. 101.

6. *Ibid.*, p. 104.

7. *Ibid.*, p. 104.

8. *Ibid.*, p. 104.

9. *Ibid.*, p. 101.

10. *Lawrence Berkeley Laboratory Site Development Plan, Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-13, No. F-2(a).

11. *Ibid.*, p. F-13, No. F-2(b).

12. *Ibid.*, p. F-14, No. F-2(c).

C. HYDROLOGY AND WATER QUALITY

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential adverse impacts on hydrology or water quality could result from continued LBL operations, including facility development as contemplated in the 1987 LRDP.

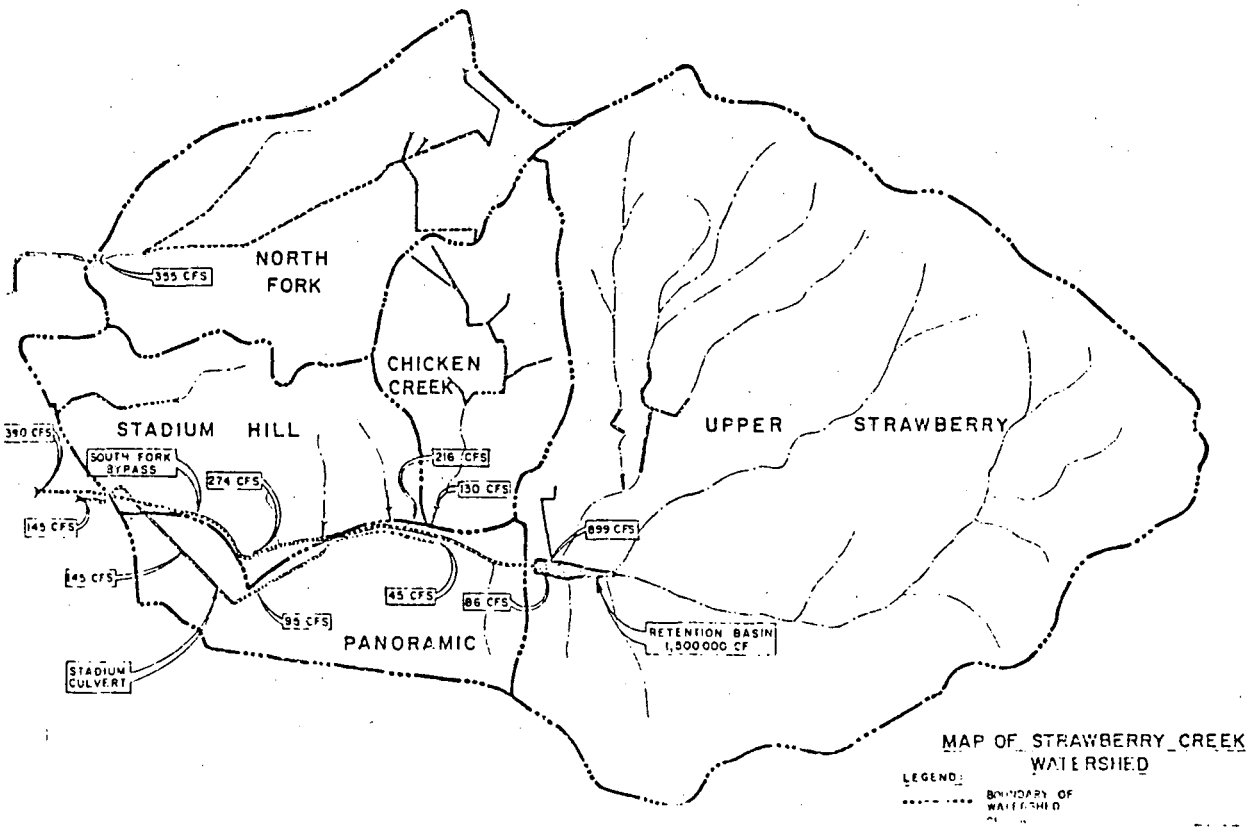
LBL is within the Strawberry Creek watershed. This watershed also includes other University of California property, public streets of both the cities of Oakland and Berkeley, and private property. The total Strawberry Creek watershed above Gayley Road contains about 874 acres. There are two main creeks in the watershed, namely the North Fork and the South Fork of Strawberry Creek. These two creeks meet near the lower end of the Berkeley Campus in the vicinity of Oxford Street, as shown in Exhibit III-C-1.[2]

Storm water runoff generated from LBL and from the upper parts of the North Fork watershed discharges into a 60 inch concrete culvert at the head of LeConte Avenue in Berkeley. The drainage facilities in this watershed have proven to be adequate during the heavy rains of the past few years. As long as these facilities are well maintained there should be no problem with storm water.[3]

Grounds and buildings in all four of the South Fork watershed areas were heavily damaged during storms in October 1962. Subsequent to that time extensive improvements have been made by LBL and UC Berkeley. Current drainage facilities have been able to accommodate all runoff since the improvements have been made. These improvements included additional pipe and culvert capacity, a retention basin in Upper Strawberry Creek watershed, trash racks and hardening of stream channels. The successful operation of the entire drainage system depends upon good maintenance to keep all trash racks clean and all culverts and pipes free of debris, so that heavy rains will not clog inlets thereby causing flooding and earth slides.[4]

As long as good maintenance practices are observed by LBL and the other owners within the watershed, there should be no significant water damage from winter storms.[5]

Exhibit III-C-1
DIVISIONS OF STRAWBERRY CREEK WATERSHED



Source: *Storm Drainage Study, Strawberry Creek Watershed at University of California, Lawrence Berkeley Laboratory*, prepared by G.T. Kuntz, Consulting Engineer, February 1980. Plate I.

Pipe sizes are adequate, channels are sufficient to carry the storm water, and there is also an emergency bypass system from the Upper Strawberry watershed in case the facilities do become clogged.[6]

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels or cause any significant new impacts, no further analysis of potential project impacts is required under CEQA. For the convenience of the reader, the following summary of hydrology and water quality impacts and mitigation measures is presented for information purposes in this SEIR. These mitigation measures remain binding commitments of LBL during the term of the contract renewal, in conformance with the LRDP EIR.

2. Impacts and Mitigation Measures

a. Standards of Significance

Adverse hydrology and water quality impacts of UC's continued operation and development of LBL would be considered significant if the project proposes facilities which:

Would be located in flood-prone areas;

Would increase off-site flood hazard, erosion or sedimentation;

Would substantially degrade or deplete groundwater resources;

Would interfere substantially with groundwater recharge; and

Substantially degrade surface or groundwater quality.

The impacts identified below are considered to be potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact 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.**

Discussion: LBL development plans which would create new impervious surfaces will be limited to the Upper Strawberry watershed. Anticipated additional LBL development in this watershed probably would be on the order of 30 acres of development, with up to four acres of impervious surfaces. This would be about two percent of the total watershed area. This development will not significantly increase the downstream runoff and will not require upgrading or enlarging of existing culverts, inlets or other drainage facilities. It only will be necessary to design an adequate local drainage system for the new proposed buildings, parking areas and roads. These proposed new facilities would consist of the inlets with underground pipe discharging into existing natural channels or to existing culverts.[7]

Planned developments within the North Fork, Chicken Creek and Stadium Hill watersheds would consist of renovation and rehabilitation work which would not add any new impervious surfaces. The work planned in these areas would require only modifications to existing storm water inlets, but would not generate any additional runoff from these areas.[8]

Mitigation: None required.

Impact III–C–2: **Continued University operation of LBL, including continued implementation of the 1987 LRDP, could produce increased surface and storm runoff.**

Discussion: The LBL facilities lie in the North Fork Watershed, the Chicken Creek Watershed, the Stadium Hill Watershed and the Upper Strawberry Creek Watershed. Proposed development in the North Fork, Chicken Creek and Stadium Hill Watersheds is likely to consist of replacement of existing obsolete installations which will not add significantly to the existing impervious area and therefore will not affect the rate of storm water runoff. Projects which consist of replacing existing facilities, do not have an impact on the existing storm water runoff characteristics.

Proposed developments in the Upper Strawberry Creek Watershed are expected to consist of new buildings and paved areas which will replace existing natural surfaces with impervious surfaces. The extent to which new development affects the storm water runoff is proportional to the additional area of impervious surface. The Upper Strawberry Creek Watershed contains approximately 502 acres and includes the LBL area, other University Property and privately owned property. If new development at LBL adds another ten acres of impervious surfaces consisting of roads, other pavement and buildings, the increase in runoff would be about two percent of the current total from the Upper Strawberry Creek Watershed. Existing downstream facilities would not be significantly impacted by this very slight increase in storm water runoff. Proposed development at LBL will not add enough impervious area to the watersheds to impact the rate of storm water runoff.

Mitigation 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.

3. Cumulative Impacts

Cumulative development at and in the vicinity of LBL is not expected to have significant adverse hydrologic impacts within the Strawberry Creek watershed. Water quality, potential for erosion and sedimentation of drainage facilities, and the quality of Strawberry Creek are all potentially impacted by cumulative development and cumulative increases in impermeable surface. However, implementation

of all hydrology mitigation measures relevant to cumulative development, and compliance with all applicable laws, will result in less than significant impacts on hydrology.

Cumulative development in the City of Berkeley may adversely impact water quality, potential for erosion, and sedimentation of drainage facilities. These potential adverse impacts can be reduced if the agencies responsible for reviewing and approving these new development projects adopt feasible mitigation measures to control surface water runoff, prevent erosion, and maintain adequate drainage facilities.

Notes for Section III-C:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-M of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 193.

3. *Ibid.*, p. 193.

4. *Ibid.*, p. 196.

5. *Ibid.*, p. 196.

6. *Ibid.*, p. 196.

7. *Ibid.*, p. 196.

8. *Ibid.*, p. 196.

D. BIOLOGICAL RESOURCES

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on biological resources could result from continued University operation of LBL, including facility development as contemplated in the 1987 LRDP.

During the 19th and early 20th century, the LBL site was grazing land. Cattle were managed at the site through the 1950's, and the predominant land cover was native and introduced grasses and shrubs. Much of the LBL site is now usually dominated by introduced trees that have grown in the past 20 to 30 years.[2]

Most of the vegetation remaining within the LBL site is located in zones around the periphery of the site, away from the centrally developed area. Although a herd of deer are maintained on the site, cattle grazing has been eliminated.

J. R. McBride in his book *Plant Succession in the Berkeley Hills, California*, has demonstrated that a general successional pattern from the grasslands to Baccharis brushlands occurs in areas of the Berkeley Hills where livestock grazing had been eliminated.[3] Analysis of historical documents indicate that the oak and bay woodlands in turn would replace the Baccharis brushland over a period of approximately 50 years in the absence of recurrent wildfires. In terms of these plant succession patterns, part of the LBL site is currently in a transitional, late Baccharis brushland/early oak-bay woodland state. This suggests that the site may have been disturbed (burned, cleared, or subject to landslide) at some time within the past 25-75 years.[4]

In general, the LBL site supports habitats and associated wildlife that are typical of disturbed portions of the Berkeley-Oakland hills. Approximately 79 species of birds, 20 mammal species, and 19 reptile and amphibian species can be expected to occur on or near the project area, as shown in Appendix F of the 1987 LRDP EIR.[5]

The most significant wildlife habitats within the LBL site occur in Blackberry Canyon and to some extent in the northeasterly edge of the LBL East Site area. The lower portion of Blackberry Canyon supports a relatively intact oak-bay woodland, but is completely surrounded by development. The amount of habitat present is small. The East Site area is rated as important because of the higher interspersion of habitats, and the presence of small areas of modified coastal sagebrush scrub. It also abuts the proposed extension of the UC Berkeley Strawberry Canyon Ecological Area.[6]

The Baccharis brushland provides cover, food and breeding sites for a variety of common birds and mammals of the region. California quail, brown towhees, white crowned sparrows, song sparrows, and scrub jays are birds typically found in this plant community, and were observed during a field reconnaissance conducted in June 1986. Brush rabbits and mule deer are the dominant mammals of this plant community and evidence of both was noted during the survey. Nocturnal rodents, most notably deer mice, raccoons, opossum, coyote and bobcat are also expected to occur in the less disturbed brushy areas along the southern perimeter of the site.[7]

Stands of eucalyptus and Monterey Pine offer nest sites for many species of birds and are potentially used by red-tailed hawks and great horned owls.[8]

Red-tailed hawk and great horned owl nests are used year after year and are noticeable during the non-breeding season. None were located during the field survey. Eucalyptus are also important to hummingbirds and other nectar eating birds during the flowering season, providing an abundant source of high energy food. However, the understorey provides poor wildlife habitat because few plants are able to tolerate the eucalyptus chemicals present in the litter and soil.[9]

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

While LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels, LBL also prepares a project-specific EIR prior to constructing any new facility which may have a significant impact on the environment. EIRs for recent LBL development projects, including the LBL Hazardous Waste Handling Facility have confirmed that there are no new biological resources at LBL, nor would that project cause significant adverse impacts to existing biological resources. Since no significant new biological resource impacts have been identified, and since potentially adverse impacts to biological resources have been mitigated to a less than significant level in the LRDP EIR, no further analysis of potential project impacts is required under CEQA. For the convenience of the reader, the following summary of biological resource impacts and mitigation measures are taken from the LRDP EIR. These mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR.

2. Impacts and Mitigation Measures

a. Standards of Significance

Impacts would be significant if UC's continued operation and development of LBL would:

Substantially reduce the number or restrict the range of a rare, endangered or threatened plant or animal;

Cause fish or wildlife populations to drop below self-sustaining levels; or

Adversely affect significant riparian lands, wetlands, marshes, and other wildlife habitats.

The impacts identified below are considered to be potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact 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 to cause any existing fish or wildlife populations to drop below self-sustaining levels.**

Discussion: No rare, endangered or threatened plant or animal species have been located or are expected to appear on the site. Thus, no significant impact on such species is expected to occur as a result of the continued implementation of the 1987 LRDP. Similarly, continued facility development is not expected to cause any fish or wildlife populations to drop below a self-sustaining level. However, additional facility development will cause a loss of open space, portions of which may be vegetated and provide some habitat for non-critical species.

Mitigation: None required.

Impact 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.**

Mitigation 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.

Mitigation 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, *Cotoneaster*, and other opportunistic colonizer shrubs and trees in disturbed areas on-site will be undertaken. Herbicides will not be used for this purpose.

Mitigation 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.)

Mitigation III–D–2d: Disturbance to the site perimeter buffer zones will be minimized.

Mitigation III–D–2e: LBL activity and encroachment in Blackberry Canyon will be minimized.

Mitigation 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.

3. Cumulative impacts

As described above, threatened or endangered plant or wildlife species and appropriate habitat for such species have not been identified at LBL. Thus, while cumulative development of the hillside area surrounding the LBL site, 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 project itself will not cause or contribute to any of these impacts. Accordingly, no further analysis is required for potential cumulative impacts for purposes of this SEIR.

Notes for Section III-D:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-S of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 224.

3. *Ibid.*, p. 226.

4. *Ibid.*, p. 226.

5. *Ibid.*, p. 235.

6. *Ibid.*, p. 235.

7. *Ibid.*, p. 235.

8. *Ibid.*, p. 235.

9. *Ibid.*, p. 235.

E. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on historical or archaeological resources could result from continued University operation of LBL, including facility development as contemplated in the 1987 LRDP.

A surface examination of all undeveloped land and proposed building locations within the Lawrence Berkeley Laboratory was completed in preparation of the 1987 LRDP EIR.[2]

A check of the data on file with Archaeological Resource Service indicated that no new archaeological sites have been reported since their last review of this literature, performed in 1982, for the UC Berkeley Biological Sciences Alteration and Construction Project.[3]

Three archaeological sites have been identified that are associated with the Strawberry Creek drainage, the main natural drainage channel through the campus. The LBL area lies in the headwaters of Strawberry Creek, in the offshoot called Blackberry Canyon. No prehistoric cultural resources are reported to lie within the Lawrence Berkeley Laboratory, as delineated by the chain link fence which borders the laboratory area.[4]

On July 14, 1986, a surface reconnaissance was conducted of the proposed building locations at LBL and any other open ground accessible within the fenced LBL area.[5] All reasonably accessible parts of the LBL area were examined. Special attention was given to areas of relatively flat land, or rock outcrops. The steep hillsides were not examined intensively, although transects through accessible areas were made.[6] No indications of historic or prehistoric archaeological resources were encountered in any location within the project area.[7]

As previously indicated, the laboratory is located on a steep hillside with limited amounts of relatively flat land. Those relatively flat areas that do exist are generally covered by buildings or parking areas. Cut and fill operations have been numerous.[8] It appears that all of the LBL areas that might have been suitable for prehistoric occupation and use have been utilized by LBL already. Building 6 (now

the Advanced Light Source and formerly the 184-inch Cyclotron) itself occupies what is probably the most likely area to have contained evidence of prehistoric human occupation or use. There is no evidence of any such use, however.[9]

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

The contract renewal will not result in any significant new impacts on historical and archaeological resources. The following summary of historical and archaeological resource impacts and mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR and other CEQA documentation.

2. Impacts and Mitigation Measures

a. Standards of Significance

Impacts would be significant if UC's continued operation and development of LBL would:

> Disrupt or adversely affect a prehistoric or archaeological site, or a property of historic or cultural significance to a community or ethnic or social group, or a paleontological site, except as part of a scientific study; or
>
> Affect a local landmark of local cultural/historic importance.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation.

Impact 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.**

Mitigation III-E-1a: A photographic record will be made of all structures demolished as part of future projects.[10]

Mitigation 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.[11]

Mitigation 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.[12] An analysis has been completed of the historical significance of the 184-inch Cyclotron building.[13]

3. Cumulative Impacts

Impacts of cumulative development upon archaeological or historical resources at and in the vicinity of LBL are not expected to be significant.

Study and preservation of LBL's own historic and archaeological resources will occur to the extent outlined in the above mitigation measures; mitigation of significant archaeological or historical impacts which result from LBL development will be mitigated under the LRDP EIR. Impacts upon historic or archaeological resources resulting from private development will be regulated by the appropriate lead agency under applicable federal, state, and local requirements.

Notes for Section III-E:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-D of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 96.

3. *Ibid.*, p. 96.

4. *Ibid.*, p. 97.

5. *Ibid.*, p. 97.

6. *Ibid.*, p. 97.

7. *Ibid.*, p. 97.

8. *Ibid.*, p. 97.

9. *Ibid.*, p. 97.

10. *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-12, No. D-2(c).

11. *Ibid.*, p. F-12, No. D-2(d).

12. *Ibid.*, p. F-12, No. D-(2)(a).

13. *Ibid.*, p. F-12, No. D-(2)(b).

F. VISUAL QUALITY

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on visual quality could result from continued University operation of LBL, including facility development as contemplated in the 1987 LRDP.

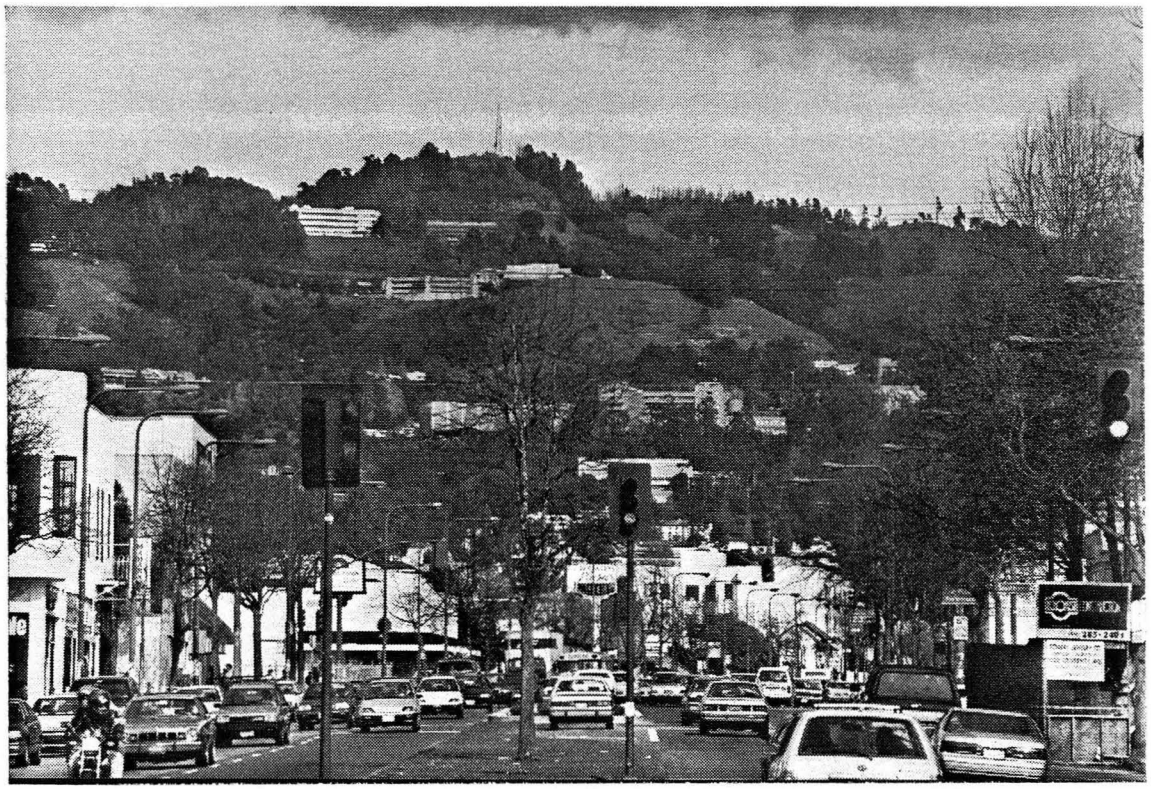
The combination of the elevational difference between LBL buildings and the low profile of the buildings themselves brings to prominence a major component of the site, its tall trees. Two tree types -- eucalyptus and pine -- are dominant on the site. Both retain their foliage throughout the year and grow quickly to a height of 50 feet or more. The plantations of eucalyptus and pine on the slopes between "benches" or plateaus of the LBL building sites create tall screens between buildings. As these linear plantations are viewed from below or from above, the successive layers appear as a continuous tree mass. As will be discussed later, few buildings of the LBL site are visible from any distance.[2]

The majority of the western slopes of the Berkeley Hills is densely wooded either with native canyon stands of oak and bay or with introduced plantations of eucalyptus or conifers. The nearly continuous tree cover throughout the LBL site creates a uniform pattern of dark green foliage across the lower slopes to present a rustic backdrop for the UC Berkeley campus and the City of Berkeley below as shown in Exhibit III-F-1.[3]

The physical components of the LBL site influence its visual character. First and foremost of these components is the steep hillside topography. Level building sites are benched into this slope and individual buildings or aggregations of buildings at LBL are separated vertically from each other. Buildings which are located quite close together in plan view are seen as discrete elements in the landscape because of differences in elevation, as shown in Exhibit III-F-1.[4]

The second component of the site's visual character is the typical geometry of its buildings. With the exception of Building 50, buildings on the site present a low profile of no more than three or four stories. While some buildings are in fact taller, they are stepped into the hillside so their apparent height is reduced, as shown in Exhibit III-F-2.[5]

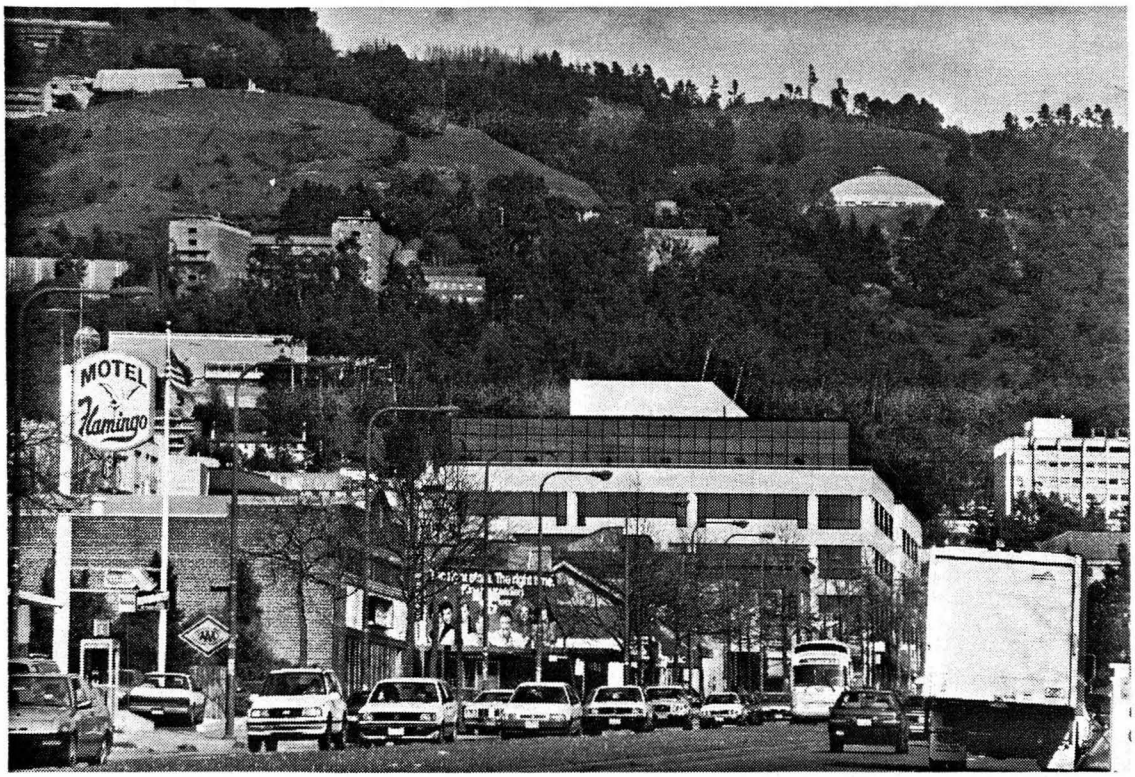
Exhibit III-F-1
LBL SITE PHOTOGRAPH 1



View of the LBL main hill site looking east from University Avenue, near San Pablo Avenue. The structures at the top of the hill side are part of the UC Berkeley campus, including (from top down) the Samuel Silver Space Sciences Laboratory, the Math Sciences Research Institute, and the Lawrence Hall of Science. The buildings in the lower portion of the hill are part of LBL, and include from left to right, the Bevalac, Building 50, 50A and 50B, and Building 70 and 70A.

Source: Ira Fink and Associates, Inc.

Exhibit III-F-2
LBL SITE PHOTOGRAPH 2



View of the LBL main hill site looking east from University Avenue near Martin Luther King, Jr. Boulevard. The large building in the foreground is the privately owned Golden Bear Building at the corner of University and Milvia. The LBL buildings which are visible include, from left to right, the Bevalac, Building 50, 50A and 50B, Building 70 and 70A, and the dome of the former 184-inch Cyclotron, (Building 6), which now houses the LBL Advanced Light Source. The building in the upper left of the photograph is the UC Berkeley Lawrence Hall of Science.

Source: Ira Fink and Associates, Inc.

Much of the built development of the LBL site has an industrial look -- numerous structures are steel clad; pipes, vents, panels and tanks are exposed; and large pieces of equipment or bulky supplies are stored out-of-doors. This visual situation is masked from external and many internal views of the site by the tall trees, as shown in Exhibit III-F-3.[6]

The buildings on the LBL site do not project glare onto adjacent communities. LBL buildings, like most other buildings in the Berkeley area, do not contain reflective materials, metallic materials, or reflective glass.[7]

Because the most visible face of the site is its west face, the buildings are usually defined in the daytime by strong shadows, with the LBL buildings blending into the hillside due to their dark earth tone colors, and the evergreen colors of the Berkeley hills in the winter time, and the tan colors of the hillside in the summer. (The UC Berkeley Space Sciences Laboratory and the UC Berkeley Math Sciences Research Institute are light colored buildings at the top of the Berkeley Hills as shown earlier in Exhibit III-F-1.)[8]

The evening view of LBL is dominated by the lights of the UC Berkeley campus hillside buildings, which are above the LBL site, including the UC Berkeley Space Sciences Laboratory, and the UC Berkeley Math Sciences Research Institute.[9]

Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels or cause any significant new impacts, no further analysis of potential visual quality impacts is required under CEQA. The following impacts and mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR and other CEQA documentation.

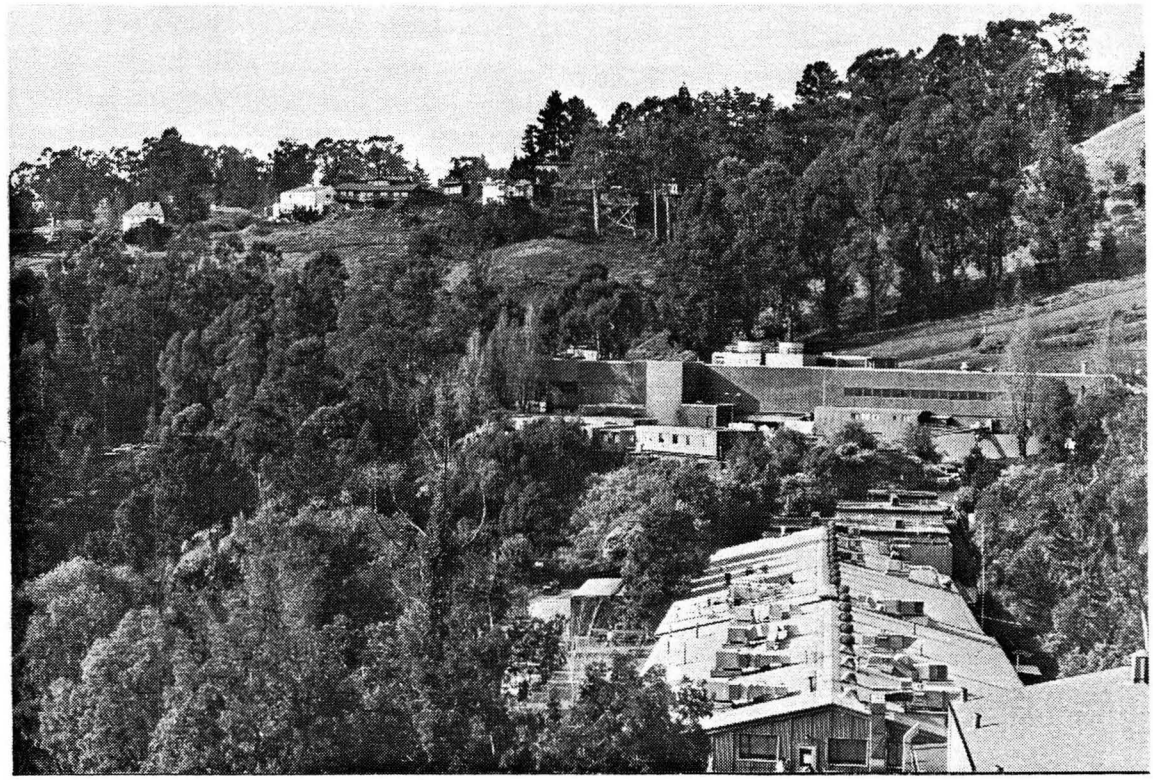
2. Impacts and Mitigation Measures

a. Standards of Significance

Impacts would be considered significant if UC's continued operation and development of LBL would:

Fail to comply with guidelines or goals related to visual quality;

Exhibit III-F-3
LBL SITE PHOTOGRAPH 3



View looking north from the base of Building 6 (the Advanced Light Source) across the roof of Building 46 (the Accelerator Electronics Department), toward Building 71 (the Heavy Ion Linear Accelerator -HILAC), and homes along Campus Drive.

Source: Ira Fink and Associates, Inc.

Significantly alter the existing natural viewsheds, including changes in natural terrain;

Significantly change the existing visual quality of the region or eliminate visual resources;

Significantly increase light and glare in the project vicinity; and

Significantly reduce sunlight or introduce shadows in areas used extensively by the campus population.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact III-F-1: **Continued implementation of the 1987 LRDP will result in a change in the visual quality of LBL and the surrounding environs.**

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

Mitigation 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.

Impact 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.**

Mitigation 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.

Note: In addition to the above Mitigation Measures, the LRDP EIR also included a series of Mitigation Measures regarding landscaping in the form of development guidelines. Because these items would be implemented on a building-by-building basis, and were based upon a 1984 report to LBL entitled "Landscape Proposed to Unify the LBL Campus", they are not included in this SEIR. Most of these design guidelines are contained on pages 17 and 18 of the 1987 LRDP.

3. Cumulative Impacts

Cumulative development in the LBL/UC Berkeley hillside area is not expected to have a significant impact upon visual quality.

Cumulative development in the hillside area has the potential to degrade the existing visual character of the hills. However, the LBL LRDP proposes only minimal development of the hill area. Implementation of the proposed mitigation measures will safeguard the aesthetic character of the hillside under LBL management. No significant adverse effect on visual quality is expected.

Notes for Section III-F:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-U, VI-V and VI-W of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 240.

3. *Ibid.*, p. 240.

4. *Ibid.*, p. 249.

5. *Ibid.*, p. 249.

6. *Ibid.*, p. 249.

7. *Ibid.*, p. 264.

8. *Ibid.*, p. 264.

9. *Ibid.*, p. 264.

G. LAND USE

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on land uses could result from continued University operation of LBL, including continued facility development as contemplated in the 1987 LRDP.

Lawrence Berkeley Laboratory

The Lawrence Berkeley Laboratory totals 134 acres, completely enclosed within the boundaries of the University of California. Of the 134 acres, 68.3 acres are leased to the Department of Energy, 11.5 acres are occupied under an occupancy agreement with the University, 50.2 acres are lands controlled by LBL within the LBL fence line, but not developed, and approximately four acres are scheduled for development in the LBL east site area. Most of this remaining land is in hillside, open space, and circulation. These leased lands are identified in Appendix D of the 1987 LRDP EIR.[2]

The buildings on the LBL main site enclose approximately 1.62 million gross square feet of space. The institutional plans for LBL on the main site call for increasing this enclosed area to approximately 1.85 million square feet between 1992 and 1997, and 2.00 million square feet at ultimate build out, with no specific date attached.

For planning purposes, the LBL site has been divided into functional planning areas. Of the site area, the greatest potential for future development is contained within the original laboratory site area (approximately 15 acres) and in the east site area where additional undeveloped land exists (approximately ten acres).[3]

As noted earlier in Section II-B, LBL lies within the property lines of the University of California. With the exception of land uses adjacent to LBL on its western and northern boundary, the uses of land adjacent to LBL along the majority of the LBL site are those of the UC Berkeley campus.[4]

Immediately along the northern boundary of the central portion of the LBL site is the UC Berkeley Lawrence Hall of Science, and above Centennial Drive in the same general area are the UC Berkeley

Samuel Silver Space Sciences Laboratory and UC Berkeley Mathematical Sciences Research Institute (MSRI). All three of these buildings have their access from Centennial Drive and all are on slopes above the LBL site.[5]

Along the LBL eastern boundary are undeveloped lands included in the UC Berkeley ecological study area. Also along the eastern edge of LBL and separated by Centennial Drive from LBL is the UC Berkeley Botanical Gardens.[6]

Along the southern edge of LBL, near its western boundary, the LBL site overlooks the UC Berkeley Bowles Residence Hall, the Greek Theatre, the Stern Residence Hall, and the new Foothill student housing. These latter facilities have their access, in part, from Gayley Road, or roads which intersect Gayley Road including Stadium Rim Way and Hearst Avenue.[7]

Along LBL's western boundary and at the foot of Blackberry Canyon, LBL property abuts a multiple and single family residential area of the City of Berkeley. Below the LBL 88-Inch Cyclotron, along Highland Avenue, are a series of mid-rise apartment buildings containing between 22 and 32 units each, plus the Nynigama Institute, the new UC Berkeley LaLoma/Ridge student housing, and the entrance to the UC Berkeley Stern Hall single student housing on the south side of Highland Avenue.[8]

Also, along the western edge, and the northern edge of the University property bordering the site are a series of single family residences which overlook LBL. These buildings are primarily uphill of the LBL Super HILAC and Bevalac Accelerator. Most of these homes overlook UC property in the vicinity of the Lawrence Hall of Science.[9]

The University of California, including LBL, as a state agency, and the Department of Energy, as a federal agency, are exempt from local zoning and planning regulations. Although exempt, the University and LBL cooperate with local agencies in planning matters of mutual concern.[10]

While LBL is normally considered as being within the City of Berkeley, the City of Berkeley/City of Oakland dividing line traverses University property at LBL in the Berkeley-Oakland hill area. Access to LBL is primarily through the City of Berkeley, although two LBL entrances are located on University property in the City of Oakland.[11]

City of Berkeley Master Plan Land Use Designations[12]

The City of Berkeley Master Plan land use designation for most of the area within the hill area is Recreational/Institutional. A portion of the southern hill area adjacent to the Berkeley-Oakland border is within Berkeley's Medium-High Density Residential designation, which permits development of medium density residential use.

In general, the City policies call for development of the hill area as an open space/recreational resource in cooperation with the City of Berkeley and consistent with the Berkeley Master Plan Open Space Element. Policy 3.3 of the Open Space Element calls for endorsement of the UC Berkeley campus policy to preserve a portion of the hill area as an ecological study area; the retention of open space in areas not designated for ecological study; and advocates working with the university to enhance the passive recreational potential of hill area lands.

City of Oakland Policy Plan (Comprehensive Plan) Land Use Designation and Policies

The City of Oakland land use designation for most of the hill area within its jurisdiction is Park, Recreation or Natural area, or Watershed. Policy 9 of the Open Space and Natural Resources Section, relating to the University of California, calls for retention of underdeveloped areas as reserves of public open space.

A portion of the Lawrence Berkeley Laboratory (LBL) in the hill area is within Oakland's jurisdiction. The land use designation for this portion of the hill area is Institutional or Governmental - other. There are no specific land use policies for the LBL in the Oakland Comprehensive Plan.

City of Berkeley Zoning[13]

Most of the hill area within the City of Berkeley is zoned High Density Residential Combined Hillside (R-5-H). The R-5 zoning permits institutional occupancies and office buildings. The purpose of the H (Hillside) district designation is to "...protect the character of Berkeley's hill districts and their immediate environs; to give reasonable protection to views yet allow appropriate development of all property; and to allow modifications in standard yard and height requirements, when justified, due to steep topography, irregular lot pattern, unusual street conditions, or other special aspects of the hillside area."

City of Oakland Zoning[14]

Portion of the Hill Area are zoned S-7, Preservation by the City of Oakland. The S-7 zone is intended to preserve and enhance the cultural, educational, aesthetic, architectural, environmental, and economic value of structures, other physical facilities, sites, and areas of special importance.

University of California, Berkeley

The proposed LBL facilities would be in concert with proposals identified in the 1962 and 1990 UC Berkeley Campus Long Range Development Plan (LRDP).

LBL, and in particular, the LBL East Site Area, is not in conflict with land use planning zones identified in the 1990 UC Berkeley Campus Long Range Development Plan. Guidance for use of those portions of the University of California property in Strawberry and Claremont canyons is identified in Exhibit III-G-1, which is adopted for the UC Berkeley 1990 LRDP EIR.

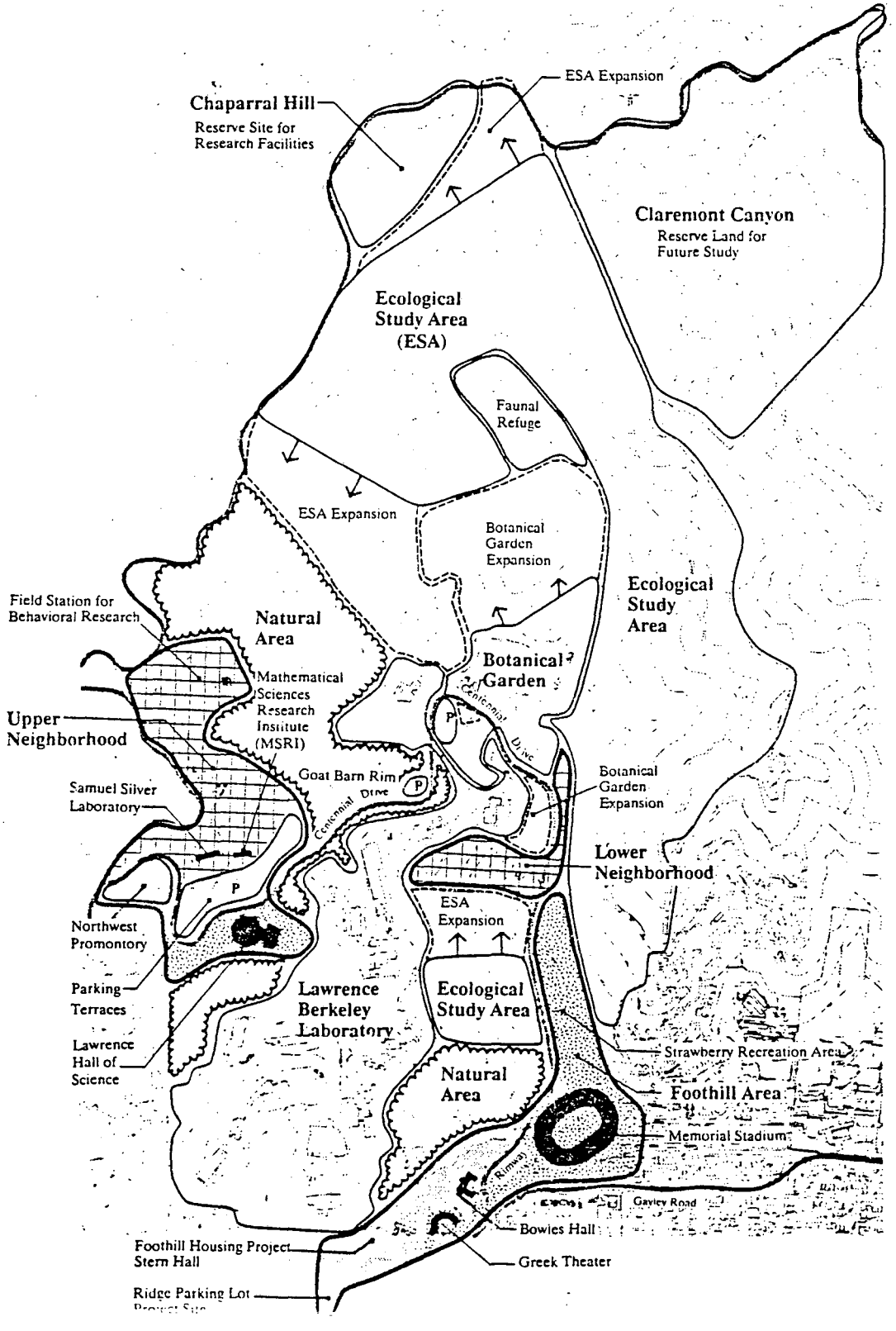
As shown in Exhibit III-G-1, the UC Berkeley Ecological Study Area (ESA) is proposed to expand westward toward the LBL East Canyon Site. Overall, LBL will remain adjacent to, but not included within the Ecological Study Area of the Berkeley campus.

To the north and west of the LBL East Canyon Site is an area designated on the 1990 UC Berkeley LRDP as a Natural Area. The UC Botanical Garden is located east of LBL and east of Centennial Drive as shown in Exhibit III-G-1.

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

Accordingly, the contract renewal project, and the reasonably foreseeable continued implementation of the LRDP EIR, will not cause any significant new impacts, and thus no further analysis of potential

Exhibit III-G-1
HILL AREA LAND USE PLANNING ZONES IN THE VICINITY OF THE LAWRENCE BERKELEY LABORATORY AS INDICATED IN THE 1990 UC BERKELEY LRDP EIR



project impacts is required under CEQA. For the convenience of the reader, what follows is a summary of impacts and mitigation measures from the LRDP EIR, and these mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the LRDP EIR and other CEQA documentation.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impacts on land use would be considered significant if UC's continued operation and development of LBL would:

Propose land uses that would conflict with existing or proposed land uses at the periphery of the campus or with local land use plans;

Result in the conversion of open space into urban- or suburban-scale uses;

Conflict with local general plans, zoning, or locally adopted environmental plans and goals; and

Result in nuisance impacts as a result of incompatible land uses.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact 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.**

Discussion: LBL development in the original laboratory site is contained in the center of the LBL site and would not affect any land uses adjacent to it outside of LBL property. LBL proposals for development in the east site area would not conflict with the proposed expanded ecological preserve area of the UC Berkeley campus.[15] The plan is consistent with policies of local government agencies.[16]

Mitigation: None required.

Impact 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 suburban-scale uses.**

Discussion: Development of the East Site Support Services area would utilize approximately four acres of open space. The other proposed buildings are, for the most part, to be constructed on sites already developed at LBL but with a lower intensity of use either in terms of building or parking.[17]

Mitigation III–G–2: Buildings proposed for development at LBL will follow the design guidelines contained in the LBL Long Range Development Plan.

Impact 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.**

Mitigation: None required.

3. Cumulative Impacts

No adverse impacts upon land uses at and in the vicinity of LBL are expected as a result of cumulative development.

Mitigation measures described above will minimize land use conflicts between LBL and its neighbors; hillside development proposed under the UC Berkeley LRDP is also not expected to conflict with local land uses. Any private development proposed in the vicinity would be subject to local land use controls.

Notes for Section III-G:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-A, VI-B, and VI-C of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 85.

3. *Ibid.*, p. 85.

4. *Ibid.*, p. 88.

5. *Ibid.*, p. 88.

6. *Ibid.*, p. 88.

7. *Ibid.*, p. 88.

8. *Ibid.*, p. 88.

9. *Ibid.*, p. 88.

10. *Ibid.*, p. 91.

11. *Ibid.*, p. 91.

12. *University of California, Berkeley Long Range Development Plan, Draft Environmental Impact Report.* Campus Planning Office, University of California, Berkeley, January 1990, p. 4.1-51.

13. *Ibid.*, p. 4.1-52.

14. *Ibid.*, p. 4.1-53.

15. *University of California, Berkeley, Long Range Development Plan, Draft Environmental Impact Report.* Prepared by the UC Berkeley Campus Planning Office, January 1990, p. 3-31.

16. *Lawrence Berkeley Laboratory, Site Development Plan, Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-11.

17. *Ibid.*, p. F-9.

H. POPULATION, EMPLOYMENT AND HOUSING

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on employment and housing could result from population increases projected during the contract renewal term and as a result of the continued implementation of the 1987 LRDP.

The total overall population of LBL in 1986 was 2,008 full-time staff, 1,064 part-time staff, and 523 guests for an overall combined total of 3,595 persons.[2] Of this population, approximately 79 percent, or 2,844 of the employees were located on the LBL hill site. Projections of LBL population made in 1986 indicate that percentage of persons on the hillside site would increase to almost 3,550 in 1992, and to 4,100 in the year 20xx.[3]

The 1991 employment on the LBL hillside site totals 3,055 persons, or approximately 500 fewer persons than was projected to occur on the hillside site by the year 1992. Overall, in 1991, LBL population totalled 3,940, including 3,330 full- and part-time employees and 610 guests.[4]

By 1997, LBL full-time and part-time employment and LBL guests are estimated to total 4,390, or 190 above the 1992 projection of 4,200 and below the 20xx projection of 4,750.

The work place distribution of the current LBL population is shown earlier in this SEIR in Table II-2. The projected change in the work place location of this population is also shown in Table II-2.

According to the 1990 U.S. Census of Population Housing, the City of Berkeley in 1990 contained a total of 45,735 housing units, including 43,453 occupied units and 2,282 (five percent) vacant units. Of the occupied units, 44 percent (18,941) were owner-occupied and 56 percent (24,512) were renter-occupied.[5]

In September 1988, the vacancy rate among single family detached dwellings in Berkeley was 1.2 percent, vacancies among single family attached dwellings was 4.1 percent, and among multi-family dwellings 1.5

percent. These figures demonstrate the current tight housing market in Berkeley.[6] The U.S. 1990 Census of Population and Housing identified the City of Berkeley as having an overall 5.0 percent vacancy rate.

Surveys undertaken for the Lawrence Berkeley Laboratory, and shown in Table III-H-1 describe the city of residence of LBL employees in 1980, 1986, and 1991. As indicated in Table III-H-1, the percentage of LBL employees living in each of the Bay Area cities identified in the survey has remained fairly constant over the past ten years, with the exception of the City of Berkeley where it has declined.

In terms of residential location, overall, in 1986, approximately one-half of the LBL part-time staff, one-quarter of the LBL full-time staff, and one-half of the LBL part-time and full-time guests lived in the City of Berkeley. Overall, 35 percent of LBL employees lived in the city of Berkeley.[7]

Based on an analysis of the 1991 zip codes of residence of LBL full-time employees, the percentage of full-time LBL employees living in the City of Berkeley has declined to 18 percent. Data for LBL part-time employees was not tabulated. A comparison of city (or location) of residence of full-time LBL employees in 1980, 1986, 1991, and the 1992 projection from the 1987 LRDP EIR is shown in Table III-H-1.

The shifts in population that have occurred have gradually been absorbed by incremental increases in the percentage of LBL employees living in adjacent cities. For example, the percentage of LBL full-time employees living in the City of Berkeley increased from 22.6 percent in 1980 to 23.4 percent in 1986, before declining to 18.1 percent in 1991. In Oakland the increase was from 14.3 percent (1980) to 16.9 percent (1986), and 17.0 percent (1991). In Orinda and communities east of LBL, the percentage stayed constant at 20.0 percent (1980 and 1991). The largest shift in residence was the increase in LBL full-time employees living in the area of San Pablo and north which increased from 4.7 percent (1980) to 8.0 percent (1986)[8] to 11.1 percent (1991).

Because of a decrease in LBL full-time employment from 2,663 in 1980 to 2,008 in 1986, to 1,971 in 1991, there were fewer LBL employees living in the Bay Area cities which surround LBL.[9]

Table III-H-1
CITY OF RESIDENCE, LBL FULL-TIME STAFF

City of Residence	LBL Full-Time Staff 1980[a] Number	Percent	1986[a] Number	Percent	1991[b] Number	Percent	1992[c] Number	Percent
Berkeley	602	22.6%	470	23.4%	356	18.1%	558	23.4%
Albany	96	3.6	72	3.6	64	3.2	86	3.6
Richmond	144	5.4	118	5.9	184	9.3	140	5.9
El Cerrito/Kensington	229	8.6	179	8.9	131	6.7	212	8.9
Oakland	381	14.3	339	16.9	335	17.0	403	16.9
San Leandro and South	128	4.8	128	6.4	123	6.2	152	6.4
San Pablo and North	125	4.7	160	8.0	219	11.1	190	8.0
Orinda and East	532	20.0	444	22.1	394	20.0	527	22.1
Marin County	27	1.0	26	1.3	30	1.5	31	1.3
San Francisco	93	3.5	72	3.6	87	4.4	86	3.6
Other	306	11.5	0	0.0	48	2.5	0	0.0
TOTAL	2,663	100.0%	2,008	100.0%	1,971	100.0%	2,385	100.0%

Notes:
a = Actual, as shown in the *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 112.
b = Actual, as shown in the *Lawrence Berkeley Laboratory, PRN 7310 Report*, September 17, 1991.
c = Estimated, as shown in the *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 114.

As shown in Table VI-G-2 of the 1987 LRDP Draft EIR (December 1986, p. 113), of all LBL full-time employees in 1986, 67 percent were homeowners and 33 percent were renters. Among those living within the City of Berkeley, 59 percent were owners and 41 percent were renters.[10]

As noted earlier, 1991 LBL hillside population totalled 3,055 and overall LBL population totalled 3,940. For the contract renewal term, current and anticipated population increase, as well as corresponding needs for employment and housing, are below levels anticipated by the 1987 LRDP. Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels or cause any significant new impacts, no further analysis of

these impacts is required under CEQA. The following impacts and mitigation measures from the LRDP EIR remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impacts as a result of population, employment or housing changes would be considered significant if UC's continued operation and development of LBL would:

Induce substantial growth or concentration of population;

Displace a large number of people; and

Conflict with the housing and population projections and policies set forth in the General Plan.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

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

Discussion: For purposes of the 1987 EIR, it was estimated that the number of LBL persons currently living in the City of Berkeley totalled 1,277. That number was expected to increase by 205 persons during the period from 1986 to 1992, including a projection that 558 LBL full-time employees (23.4 percent) would live in Berkeley, in comparison to 470 (23.4 percent) who lived in Berkeley in 1986. (The remaining approximately 400 person increase in the LBL population during the period 1987 to 1992

were expected to be from, or seek to live in, communities other than Berkeley.[11]) In actuality, in September 1991, 356 LBL full-time employees (18.0 percent) lived in the City of Berkeley, down from 470 in 1986, and below the 558 projected to live in Berkeley in 1992.

Population changes in the LBL environs communities will be the result of population factors which affect the San Francisco Bay region as a whole and not LBL or the city of Berkeley in particular.[12]

Renewal of the contract term is not expected to cause population levels to exceed those projected in the 1987 LBL LRDP.

Mitigation: None required.

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.**

Discussion: While there could be an impact on the local housing markets due to the implementation of the 1987 LRDP, demand for housing units as shown in the 1987 LRDP EIR represents about one-half of one percent of the existing supply in the City of Berkeley. This is not considered significant, and mitigation measures are not required.[13]

Mitigation: None required.

3. Cumulative Impacts

No significant impacts upon employment or housing are projected as a result of cumulative development at and in the vicinity of LBL.

Population increases as a result of cumulative development are not expected to be significant. The LBL LRDP projects a modest increase in population; other proposed developments in the vicinity, like UC

Berkeley, are not expected to significantly impact population trends, the availability of housing, or local employment statistics.

Notes for Section III-H:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section III, VI-E and VI-G of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 99.

3. *Ibid.*, p. 99.

4. *Lawrence Berkeley Laboratory FY 1991 Site Development Plan.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, March 1991, p. 1.

5. State of California, Census Data Center, *1990 U.S. Census of Population and Housing, Summary Tape File 1*, p. 5, undated.

6. *Housing Vacancy Survey, Alameda County and Contra Costa County.* Federal Home Loan Bank of San Francisco; Survey Date, September 1988, Publication Date, May 1989.

7. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 99.

8. *Ibid.*, p. 111.

9. *Ibid.*, p. 111.

10. *Ibid.*, p. 111.

11. *Ibid.*, pp. 99-100.

12. *Ibid.*, pp. 100.

13. *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, pp. F-14, No. G-2.

I. TRAFFIC, CIRCULATION AND PARKING

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, the University's continued operation of LBL for the next five years will result in the ongoing operation of LBL activities and continued implementation of the 1987 LRDP. The growth in facilities and personnel which the 1987 LRDP projected would occur over the past five years has not been realized, largely due to funding constraints. The 1987 LRDP's optimistic development projections were analyzed, and mitigated to a less than significant level, in the accompanying programmatic 1987 LRDP EIR.

Because actual facility expansion and personnel projections have been lower than proposed, and because ongoing funding constraints will ensure that future development at LBL will continue to be lower than the levels which were approved in 1987, the University's renewal of the DOE contract will not result in impacts which are greater than those already identified and mitigated. For the convenience of the reader, what follows is a discussion of the traffic, parking and circulation issues associated with the continued operation of LBL and continued implementation of the 1987 LRDP.

a. Traffic

Traffic projections were based on anticipated employee and visitor populations. As noted in the LBL LRDP Draft EIR (December 1986, pp. 137-139) the daily traffic generation rate of 2.46 trips per employee was used to estimate trip generation. A recomputation of this data based upon traffic counts made in 1991 results in a current traffic generation rate of 2.18 trips per employee. This rate includes trips made by visitors and delivery vehicles, because it is based on a total count of vehicle trips to and from the LBL site, not just employee vehicles. The data presented below indicates the total numbers of vehicle trips which were anticipated in the LBL LRDP EIR based on population projections at LBL to 1997 and to the year 20xx.

1991 LBL employee population levels (total 3,940), as shown in Table II-2, are approximately six percent less than the 4,200 population levels projected in the LRDP EIR for 1992. LBL has also implemented a comprehensive trip management program designed to encourage the use of bicycles, public

transportation, free shuttle buses, carpools, and other measures designed to reduce the employee-related vehicle trips.

Even by totally discounting the effectiveness of these transportation measures and continuing to use the higher employee/trip ratio utilized in the 1987 LRDP EIR, total vehicle trips at LBL remain lower than projected levels because the employee levels at LBL are lower than the levels projected in the 1987 LRDP EIR. The total vehicle traffic in 1991 at LBL as measured by 24-hour traffic counts at the three LBL gateways has not exceeded 78 percent of the volume estimated in the 1987 LRDP EIR to occur in 1992. Thus, traffic impacts from continued operation of LBL, including continued implementation of the 1987 LRDP, remain well below the levels which were identified -- and mitigated to a less than significant level -- in the 1987 LRDP EIR. The estimates for additional traffic at LBL for the year 1997 and the year 20xx based upon average daily trip (ADT) rates used in the 1987 LRDP EIR are shown in Table III-I-1. Estimates for the year 1997 and the year 20xx based upon 1991 data are shown in Table III-I-2.

The average daily traffic link volumes (two-way) for the years 1986, 1991, and projected to 1992 on roadways leading to LBL, and near LBL, are shown in Table III-I-3. The projected average daily traffic link volumes (two-way), for the years 1992 and to the year 20xx, as shown in the 1987 LBL LRDP EIR are contained in Table III-I-4. Also shown in this table is the increment of growth of vehicular traffic due to projected population increases at LBL to the year 1997.

A review of Table III-I-3 indicates that in 1991 average daily 24-hour traffic volumes (two-way) had reached or exceeded projected 1992 estimates by 4,800 vehicles at one roadway link, between 50 and 200 vehicles per 24-hour period at four of the roadway links, and was 150 to 5,700 vehicles below estimates at 11 other roadway links. In those instances where actual volumes in 1991 exceeded projected 1992 volumes, the increases were in the range of less than one percent to 4.5 percent, except on one roadway where the increase was 26.6 percent. On the remaining 11 roadway links, average 24-hour two-way traffic volumes ranged from 55.0 percent to 96.1 percent of 1992 projections. As noted above, traffic at the three LBL gateways in 1991 total 78 percent of that projected for the year 1992.

Tables III-I-5 and III-I-6 present similar data for p.m. peak hour traffic. (P.M. peak hour is defined as the 60 minute period in the afternoon or early evening when the maximum number of vehicles passes

Table III-I-1
PROJECTED DAILY AND PEAK HOUR TRIP GENERATION, LBL HILL SITE ONLY, BASED UPON 1986 AVERAGE DAILY TRIP GENERATION RATES

Trip Generation (Main Site)	1986-1992	1992-20xx	Total 1986-20xx
Average Daily Traffic (ADT)			
Net Population Increase	706	550	1,256
x 2.46 Trips/Emp	x 2.46	x 2.46	x 2.46
= ADT Increase	1,737	1,353	3,090
P.M. Peak Hour			
ADT Increase	1,737	1,353	3,090
x 10.9 Percent in P.M. Peak	x 0.109	x 0.109	x 0.109
= P.M. Peak Hour	189	147	336
Inbound/Outbound			
x 12.5 Percent Inbound	24	18	42
x 87.5 Percent Outbound	166	129	295

Source: *LBL Site Development Plan Draft EIR* (December 1986, p. 139.)

Table III-I-2
PROJECTED DAILY AND PEAK HOUR TRIP GENERATION, LBL HILL SITE ONLY, BASED UPON 1991 AVERAGE DAILY TRIP GENERATION RATES

Trip Generation (Main Site)	1991-1997	1997-20xx	Total 1991-20xx
Average Daily Traffic (ADT)			
Net Population Increase	535	510	1,045
x 2.18 Trips per Employee	x 2.18	x 2.18	x 2.18
= Average Daily Trip (ADT) Increase	1,166	1,112	2,278
P.M. Peak Hour			
ADT Increase	1,166	1,112	2,278
x 9.7 Percent in P.M. Peak	x 0.097	x 0.097	x 0.097
= P.M. Peak Hour	113	108	221
Inbound/Outbound			
x 14.4 Percent Inbound	16	16	32
x 85.6 Percent Outbound	97	92	189

Source: Ira Fink and Associates, Inc.

Table III-I-3
AVERAGE DAILY TRAFFIC LINK VOLUMES, TWO WAY
1986[a], 1991[b], 1992[c] and 1997[e]

	Actual 1986[a]	Actual 1991[b]	Projected 1992[c]	1991 Actual Volume as a Percentage of 1992 Projected Volume[d]	Projected 1997 Increase Due to LBL[e]
East/West Links					
Centennial East of Stadium[f] (12/121)	6,969	6,104	7,395	82.6%	198
Centennial West of Grizzly Peak Boulevard (13/131)	3,375	4,174	4,013	104.1%	293
Dwight East of Piedmont (40)	6,515	3,689	6,708	55.0%	130
Hearst East of Oxford (26)[g]	22,175	22,876	23,841	96.0%	593
Hearst East of Shattuck (3)	15,500	13,917	16,690	83.4%	208
Stadium East of Gayley (10/101)	2,820	3,683	3,541	104.1%	59
University East of Shattuck (6)	21,245	18,132	22,845	79.4%	346
North/South Links					
Gayley South of Hearst (6/61)	20,535	21,452	21,403	100.3%	140
Gayley South of Stadium (7/71)	22,335	18,479	22,776	81.2%	142
Grizzly Peak North of Centennial (15/151)	3,257	3,583	3,431	104.5%	117
Grizzly Peak South of Centennial (14/141)	3,360	3,548	3,694	96.1%	177
Oxford North of Hearst (25)	14,955	13,924	15,405	90.4%	41
Oxford South of Hearst (24)	26,442	25,377	27,528	92.2%	344
Warring South of Dwight (41)	25,540	21,500	27,238	78.9%	216
Shattuck South of University (7)	25,935	25,673	27,107	94.7%	148
Stadium South of Centennial (35)	5,274	4,375	5,985	73.1%	140

Continued

Table III-I-3 (Continued)
AVERAGE DAILY TRAFFIC LINK VOLUMES, TWO WAY
1986[a], 1991[b], 1992[c] and 1997[e]

	Actual 1986[a]	Actual 1991[b]	Projected 1992[c]	1991 Actual Volume as a Percentage of 1992 Projected Volume[d]	Projected 1997 Increase Due to LBL[e]
Gates to LBL					
(1) Cyclotron Road Gate					
(a) Blackberry Canyon (31)	4,399	4,163	5,409	77.0%	653
(2) Centennial Avenue Gates					
(a) Grizzly Peak (48)	605	1,009	921	109.6%	211
(b) Strawberry Canyon (46)	1,949	1,489	2,267	65.1%	302
(3) Total of three LBL Gates	6,953	6,661	8,597	77.5%	1,166

Notes:
a = Actual roadway counts as shown in the LBL Site Development Plan Final EIR (August 1987, pp. F1-22 and F-123).
b = Actual roadway counts based on measurements taken on May 8, 1991, May 15, 1991, December 4, 1991, and December 11, 1991.
c = Projections shown in the LBL Site Development Plan Final EIR (August 1987, pp. F-128 and F-129).
d = Ratio of "Actual 1991" divided by "Projected 1992".
e = Projected total increase from 1991 to 1997, based upon an LBL hill site population increase of 535 persons and an average daily trip increase of 1,166 trips based on a multiplier of 2.18 trips per day.
f = Numbers in ( ) are I.D. numbers assigned to roadways during traffic counts.
g = In the LRDP Final EIR (August 1987) p. F-124, incorrect data was reported for this link. The reported 1987 Final EIR data was actually for Hearst east of Euclid. The data reported in this SEIR is taken from the Draft EIR (December 1986) and represent the roadway link of Hearst east of Oxford.

Source: *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report*, August 1987, pp. F-122 and F-123, and new measurements taken at various roadways on May 8, 1991, May 15, 1991, December 4, 1991 and December 11, 1991.

Table III-I-4
AVERAGE DAILY TRAFFIC LINK VOLUMES, TWO WAY
Site Capacity

		20xx Projections[a]		
	Projected 1992	**With LBL**	**W/LBL And UC**	**W/LBL, UC And City**
East/West Links				
Centennial East of Stadium (12/121)	7,395	7,625	7,949	8,097
Centennial West of Grizzly Peak Boulevard (13/131)	4,013	4,351	4,701	4,782
Dwight East of Piedmont (40)	6,708	6,858	6,992	7,126
Hearst East of Oxford (26)	23,841	24,531	26,050	26,752
Hearst East of Shattuck (3)	16,690	16,928	18,436	18,770
Stadium East of Gayley (10/101)	3,541	3,609	4,524	4,595
University East of Shattuck (6)	22,845	23,249	23,972	25,607
North/South Links				
Gayley South of Hearst (6/61)	21,403	21,567	22,879	23,307
Gayley South of Stadium (7/71)	22,776	22,940	23,704	24,159
Grizzly Peak North of Centennial (15/151)	3,431	3,565	3,634	3,702
Grizzly Peak South of Centennial (14/141)	3,694	3,898	4,066	4,140
Oxford North of Hearst (25)	15,405	15,453	16,001	16,589
Oxford South of Hearst (24)	27,528	27,932	29,168	30,206
Warring South of Dwight (41)	27,238	27,486	28,907	30,644
Shattuck South of University (7)	27,107	27,281	27,929	29,633
Stadium South of Centennial (11/111)	5,985	6,147	5,935	7,054

Continued

Table III-I-4 (Continued)
AVERAGE DAILY TRAFFIC LINK VOLUMES, TWO WAY
Site Capacity

	20xx Projections[a]			
	Projected 1992	**With LBL**	**W/LBL And UC**	**W/LBL, UC And City**
Gates to LBL				
(1) Cyclotron Road Gate				
(a) Blackberry Canyon (5/51)	5,409	6,195	6,195	6,195
(2) Centennial Avenue Gates				
(a) Grizzly Peak (17/171)	921	1,247	1,247	1,247
(b) Strawberry Canyon (16/161)	2,267	2,509	2,509	2,509
(3) Total of three LBL Gates	8,597	9,951	9,951	9,951

Note: As indicated in the *LBL Site Development Plan Draft Environmental Impact Report* (December 1986, pp. 140-141, the "distribution of incremental traffic generated by population increase at LBL is based upon existing residential patterns as reported in the 1986 [LBL] Housing and Transportation Survey...The total amount of new trips were assigned to those roadways which provide the most reasonable areas from each of the eight residential zones to the hill."

Sources for cumulative development in downtown Berkeley and other university areas were shown on pages 142 through 145 of the December 1986 Draft EIR; this totalled 962 additional peak hour trips in 1992. For the year 2000, a rate of growth was assumed for both the university and the city which is slightly greater than the specific growth forecast for the period 1986 to 1992 (Draft EIR, p. 156).

Source: *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report*, August 1987, pp. F-128 and F-129.

Table III-I-5
P.M. PEAK HOUR LINK VOLUMES, TWO WAY
1986[e], 1991[f], 1992[g] and 1997[i]

	Actual 1986[e]	Actual 1991[f]	Projected 1992[g]	1991 Peak Hour Volume as a Percentage of 1992 Projected Volume[h]	Projected 1997 Increase Due to LBL[i]
East/West Links					
Centennial East of Stadium (12/121)[j]	764	605[b]	814	74.4%	18
Centennial West of Grizzly Peak Boulevard (13/131)	632	533[c]	712	74.9%	37
Dwight East of Piedmont (40)	503	367[a]	521	70.5%	11
Hearst East of Oxford (26)[k]	2,101	1,935[d]	2,275	85.1%	58
Hearst East of Shattuck (3)	1,468	1,284[d]	1,613	79.6%	21
Stadium East of Gayley (10/101)	457	388[d]	524	74.1%	5
University East of Shattuck (6)	1,470	1,275[d]	1,709	74.6%	34
North/South Links					
Gayley South of Hearst (6/61)	1,810	1,725[c]	1,896	91.0%	13
Gayley South of Stadium (7/71)	1,547	1,301[c]	1,584	82.2%	13
Grizzly Peak North of Centennial (15/151)	418	431[d]	439	98.2%	13
Grizzly Peak South of Centennial (14/141)	390	479[d]	428	112.0%	17
Oxford North of Hearst (25)	1,467	1,341[d]	1,534	87.5%	4
Oxford South of Hearst (24)	2,282	2,250[d]	2,437	92.3%	34
Warring South of Dwight (41)	2,101	1,689[d]	2,325	72.7%	21
Shattuck South of University (7)	1,720	2,036[d]	1,904	107.0%	15
Stadium South of Centennial (11/111)	559	457[d]	622	73.5%	13

Continued

Table III-I-5 (Continued)
P.M. PEAK HOUR LINK VOLUMES, TWO WAY
1986[e], 1991[f], 1992[g] and 1997[i]

	Actual 1986[e]	Actual 1991[f]	Projected 1992[g]	1991 Peak Hour Volume as a Percentage of 1992 Projected Volume[h]	Projected 1997 Increase Due to LBL[i]
Gates to LBL					
(1) Cyclotron Road Gate					
(a) Blackberry Canyon (5/51)	410	360[b]	517	69.7%	63
(2) Centennial Avenue Gates					
(a) Grizzly Peak (17/171)	143	166[b]	188	88.3%	28
(b) Strawberry Canyon (16/161)	190	116[b]	222	52.3%	20
(3) Total of three LBL Gates	743	642	927	69.3%	113

Notes and Sources:
a = 4:15 - 5:15 p.m.
b = 4:30 - 5:30 p.m.
c = 4:45 - 5:45 p.m.
d = 5:00 - 6:00 p.m.
e = *LBL Site Development Plan Final EIR*, August 1987, pp. F-126 and F-127.
f = Measurements taken at identified roadways on May 8, 1991, May 15, 1991, December 4, 1991, and December 11, 1991.
g = As projected for 1992 in the *LBL Site Development Plan Final EIR*, August 1987, pp. F-126 and F-127.
h = Comparison of actual 1991 traffic volumes with projected 1992 traffic volumes (f ÷ g).
i = Projection of 1997 traffic, based upon 1986 traffic distribution allocation applied to 1997 data.
j = Numbers in ( ) are I.D. numbers assigned to roadways during traffic counts.
k = In the LRDP Final EIR (August 1987) p. F-124, incorrect data was reported for this link.

Source: *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report*, August 1987, pp. F-126 and F-127, and measurements taken at various roadways on May 8, 1991, May 15, 1991, December 4, 1991, and December 11, 1991.

Table III-I-6
P.M. PEAK HOUR LINK VOLUMES, TWO WAY
Site Capacity

		20xx Projections		
	Projected 1992	**With LBL**	**W/LBL And UC**	**W/LBL, UC And City**
East/West Links				
Centennial East of Stadium (12/121)	814	836	880	897
Centennial West of Grizzly Peak Boulevard (13/131)	712	748	805	819
Dwight East of Piedmont (40)	521	535	545	556
Hearst East of Oxford (26)	1,464	1,532	1,683	1,728
Hearst East of Shattuck (3)	1,613	1,637	1,815	1,848
Stadium East of Gayley (10/101)	524	530	619	630
University East of Shattuck (6)	1,709	1,749	1,829	2,065
North/South Links				
Gayley South of Hearst (6/61)	1,896	1,914	2,039	2,077
Gayley South of Stadium (7/71)	1,584	1,602	1,660	1,691
Grizzly Peak North of Centennial (15/151)	439	454	463	472
Grizzly Peak South of Centennial (14/141)	428	449	473	481
Oxford North of Hearst (25)	1,534	1,538	1,601	1,680
Oxford South of Hearst (24)	2,437	2,477	2,617	2,721
Warring South of Dwight (41)	2,325	2,352	2,486	2,730
Shattuck South of University (7)	1,904	1,922	1,978	2,214
Stadium South of Centennial (11/111)	622	638	706	719

Continued

Table III-I-6 (Continued)
P.M. PEAK HOUR LINK VOLUMES, TWO WAY
Site Capacity

		20xx Projections		
	Projected 1992	**With LBL**	**W/LBL And UC**	**W/LBL, UC And City**
Gates to LBL				
(1) Cyclotron Road Gate				
(a) Blackberry Canyon (5/51)	517	597	597	597
(2) Centennial Avenue Gates				
(a) Grizzly Peak (17/171)	188	221	221	221
(b) Strawberry Canyon (16/161)	222	247	247	247
(3) Total of three LBL Gates	927	1,065	1,065	1,065

Source: *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report*, August 1987, pp. F-130 and F-131.

through a designated roadway link.) As indicated in Table III-I-5, at only two of the traffic links did actual 1991 p.m. peak hour traffic volume exceed projected 1992 volumes. On one link, which was Grizzly Peak Boulevard south of Centennial Drive, peak hour traffic was 12 percent greater than the 1992 projection. This totalled 51 vehicles above projection. Since peak hour traffic from all three LBL gates totalled only 69.3 percent of the 1992 projection, it was concluded that the increase in p.m. peak hour traffic at Grizzly Peak Boulevard was partially a result in a shift of departure routes among employees at LBL. (The LBL Grizzly Peak Gate, which is open only in the a.m. and p.m. peak hour, in 1990 extended its hours of operation to cover the period from 6:00 a.m. to 9:00 a.m. and from 3:30 p.m. to 6:30 p.m. The gate was formerly open only between 7:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m.) At the second link, Shattuck Avenue south of University Avenue, in downtown Berkeley, p.m. peak hour traffic increase was seven percent (or 132 vehicles) above projection. At the third link, Hearst Avenue east of Oxford Street, p.m. peak hour traffic was 32 percent (or 471 vehicles) above projection.

At the remaining 13 traffic links adjacent to LBL that were surveyed in 1991, peak hour 1991 capacity ranged from 70.5 percent to 98.2 percent of projected 1992 p.m. peak hour volumes. At the three gates to LBL, 1991 p.m. peak hour traffic ranged from 52.3 percent to 88.3 percent of 1992 projections, with an overall peak of 69.3 percent of projected 1992 traffic.

This data illustrates that while overall traffic volumes have increased between 1986 and 1991, and in some cases 1991 traffic volumes exceeded 1992 projected 24-hour total traffic volumes, a major shift has occurred on the majority of traffic links studied. For example, not only has p.m. peak hour traffic not reached 1992 projections, but in 12 of the 16 roadway links adjacent to LBL that were studied in 1991, and at two of the three LBL gates, actual 1991 p.m. peak hour traffic volumes were less than actual 1986 p.m. peak hour traffic volumes.

Table III-I-3 also indicates the net additional average daily traffic increase on these roadway segments due to change in LBL population from 1991 to 1997. As shown earlier, in Table II-2, LBL hill site population is expected to increase by 535 persons between 1991 and 1997. Current 1991 daily traffic generation, as shown in Table III-I-2, is 2.18 trips per employee. This would mean a total of 1,166 projected additional LBL trips would occur between 1991 and 1997. Similarly, Table III-I-1 also shows

projected p.m. hour travel for both 1997 and 20xx. Based on LBL projected population growth between 1991 and 1997, 113 additional LBL peak hour trips would occur.

Both the increased LBL daily trips and the LBL p.m. peak hour trips on each roadway segment are shown in Tables III-I-3, and III-I-5. Since there was no significant change in the overall distribution of traffic at the LBL gates between 1986 and 1992, the 1986 traffic distribution allocation was applied to the 1997 data shown in Tables III-I-3, and III-I-5 (e.g., in 1986, 63.3 percent of LBL daily traffic used the Blackberry Canyon Gate, in 1991 62.5 percent did so; in 1986, 55.2 percent of LBL p.m. peak hour traffic used the Blackberry Gate, in 1991, 56.1 percent did so.)

b. Parking

Parking demand is both a function of employee and visitor population levels as well as projected traffic volumes. Because these factors are lower than what was projected and mitigated in the 1987 LRDP EIR, parking demand from continued operation and implementation of the LRDP is not anticipated to be significant.

The LRDP EIR presented a comprehensive survey of parking demand and supply, as shown in Table III-I-7. Future demand for parking was calculated following the same distribution of commuting patterns. The resulting parking demand projections resulted in a "worst case" analysis which did not assume any parking demand decreases based on the implementation of the Transportation System Management Program.

As shown in Table III-I-7, by 1991, the amount of parking on the LBL hill site had increased from 1,581 spaces in 1986 to 1,843 spaces in 1991. (This parking figure excludes 275 parking spaces that are provided for government-owned vehicles that are stored at LBL and used for day-time, not commute trips, to and from the LBL site.) This increase in parking spaces, coupled with LBL hill site population in 1991 of 3,055 compared to a 1986 population of 2,844 meant that the ratio of LBL population to parking spaces declined from 1.80:1 to 1.66:1 population to spaces.

Table III-I-7
LBL HILL SITE PARKING

Location	Time Period[a] 1985	1986	1992	1997[b]	20xx	Actual 1991
LBL Hill Site Population	2,820	2,844	3,550	3,590	4,100	3,055
LBL Hill Site Parking	1,622	1,581	2,074	2,071	2,410	1,843[c]
Ratio of LBL Population To Parking Spaces	1.74	1.80	1.71	1.73	1.70	1.66

Notes:
a = Data as shown and projected in the *Lawrence Berkeley Laboratory Site Development Plan Draft Environmental Impact Report*, December 1986, p. 164, Table VI-H-17.
b = Projection for 1997, not included in 1987 LRDP EIR.
c = Based upon October 25, 1989 LBL Parking Inventory. Excludes 275 parking spaces used to store government vehicles which are used for daytime, not commute trips, to and from LBL.

The 1987 LRDP anticipated future construction that would eliminate some of the existing parking areas, but required replacement as needed with smaller building footprints, and new on-site parking, including parking structures.

c. Shuttle Buses

Many LBL employees already arrive via shuttle buses operated by LBL, and these services will continue and be expanded in the future. As noted in the 1987 LRDP EIR, LBL proposed to increase the number of off-site shuttle trips per day from 70 at present to 82 in the future.[2] The number of off-site shuttle trips in 1991 has increased to 72 per day. In addition, LBL has 96 on-site shuttle trips per day.[3]

d. Pedestrian and Bicycle Access

Pedestrian and bicycle access and adequate safety measures become increasingly important with the effectiveness of traffic reduction programs. The 1987 LRDP EIR projected that at the Hearst/Gayley/LaLoma intersection, additional traffic due to the project will cause an impact to pedestrian crossing conditions. Daily and peak hour volumes on Hearst east of Gayley Road were

projected to increase by 19 percent and 21 percent respectively by site buildout, causing more competition for available intersection capacity not only for autos but pedestrians and cyclists as well. This and other potentially adverse impacts to pedestrian and bicycle access were mitigated to a less than significant level in the 1987 LBL LRDP EIR.

e. Agreement with the City of Berkeley

Following completion of the 1987 LRDP EIR, the Regents of the University of California and the City of Berkeley reached an agreement regarding an action filed in Alameda County Superior Court by the City of Berkeley regarding traffic to be generated by future population growth at LBL. A copy of this agreement is shown in Appendix A.

As noted in the agreement "an important measure of traffic growth at LBL is the increase in p.m. peak hour trips at LBL's three gates. The p.m. peak hours trips are measured by counting cars entering and leaving the three gates between 3:00 and 7:00 p.m. The 'peak hour' is the hour with the largest number of cars entering and leaving."[4]

As a result of the settlement agreement, LBL agreed to conduct gate counts three times per year, in the fall, winter and spring, at each of its three gates, on Wednesdays, during non-holiday periods, between 3:00 p.m. and 7:00 p.m.

LBL has conducted these gate counts per the agreement with the City of Berkeley. The results of the counts are shown in Table III-I-8. As part of the agreement, LBL agreed that its goal would be to limit the total number of p.m. peak hour trips at the three gates. The p.m. peak hour trips would not exceed 763 by May 31, 1989, 783 by May 31, 1990, 803 by May 31, 1991, and 823 by May 31, 1992. As shown in this table, peak hour travel to and from LBL through February 1992 has been below the agreed upon peak hour maximum.

f. Status of LBL Transportation Programs

LBL has conducted quarterly traffic counts at each of its three entrances, assigned a transportation planner to coordinate the design and implementation of TSM programs, promoted carpools by creating

Table III-I-8
LBL GATE COUNT PEAK HOUR VEHICLE TRIPS AND SETTLEMENT GOALS

Survey Date	Peak Hour	Total Trips	Settlement Trips Goal	Target Date
11-16-88	4:30-5:30 p.m.	703		
2-15-89	4:30-5:30 p.m.	590		
5-17-89	4:00-5:00 p.m.	650	763	5-31-89
11-15-89	4:00-5:00 p.m.	654		
2-14-90	4:30-5:30 p.m.	651		
5-16-90	3:30-4:30 p.m.	665	783	5-31-90
11-14-90	4:45-5:45 p.m.	641		
3-13-91	3:30-4:30 p.m.	701		
5-15-91	3:45-4:45 p.m.	621	803	5-31-91
11-13-91	4:00-5:00 p.m.	723		
2-12-92	4:00-5:00 p.m.	798		
5- -92	(Not Yet Counted)		823	5-31-92

Source: Lawrence Berkeley Laboratory

a carpool matching program, provided funding to Berkeley TRIP to assist in their vanpooling program, permitted staggered (flex-time) work hours, provided preferential parking for car and vanpools, reviewed LBL shuttle service and transit interface facilities, and provided bicycle racks on all LBL shuttle buses.[5]

g. Truck Counts

Counts of trucks entering and leaving LBL were made both in 1986 and 1992. Results of these truck counts are shown in Table III-I-9. As shown in this table, truck traffic to LBL declined between the two survey dates. In 1986, 78 single unit trucks entered and left the site; in 1992, 52 single unit trucks did so. In 1986, 16 tractor-trailer trucks entered and left the site; in 1992, 17 tractor-trailer trucks did so.

Table III-I-9
LBL TRUCK COUNTS, BY GATE OF ENTRY
1986 and 1992

Time Period	Main Gate Blackberry Canyon S.U. Truck		Main Gate Blackberry Canyon Tractor-Trailer		Strawberry Canyon S.U. Truck		Strawberry Canyon Tractor-Trailer	
	1986	1992	1986	1992	1986	1992	1986	1992
Midnight-6:00 a.m.	1	5	0	0	0	0	0	0
6:01 a.m.-12:00 noon	14	24	1	10	20	5	7	0
12:01 p.m.-6:00 p.m.	15	10	6	7	28	8	1	0
6:01 p.m.-12:00 midnight	0	0	1	0	0	0	0	0
Total	30	39	8	17	48	13	8	0

Note: 1986: Trucks entering and exiting the three main LBL gates were tabulated over the 24-hour period from May 21, 1986 to noon May 22, 1986. Trucks were placed into one of two groups, either single unit trucks (S.U.) or tractor-trailer combinations according to design. No trucks were recorded at the Grizzly Peak gate. Source: *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report.* December 1986, p. 126, Table VI-H-2.

1992: Counts were made over the 24-hour period from midnight March 4, 1992, to midnight March 5, 1992. One truck was recorded at the Grizzly Peak gate. Source: Lawrence Berkeley Laboratory.

Implementation of the LRDP to date has resulted in no unanticipated or unmitigated significant new impacts to circulation, parking or pedestrian and vehicle access. Because the 1991 employee population levels total 3,940, or 260 persons less than the levels projected in the 1987 LRDP to occur as of 1992 and 810 employees less than the levels projected at LRDP buildout, actual population-related impacts of LRDP implementation, including traffic and circulation, are less than projected as shown in the daily and p.m. peak traffic counts at the three LBL gates. Changes in traffic patterns and assumed changes in vehicular use in the City of Berkeley could explain the traffic counts which were above projections

of 24-hour traffic volumes on four roadways near LBL, and are currently less than anticipated on 12 other roadway segments near LBL. This is confirmed by data from the 1991 traffic count on these roadways near LBL.

The renewal of the DOE operating contract will enable UC to continue to operate LBL in conformance with the 1987 LRDP. The traffic, parking and circulation impacts associated with the continued operation of LBL are within the levels which were anticipated and fully mitigated upon adoption of the 1987 LRDP EIR.

2. Impacts and Mitigation Measures

The 1987 LRDP EIR presented a detailed analysis of impacts of 1987 LRDP implementation on circulation and parking, identified potentially significant impacts, and proposed mitigation measures.[6] A summary of these impacts and mitigation measures is presented below for the information of the reader:

a. Standards of Significance

Potential adverse impacts regarding traffic and transportation or as a result of population, employment or housing changes would be considered significant if UC's continued operation and development of LBL would:

Cause intersection levels of service (LOS) to fall below LOS D or cause a significant incremental decline in service at an intersection currently operating at LOS E or below;

Have inadequate parking and internal circulation to accommodate projected traffic so that off-campus areas are adversely affected; and,

Fail to include provisions for pedestrian and bicycle circulation, and bicycle and motorcycle parking and security.

The impacts identified below are considered significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these significant impacts to a less than significant level.

b. Impacts and Mitigation

Impact III-I-1: **Incremental increases in traffic are expected due to projected increases in the number of employees and visitors at LBL.**

Discussion: While within the parameters of the earlier 1987 LRDP EIR, daily traffic to and from LBL is expected to increase, albeit at a lower level than anticipated in the 1987 LRDP EIR. Recent traffic studies from 1991 traffic counts confirm that daily 24-hour traffic volumes at the three gates to LBL are below the levels projected for 1992 in the 1987 LRDP EIR and below the levels projected at LRDP buildout in 20xx.[7] Peak hour traffic volumes will increase, particularly at the Blackberry Canyon and Grizzly Peak gates, with minimal impacts on the overall volume of traffic away from LBL. Peak Hour Level of Service will be marginally impacted by the additional traffic generated. Conflicts between motor vehicles and pedestrians and/or bicycles will increase, due to the increased traffic and emphasis on use of alternate transportation.

Mitigation 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;

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.

Mitigation 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.

Mitigation 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.

Mitigation 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 increases in traffic.

Mitigation 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.

Impact III-I-2: **The ratio of parking spaces to LBL employees will decrease during the LRDP implementation period.**

Discussion: LBL employees who drive to work generally park within the LBL area. The current ratio of parking to employees is **[1:1.66]** and adequately meets existing parking demand. The following measures have been adopted to further reduce the potential for adverse parking impacts:

Mitigation III-I-2: LBL will continue to implement and monitor the implementation of its Transportation System Management Program.

3. Cumulative Impacts

The 1990 UC Berkeley LRDP EIR included a comprehensive update on traffic and circulation in the areas affected by the campus, including the streets and intersections near LBL. The information developed in 1989 and 1990 indicated that cumulative population growth and facility development in the vicinity had resulted in a deterioration of the levels of service at intersections on the feeder routes into the UC Berkeley campus and LBL area.[8] The effect of this cumulative development on the roadways near LBL is summarized in Tables III-I-3 and III-I-5 shown earlier.

The 1990 UC Berkeley LRDP EIR study revealed that the levels of service ("LOS") in intersections and roadway segments have deteriorated to below acceptable levels along the northern access routes to the UC Berkeley campus. The level of traffic service has declined most along the Piedmont/Gayley corridor.[9] LBL, along with the City of Berkeley and UC Berkeley, has undertaken steps to alleviate the traffic congestion in the area, and restore acceptable levels of traffic service. LBL's commitments are included as a mitigation measure for this project.

New data provided by the 1990 UC Berkeley LRDP EIR led to the conclusions that the cumulative increases in traffic and parking demand were significant impacts. However, because of the mitigation commitments set forth in the UC Berkeley LRDP EIR, the UC Berkeley/City Mitigation Monitoring Agreement, and the mitigation commitments of LBL as summarized in this SEIR, these cumulative impacts will be reduced to a less than significant level. In fact, the cumulative measures undertaken by the City of Berkeley, UC Berkeley and LBL should result in a net improvement in the traffic and parking conditions in the immediate vicinity of LBL and UC Berkeley.

Notes for Section III-I:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-H of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR. These restated mitigations are now included in the Mitigation Monitoring Program (MMP) included in Appendix B.

2. *Ibid.*, p. F-86.

3. Dave Nielsen, LBL, November 15, 1991.

4. Settlement Agreement between the City of Berkeley and The Regents of the University of California, 1988. (This agreement is reproduced in Appendix A of this SEIR.)

5. *Ibid.*

6. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, pp. 168-169.

7. *Ibid.*, p. 146.

8. *Draft Environmental Impact Report. Long Range Development Plan. University of California at Berkeley.* Prepared for Campus Planning Office, University of California at Berkeley, January 1990, p. 4.5-9.

9. *Ibid.*, p. 4.5-9, Figure 4.5-3.

III. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

J. AIR QUALITY

1. Setting

a. Climate

Located on the east shore of San Francisco Bay, Berkeley is usually influenced by maritime air masses from the eastern Pacific Ocean that flow through the Golden Gate. During the spring through autumn months, this flow of marine air is usually generated by temperature differences between the air over the Pacific Ocean and the interior valleys of California. This flow is characterized by relatively high winds, cool temperatures, and high humidity. As a result, Berkeley is well ventilated and has relatively good air quality compared to most of the Bay Area.

Periods of extended stagnant wind conditions around Berkeley and the LBL site are caused by a large scale shift in weather patterns that counteract the typical sea breeze flow. The resultant light winds of this abnormal pattern originate over the warmer and drier interior valleys. This pattern allows for an increase in pollutant levels, especially ozone, over the entire Bay Area. Such conditions usually produce the region's highest levels of photochemical pollutants. However, a review of air quality data from recent years shows that regions immediately surrounding the northern half of San Francisco Bay seldom exceed either Federal or State air quality standards during these stagnant conditions[1].

The winter months are historically characterized by cycles of Pacific Ocean storms that bring periods of clouds, wind and rain, followed by stable periods of sunny days with light winds and cool, calm nights. Seasonal temperature variations are small. The mean temperature for the summer is 17C (63F), while the mean temperature for the winter drops down only slightly to 9C (48F). Generally, comfortable outdoor conditions prevail year round at the LBL site.

Annually, relative humidity ranges from 85-90 percent in the early morning to 65-75 percent in the afternoon at the LBL site. Annual insolation (incoming solar radiation) is approximately 65-75 percent of the potentially available sunshine with only minor variations from season to season. The number of annual heating degree-days is about 2,600 and cooling degree-days about 150. [Degree-days are a measure of the deviation of the average daily temperature (in Fahrenheit) from 65°F. Degree days are accumulated over a season, such as cooling degree-days for summer and heating degree-days for winter.][2] Winds are usually light, but summer afternoon sea breezes typically range to 10-15 meters per second (20-30 mph); peak winds occur during winter months and usually occur from the south or southwest direction ahead of approaching storms.

About 95 percent of the average annual rainfall of approximately 63 centimeters (25 inches) at the LBL site occurs from October through April. Rainfall intensities are seldom greater than one and one-quarter centimeters per hour (one-half inch per hour). Precipitation may vary widely from year to year as the region experiences natural shifts in global weather patterns. Thunderstorms, hail and snow are extremely rare. As a general matter, LBL enjoys a Mediterranean type climate.[3]

b. Regulatory Setting

Following the approval of the 1987 LRDP and the corresponding LRDP EIR, numerous changes occurred in air quality regulations at the federal, state and local levels. The result has been a significant expansion in the scope of air quality regulations applicable to "stationary sources" (i.e., factories, power plants and other non-mobile sources) of air pollutants. Overall, these changes have resulted, or will in the near future result, in more stringent technology control measures for new and existing stationary sources of air pollutants, more stringent permit requirements, and increased attention to toxic air pollutants, as well as the traditional "criteria" air pollutants (see next section for definition of "criteria").

1) Criteria Pollutants and Regulatory Agencies

Federal Regulations

The 1970 Federal Clean Air Act gave the U.S. Environmental Protection Agency (EPA) the authority to set federal ambient air quality standards (i.e., area-wide pollutant levels) designed to protect public health and welfare. The Clean Air Act indicated the need for primary standards to protect public health

and secondary standards to protect public welfare from effects such as visibility reduction, soiling and nuisance. It also required that the federal standards be designed to protect those people most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by illness, and persons engaged in strenuous work or exercise. Such people are termed "sensitive receptors" by the regulatory community.

In 1971, the EPA established federal standards for five major air pollutants: photochemical oxidants (ozone); carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); and suspended particulate matter. The particulate standard originally applied to particulates of any diameter, termed total suspended particulate (TSP), but was changed in 1987 to apply only to particulates less than ten microns in diameter, termed PM_{10}. EPA subsequently established a federal standard for lead. The federal ambient air quality standards for each of these so called "criteria pollutants" are set forth in Table III-J-1.

The Clean Air Act places primary responsibility on the states to adopt pollution control requirements designed to comply with the federal ambient air quality standards. In particular, each state is required to adopt an implementation plan, to be approved by EPA, by which emissions controls and other permitting and operating requirements may be imposed on pollutant emitting facilities.

California Regulations

California also has established ambient air quality standards for the criteria pollutants which are as stringent as, or more stringent than, the federal standards (See Table III-J-1). Both the federal and state ambient air quality standards establish exposure durations for specific contaminant levels in order to provide sensitive receptors with an ample margin of safety from adverse impacts. The California list of state-wide ambient air quality standards also includes additional pollutants (See Table III-J-1).

The California Air Resources Board (CARB) is the agency responsible for coordinating both the state and federal air pollution control programs in California. CARB has primary statutory authority to control pollutant levels throughout the state by establishing and enforcing regulations applicable to mobile sources as well as some categories of stationary sources. The CARB has divided the state into air basins and has delegated some of its pollution control authority to local air quality management districts to assist in this effort.

Table III-J-1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS[1]

Pollutant	Averaging Time	California Standard[3]	Federal Standards[2] Primary[4]	Federal Standards[2] Secondary[5]
Ozone	1-hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)
Carbon Monoxide	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide	1-hour	0.25 ppm (470 mg/m^3)	---	---
	Annual Average	--- ---	0.053 ppm (100 $\mu g/m^3$)	0.053 ppm (100 $\mu g/m^3$)
Sulfur Dioxide	1-hour	0.25 ppm (665 mg/m^3)	--- ---	--- ---
	3-hour	--- ---	--- ---	1300 $\mu g/m^3$ (0.5 ppm)
0.05 ppm[6]	24-hour 365 $\mu g/m^3$	--- (131 $\mu g/m^3$)	(0.14 ppm)	---
	Annual Average	--- ---	80 $\mu g/m^3$ (0.03 ppm)	--- ---
Suspended Particulate Matter (PM_{10})	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
	Annual Geometric Mean	30 $\mu g/m^3$	---	---
	Annual Arithmetic Mean	---	50 $\mu g/m^3$	50 $\mu g/m^3$
Sulfates	24-hour	25 $\mu g/m^3$	---	---

Continued

Table III-J-1 (Continued)
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS[1]

Pollutant	Averaging Time	California Standard[3]	Federal Standards[2] Primary[4]	Federal Standards[2] Secondary[5]
Lead	30 Day Average	1.5 $\mu g/m^3$	---	---
	Calendar Quarter	---	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$
Hydrogen Sulfide	1-hour	0.03 ppm (42 $\mu g/m^3$)	--- ---	--- ---
Vinyl Chloride	24-hour	0.010 ppm (26 $\mu g/m^3$)	--- ---	--- ---
Visibility-Reducing Particles	1 Observation	Visibility[7] < 10 miles	---	---

Notes:

1 = Concentrations expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius and a reference pressure of 760 mm of mercury. Note: ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas. $\mu g/m^3$ = micrograms per cubic meter.

2 = National Standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

3 = California standards for ozone, carbon monoxide, sulfur dioxide (1 hour), nitrogen dioxide and particulate matter (PM_{10}), are values that are not to be exceeded. The sulfates, lead, hydrogen sulfide, vinyl chloride, and visibility-reducing particles standards are not to be equaled or exceeded.

4 = National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency.

5 = National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.

6 = At locations where the State standards for ozone and/or suspended particulate matter are violated. National standards apply elsewhere.

7 = Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

Source: California Air Resources Board, as shown in *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan, Volume 1: Draft EIR*, prepared by the Bay Area Air Quality Management District, July 1991, p. 3-7.

Local District Regulations

Local air quality management districts also have principal responsibility for rulemaking, permitting and enforcement activities affecting stationary sources, such as the LBL facility. The Bay Area Air Quality Management District (BAAQMD) has the authority to develop and enforce regulations to control ambient air quality within most of the nine-county Bay Area (i.e., the San Francisco Bay Area Air Basin) that includes Berkeley and LBL.

At present the Bay Area, like many other metropolitan areas in the country, has not attained the federal ambient air quality standards for ozone.[4] The Bay Area also is considered nonattainment for the federal carbon monoxide (CO) standard and for the state ozone, carbon monoxide, and PM_{10} standards.[5]

Federal Clean Air Act Amendments

In November 1990, Congress enacted wide-ranging amendments to the federal Clean Air Act. This included a comprehensive nonattainment program which is designed to require local areas to achieve expedited compliance with the federal ambient air quality standards. The Bay Area has been designated by EPA as a "moderate" nonattainment area which is expected to achieve compliance with the federal standards by 1996.

California Clean Air Act

At the state level in 1988, the California legislature amended the Health & Safety Code thereby enacting California's own Clean Air Act, which established a comprehensive program for attaining the more stringent state ambient air quality standards.

A primary component of the California Clean Air Act (CCAA) requires each local air district to develop a Clean Air Plan (CAP) to be approved by CARB, and to achieve and maintain the California ambient air quality standards by the earliest practicable date. The Clean Air Plan must ensure annual district-wide emissions reductions of five percent or more for each nonattainment pollutant or its precursors, as averaged over a three-year period. CARB may approve of plans providing for a reduction of less than five percent only if the plan includes "all feasible control methods."

District Clean Air Plan

The BAAQMD approved a CAP in November 1991 and submitted it to CARB for review and approval. The BAAQMD CAP includes numerous emission control measures which will be adopted on a phased-in basis over the next several years. It is likely that some of these control measures will require LBL to implement more stringent emission control technology or operational practices. A summary of BAAQMD's draft emission control measures is included in Table III-J-2.

New Source Review Rules

The California Clean Air Act also requires local districts to revise their existing new source review rules (NSR) to conform with a goal of "no net increase" in emissions of nonattainment pollutants. BAAQMD has recently adopted a revised NSR rule, officially effective on November 20, 1991, which considerably lowers applicable permitting thresholds for new or modified sources. The rule has two major components to it. First, it requires Best Available Control Technology (BACT) for sources of criteria pollutants (except ozone), precursor organic compounds (POC), or non precursor organic compounds if emissions exceed or are likely to exceed five pounds on any one day or 365 pounds per year; BACT requirements also apply to several hazardous air pollutants if emissions are likely to exceed other levels specified in the rule.

The second aspect of the "No Net Increase" rules addresses "offsets" (i.e., emission reductions) before the issuance of an operating permit. Offset requirements would apply only if emissions of certain pollutants exceed specified threshold amounts. These pollutants include POC, nitrogen oxides, particulate matter, PM_{10}, and sulfur dioxide. For each of these pollutants, the rule establishes limitations of five pounds on any one day or a facility-wide cumulative increase after April 5, 1991, of one ton per year. Offset reductions are always required at a rate greater than the proposed increase (e.g., 1.2 tons of reduction per one ton of increase). In general, offsets must be obtained in the area where increases from new or modified stationary sources are proposed; also the BAAQMD has established a small facility (less than 25 tons of emissions per year) "bank" from which offsets may be purchased. For purpose of a CEQA analysis the potential impacts of the increased emissions are considered real and are still evaluated although the regulatory requirements may require greater reductions in emissions. New or modified sources of air emissions at LBL will be subject to this more stringent NSR rule.

Table III-J-2
PROPOSED CONTROL MEASURES AND RELATED BAAQMD REGULATIONS

Control Measure	Regulation
Surface Coating and Solvent Use Control Measures	
A1 Improved Architectural Coatings Rule	Regulation 8, Rule 3
A2 Improved Industrial Maintenance Coatings Rule	Regulation 8, Rule 48
A3 Improved Aerospace Coatings Rule	Regulation 8, Rule 29
A4 Improved Wood Furniture and Cabinet Coatings Rule (Adopted April 17, 1991)	Regulation 8, Rule 32
A5 Improved Surface Coating of Miscellaneous Metal Parts and Products Rule	Regulation 8, Rule 19
A6 Improved Surface Coating of Plastic Parts and Products Rule	Regulation 8, Rule 31
A7 Improved Can and Coil Coating Rule	Regulation 8, Rule 11
A8 Improved Magnet Wire Coating Operations Rule	Regulation 8, Rule 26
A9 Improved Automobile Assembly Coating Operations Rule	Regulation 8, Rule 13
A10 Improved General Solvent and Surface Coating Rule	Regulation 8, Rule 4
A11 Further Control of Emissions from Adhesives Use	
A12 Elimination of Coatings Rules Alternative Emission Control Plans	Regulation 8, Rules 11, 20, 32, and 43
A13 Improved Graphic Arts Printing Operations Rule	Regulation 8, Rule 20
A14 Improved Coatings and Ink Manufacturing Rule	Regulation 8, Rule 35
A15 Improved Resin Manufacturing Rule	Regulation 8, Rule 36
A16 Improved Semiconductor Manufacturing Operations Rule	Regulation 8, Rule 30
A17 Control of Emissions from Household Solvent Disposal	Current not regulated
A18 Substitute Solvents Used for Surface Preparation/Cleanup of Surface Coatings	Regulation 8, Rules 1 and 16
A19 Ultra-Low VOC Coatings	Regulation 8, All Rules
Fuels/Organic Liquids Storage and Distribution Control Measures	
B1 Control of Emissions from Railcar Loading	Currently not regulated
B2 Improved Storage of Organic Liquids Rule	Regulation 8, Rule 5
B3 Improved Organic Chemical Terminals and Bulk Plants Rule	Regulation 8, Rule 6
B4 Further Emissions Reductions from Gasoline Delivery Vehicles	Source Test Procedure ST-33
B5 Limitations on Marine Vessel Tank Purging	Currently not regulated
B6 Control of Emissions from Cleaning-Up Organic Liquids	Regulation 8, Rules 2 and 9
B7 Control of Emissions from Propane Handling	Currently not regulated
Refinery and Chemical Processes Control Measures	
C1 Improved Pressure Relief Valves at Refineries and Chemical Plants Rule	Regulation 8, Rule 28
C2 Improved Pump and Compressor Seals at Refineries and Chemical Plants Rule	Regulation 8, Rule 25

Continued

Table III-J-2 (Continued)
PROPOSED CONTROL MEASURES AND RELATED BAAQMD REGULATIONS

Control Measure	Regulation
C3 Improved Valves and Flanges at Refineries and Chemical Plants Rules	Regulation 8, Rules 18 and 22
C4 Improved Process Vessel Depressurization Rule	Regulation 8, Rule 10
C5 Improved Wastewater (Oil-Water) Separators Rule	Regulation 8, Rule 8
C6 Further Control of Emissions from Wastewater Treatment at Refineries	Regulation 8, Rule 8 Regulation 11, Rule 12
C7 Control of Emissions from Petroleum Refinery Flares	Currently not regulated
Combustion of Fuels (NO_x Sources) Control Measures Including	
D1 Control of Emissions from Non-Utility Reciprocating Engines	Currently not regulated
D2 Control of Emissions from Stationary Gas Turbines	Currently not regulated
D3 Control of Emissions from Electric Power Generating Boilers	Regulation 9, Rule 3
D4 Control of Emissions from Boilers, Steam Generators and Process Heaters	Regulation 9, Rule 3
D5 Control of Emissions from Cement Plant Kilns	Currently not regulated
D6 Control of Emissions from Glass Manufacturing Plant Melting Furnaces	Currently not regulated
D7 Control of Emissions from Residential Water Heating	Currently not regulated
Other Industrial/Commercial Processes Control Measures	
E1 Control of Emissions from Rubber Products Manufacturing	Regulation 8, Rules 2 and 4
E3 Control of Emissions from Commercial Charbroiling	Currently not regulated
Other Stationary Source Control Measures	
F1 Improved New Source Review Rule	Regulation 2, Rule 2
F2* Emission Minimization Management Plan * Contingency Measure.	Currently not regulated
F3 Promotion of Energy Efficiency	Currently not regulated
F4 Enhanced Enforcement of Existing District Regulations	Regulation 8, Enforcement Strategy
Intermittent Control Measures	
G1 Citizen Postponement of Discretionary Activities	Regulation 4
G2 Industrial Postponement of Activities During Forecast Ozone Excess Days	Regulation 8, Rule 44 and Regulations 4 and 5

Source: *Candidate Control Measure Descriptions*, BAAQMD, Draft, March 18, 1991, as shown in *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan, Volume 1: Draft EIR*, prepared by the Bay Area Air Quality Management District, July 1991, pp. 3-38 to 3-40.

Effect of Changes in Regulations

The effect of changes in regulations since adoption of the 1987 LRDP is difficult to quantify. Air quality in the Bay Area is a function of the quantity of pollutants emitted locally, plus the transport of pollutants from sources outside of the immediate area, with the resulting ambient air quality largely dictated by regional meteorological and topographical factors. A review of exceedances of federal and state ambient air quality standards during the last eight years indicates decreasing levels of pollutants in the Bay Area (See Table III-J-3).

Regionally, the most severe and complex air quality problem is the relatively high level of ambient ozone experienced during hot, meteorologically stable periods during the months of April through October. Although the Bay Area's highest ozone levels can fluctuate from year to year, both federal and state standards are most often exceeded in the Santa Clara, Livermore, and Diablo Valleys.[6]

In contrast to ozone, CO and PM_{10} are a sub-regional problem in the Bay Area which occur at a different time of year than ozone. It is estimated that 85 percent of CO in the Bay Area is generated by vehicles.[7] CO standards are occasionally exceeded in those parts of the Bay Area subject to a combination of high traffic density and surface-based temperature inversions during the winter months. From 1987 to 1989, three sub-areas of the Bay Area (San Francisco, San Jose, and Vallejo) exceeded CO standards[8], but the level of exceedances has decreased over time.

The BAAQMD operates a regional air quality monitoring network in order to track the Bay Area's progress toward attainment of federal and state ambient air quality standards. At monitoring stations throughout this network, concentrations of the five major criteria air pollutants are measured regularly.[9] Ozone and carbon monoxide are sampled with continuous measurement instrumentation. In conformance with applicable regulations, PM_{10} sampling occurs on a once-every-6-day schedule, except for one station in San Jose for which EPA requires a more frequent sampling schedule (every second day).

Summary of Bay Area Air Quality Data

An eight-year summary of the data collected for the Bay Area covering the period 1983 through 1990 is shown in Table III-J-3. The data in Table III-J-3 reveal 14 violations of the state ozone standard and two violations of the federal ozone standard in 1990. However, the locations of the violations were

Table III-J-3
BAY AREA AIR POLLUTANT DATA SUMMARY, 1983-1990

Pollutant	Standard	Year 1983	1984	1985	1986	1987	1988	1989	1990
OZONE:									
Highest 1-hour (ppm)		0.20	0.17	0.16	0.14	0.17	0.15	0.14	0.13
Days > 0.09 ppm	State	53	55	45	39	46	41	22	14
Days > 0.12 ppm	Federal	21	22	9	5	14	5	4	2
CARBON MONOXIDE:									
Highest 1-hour (ppm)		17.0	20.0	21.0	20.0	17.0	15.0	19.0	NA
Days > 20.0 ppm	State	0	0	2	0	0	0	0	0
Days > 35.0 ppm	Federal	0	0	0	0	0	0	0	0
Highest 8-hour		10.6	12.10	16.10	12.60	10.0	12.80	12.0	11.3
Days > 9.0 ppm	State/ Federal	4	8	20	8	2	4	10	2
NITROGEN DIOXIDE:									
Highest 1-hour (ppm)		0.18	0.18	0.19	0.16	0.17	0.16	0.15	0.15
Days 0.25 ppm	State	0	0	0	0	0	0	0	0
Annual Mean		0.020	0.022	0.022	0.014	0.021	0.022	0.022	NA
Year > 0.053 ppm	Federal	No	No	No	No	No	No	No	No
SULFUR DIOXIDE:									
Highest 1-hour (ppm)		0.24	0.37	0.18	0.12	0.16	0.13	0.09	NA
Days > 0.25 ppm	State	0	1	0	0	0	0	0	NA
Highest 24-hour		0.038	0.050	0.034	0.030	0.028	0.024	0.024	0.013
Days > 0.05 ppm	State	0	0	0	No	No	No	No	0
Annual Mean		0.001	0.001	0.001	0.001	0.001	0.001	0.001	NA
Year > 0.03 ppm	Federal	No	No	No	No	No	No	No	NA
PARTICULATES (PM_{10}):									
Highest 24-hour (ppm)		NM	67	181	122	112	146	150	NA
Days > 50 $\mu g/m^3$	State	NM	3	24	26	26	32	51	15
Days > 150 $\mu g/m^3$	Federal	NM	0	2	0	0	0	0	1

Notes: ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
NM = not monitored.
* = data presented are valid, but incomplete in that an insufficient number of valid data points were collected to meet EPA and/or ARB criteria for statistical significance.
NA = Not Available.

Sources: California Air Resources Board, *Air Quality Data Summary,* 1986-1989. BAAQMD, *Air Pollution in the Bay Area by Station and Contaminant:* 1990, as shown in *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan, Volume 1: Draft EIR*, prepared by the Bay Area Air Quality Management District, July 1991, p. 4.1-11.

southern Alameda County (Fremont), eastern Alameda County (Livermore), Contra Costa County east of the East Bay hills, Santa Clara County, and Solano County. State and federal one-hour CO standards were not violated in 1990, while two violations of the eight-hour standards were recorded.[10] Both of these were in San Jose. The federal PM_{10} standard was exceeded once in 1990, while 15 violations of the state PM_{10} standard occurred during the same time period from the BAAQMD six-day sampling network.[11] The federal exceedance occurred in Concord. The state exceedances were scattered throughout the nine-county region.

A summary of the data collected in the East Bay at the Richmond, Oakland and Concord monitoring stations for the five-year period, 1986-1990, together with the most applicable air quality standards, is shown in Table III-J-4.

The Richmond and Oakland stations represent the closest geographical locations to LBL but do not necessarily represent air quality conditions at or near LBL.[12] During 1990, no violations of federal standards for ozone, CO, or PM_{10} were recorded at these three East Bay monitoring stations (the Oakland station does not monitor for PM_{10}.) The federal TSP standard was exceeded once in 1990 at Concord. Of the state standards, only the ozone and PM_{10} standards were exceeded during 1990 at these three monitoring stations: Concord violated the ozone standard three times and the PM_{10} standard six times, while Richmond exceeded the PM_{10} standard five times (same exceedance dates as Concord).[13]

Computer Modelling of CO Concentrations

CO concentrations in areas distant from BAAQMD monitoring stations, including all of Berkeley, are usually estimated by computer modeling. Specifically, this is accomplished using the CARB's CALINE4 model (or an equivalent developed by BAAQMD) to simulate CO dispersion from major local roadways. Background concentrations reflective of the BAAQMD monitoring data suggest that an average worst-case CO background of seven parts per million (ppm) and four ppm for one- and eight-hour averaging periods, respectively, is likely in Berkeley.[14] The corresponding standards are 20 ppm (state) and 35 ppm (federal) for one-hour, and nine ppm (state and federal) for the eight-hour standard. This background concentration is relatively low in comparison to levels measured in many South Bay communities, which are more geographically sheltered by the surrounding mountainous terrain. This makes those regions more susceptible to the influence of atmospheric inversions and more restrictive dispersion conditions for pollutants.

Table III-J-4
AIR POLLUTANT DATA SUMMARY 1986-1990
STATIONS: Richmond (RCMD), Oakland (OKLD), Concord (CNCD)

	1986			1987			1988		
Pollutant	**RCMD**	**OKLD**	**CNCD**	**RCMD**	**OKLD**	**CNCD**	**RCMD**	**OKLD**	**CNCD**
OZONE:									
Highest 1-hour	0.07	0.09*	0.12	0.09	0.09*	0.14	0.10	0.10*	0.14
Days > 0.09 ppm	0	0	5	0	0	20	2	1	10
CARBON MONOXIDE:									
Highest 1-hour	8.0	12.0	10.0	8.0	9.0	12.0	10.0	10.0*	15.0
Days > 20.0 ppm	0	0	0	0	0	0	0	0	0
Highest 8-hour	5.9	7.5	5.6	4.8	4.9	5.5	5.0	5.6	6.6
Days 9.1 ppm	0	0	0	0	0	0	0	0	0
NITROGEN DIOXIDE:									
Highest 1-hour	0.13	NM	0.11	0.09	NM	0.13	0.11	NM	0.11
Days > 0.25 ppm	0	NM	0	0	NM	0	0	NM	0
SULFUR DIOXIDE:									
Highest 24-hour	0.05	NM	0.05	0.04	NM	0.05	0.03	NM	0.05
Days 0.05 ppm	0	NM	0	0	NM	0	0	NM	0
PARTICULATES:									
Highest 24-hour TSP	85	NM	96	99	NM	135	73	NM	121
Days > 150 $\mu g/m^3$	0	NM	0	0	NM	0	0	NM	0
Geometric Mean TSP	37.8	NM	38.8	43.0	NM	47.8	40.9*	NM	46.4
Year > 60 $\mu g/m^3$	No	NM	No	No	NM	No	No	NM	No
Highest 24-hour PM_{10}	NM	NM	86	NM	NM	85	NM	NM	77
Days > 50 $\mu g/m^3$	NM	NM	4	NM	NM	6	NM	NM	6
Geometric Mean PM_{10}	NM	NM	23.0*	NM	NM	26.1	NM	NM	286*
Year > 30 $\mu g/m^3$	NM	NM	No	NM	NM	No	NM	NM	No

Notes: ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
NM = not monitored.
* = data presented are valid, but incomplete in that an insufficient number of valid data points were collected to meet EPA and/or ARB criteria for representativeness.

Of the standards listed above, all are State standards, except the first block listed under Particulates, which are federal standards.

Source: California Air Resources Board, *Air Quality Data Summary*, 1986-1988, as shown in *Draft Environmental Impact Report, University of California at Berkeley, University Health Service Building*, prepared by the University of California at Berkeley, Campus Planning Office, April 16, 1990, p. 4.9-6.

Table III-J-4 (Continued)
AIR POLLUTANT DATA SUMMARY 1986-1990
STATIONS: Richmond (RCMD), Oakland (OKLD), Concord (CNCD)

Pollutant	1989 RCMD	1989 OKLD	1989 CNCD	1990 RCMD	1990 OKLD	1990 CNCD
OZONE:						
Highest 1-hour						
Days > 0.09 ppm	1	0	6	0	0	3
CARBON MONOXIDE:						
Highest 1-hour	9.0	10.0	10.0	7.0	8.0	11.0
Days > 20.0 ppm	0	0	0	0	0	0
Highest 8-hour	4.1	7.5	5.6	4.0	6.1	5.8
Days 9.1 ppm	0	0	0	0	0	0
NITROGEN DIOXIDE:						
Highest 1-hour	0.11	NM	0.10	0.08	NM	0.09
Days > 0.25 ppm	0	NM	0	0	NM	0
SULFUR DIOXIDE:						
Highest 24-hour	0.01	NM	0.02	0.01	NM	0.01
Days 0.05 ppm	0	NM	0	0	NM	0
PARTICULATES:						
Highest 24-hour TSP	93	NM	119	100	NM	168
Days > 150 $\mu g/m^3$	0	NM	0	0	NM	0
Geometric Mean TSP	39.3	NM	42.6	32.9	NM	35.3
Year > 60 $\mu g/m^3$	0	NM	0	0	NM	0
Highest 24-hour PM_{10}	115	NM	101	109	NM	147
Days > 50 $\mu g/m^3$	5	NM	9	5	NM	6
Geometric Mean PM_{10}	NM	NM	25.8	22.9	NM	21.5
Year > 30 $\mu g/m^3$	NM	NM	No	NM	NM	No

Notes: ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
NM = not monitored.
* = data presented are valid, but incomplete in that an insufficient number of valid data points were collected to meet EPA and/or ARB criteria for representativeness.

Of the standards listed above, all are State standards, except the first block listed under Particulates, which are federal standards.

Source: California Air Resources Board, Air Quality Data Summary, 1989-1990, obtained from the Bay Area Air Quality Management District, February, 1992.

Suspended Particulates

Suspended particulates are solid or liquid particles of dust, aerosols, smoke, fumes, and other matter found in the atmosphere. Generally, particulates with smaller diameters remain suspended the longest and are the most harmful in terms of health effects. A portion of the suspended particulates in the air are caused by natural sources such as wind-blown dust and pollen. The most important particulate sources in the Bay Area are demolition and construction activity, and motor vehicle travel over paved and unpaved roads. Typically, levels of PM_{10} exhibit seasonal differences. For example, in the San Francisco Bay Area Air Basin, the average concentration during the winter months is twice the average concentration measured during the summer months.[15]

2) Toxic Air Contaminants

Sources of Toxic Air Contaminants

In recent years, regulatory agencies have placed greater emphasis on regulating emissions of toxic air contaminants (TACs). TACs may include both organic and inorganic chemicals that are capable of causing short-term or long-term adverse health effects if emitted to the ambient environment and inhaled or ingested by humans. TACs may be emitted from a variety of common sources, including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. Research and teaching facilities such as LBL, where a variety of chemicals are used for various experiments, also emit low levels of TACs via fume hoods and building exhaust systems.

The six criteria pollutants (ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead), for which federal and state ambient air quality standards have been set, are generally not considered TACs. On the other hand, certain TACs, such as volatile organic compounds, are considered precursors to ozone.

Federal Regulatory Standards of TACs

In general, TACs are considered separately from the criteria pollutants in the regulatory process. Few regulatory standards, and no ambient air quality standards, have been set for TACs. For many substances, there are few or no data concerning potential health effects associated with inhalation of varying doses of TACs; the toxicity data that are available are generally based on the results of exposing rodents and other animals to varying doses and exposure durations. Information about exposures

typically experienced in workplace environments is generally extrapolated from the dose-response results of these animal studies, even though the workplace exposure levels may be quite different from those studied in the experimental setting. Virtually no epidemiological data exist regarding the potential increased risk of contracting cancer or other diseases from typically low levels, but changeable durations of exposure to TACs within research laboratories or in areas surrounding research laboratories. Because of the lack of human epidemiological information about TACs exposures, few specific comparison levels exist for determining when human exposure to TAC emissions may cause significant health effects.

Some toxic air contaminants have been regulated at the federal level through the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) established under the federal Clean Air Act. NESHAPs include standards for asbestos, benzene, beryllium, inorganic arsenic, mercury, radionuclides, radon, and vinyl chloride. The BAAQMD has adopted standards for this group of pollutants, except inorganic arsenic, mercury, and radionuclides. Standards developed by BAAQMD nearly parallel the federal NESHAPs standards.

Although the NESHAPs program has been fairly ineffective in the past with regard to toxic air contaminants, Title III of 1990 amendments to the federal Clean Air Act provide for substantially greater regulation of sources which emit any of 189 toxic air pollutants listed by EPA. The amendments require certain "major sources" of toxic air pollutants to implement maximum available control technology (MACT), according to standards established by EPA, on a phased-in basis. This MACT-based approach for setting standards differs from the previous risk-based approach used in developing criteria standards. This new approach will allow for the accelerated implementation of the 189 standards since it avoids the lengthy and costly health-related studies.

State Regulatory Controls of TACs

Assembly Bill 1807 (known as the Tanner bill) set up a California statewide process to determine the need for, and methods of, setting regulatory controls for TACs. The process includes identification of TACs, determination of existing emissions and ambient concentrations of the identified compounds and establishment of minimum statewide emission control standards by the CARB. As of September 1991, the CARB had identified asbestos, benzene, cadmium, carbon tetrachloride, dibenzofurans (15 species), hexavalent chromium, ethylene dibromide, ethylene dichloride and ethylene oxide as TACs. In addition,

1,3-butadiene, chloroform, formaldehyde, inorganic arsenic, ethylene chloride, nickel, perchloroethylene, trichloroethylene, and vinyl chloride are all being reviewed for possible inclusion in the TAC list. A number of other substances, including those listed under Title III of the amended Federal Clean Air Act, will be considered in the future, so the list is likely to grow significantly.

Local District Management Programs

At the local level, BAAQMD has established a comprehensive toxic air contaminant risk management program designed to evaluate and reduce health impacts to the public resulting from airborne toxic contaminants. The program includes the following elements: air toxics "hot spots" program; annual updates of toxic air contaminant emission inventories; toxic air contaminant reduction plan; screening analysis for new and modified sources of toxic air contaminants; proposed regulatory measures designed to incorporate all available risk reduction techniques for emissions of toxic air contaminants; and, district-wide ambient monitoring for toxic air contaminants.

BAAQMD's toxic hot spots program is based upon the California Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) (Health & Safety Code, §44360 et seq.), which requires specified facilities to submit to the local districts, by a specified deadline, a comprehensive plan for estimating the amount of TACs potentially emitted by the facility. Following approval of the plan, the facilities must submit the resulting air toxics emissions inventory to the district by a separate, specified deadline. After BAAQMD receives completed inventories, it is required to identify high priority facilities which must prepare facility-wide health risk assessments. A health risk assessment is based on established cancer and non-cancer toxicity factors for various TACs, estimated or measured quantities of emissions from individual air pollution sources at a facility, projected ground level concentrations from these emissions for certain receptor locations, and a "worst case" hypothetical exposure scenario which assumes that an individual will be exposed for a continuous 70-year period to facility's maximum quantity of TAC emissions. A facility operator is required to give notice to "all exposed persons" if BAAQMD concludes, based upon the risk assessment, that there is a significant health risk caused by toxic air emissions from the facility.

On August 7, 1991, BAAQMD adopted a Toxic Air Contaminant Reduction Plan. The explicit goal of the plan is to reduce the toxicity of emissions from sources under BAAQMD's jurisdiction to less than 50 percent of 1989 levels by 1995. The plan is intended to reduce the emissions of both carcinogens and

non-carcinogens and will encourage facilities to use source reduction techniques and to implement emission control measures in order to achieve the requisite reductions.[16]

The specific emission control measures proposed under the plan will be enacted by the BAAQMD on a phased-in basis over the next several years. A list of these proposed control measures is shown earlier in Table III-J-2. BAAQMD's progress towards the 50 percent reduction goal will be monitored through the annual toxics emission inventory. It is likely that some of the control measures will require LBL to implement more stringent emission control technology operational procedures.

BAAQMD's plan also includes a proposed new source review rule (proposed BAAQMD Regulation 2, Rule 5) specifically addressing potentially toxic air contaminants. As a matter of practice, during the past several years, new and modified sources of air emissions under BAAQMD's jurisdiction have been subjected to an air toxics risk screening as a part of the Authority to Construct/Permit to Operate application process. Depending upon the level of risk that is expected to result from a new or modified facility, best available control technology for potentially toxic air contaminants may be required by the BAAQMD. The proposed new source review rule for potentially toxic air contaminants would, with some changes, codify existing BAAQMD practice.

Since approval of the 1987 LRDP EIR and with the regulatory changes affecting TAC emissions, BAAQMD has developed new data regarding TAC emissions from many individual stationary sources and ambient levels of TACs. In implementing its toxic "hot spots" program, BAAQMD prepared a comprehensive air toxics emissions inventory which includes a list of predictable releases associated with routine activities at existing stationary sources under BAAQMD's permit authority.[17] BAAQMD plans to update the inventory annually..

In addition, BAAQMD recently established a number of monitors throughout the Bay Area including Oakland, San Leandro, Fremont and Walnut Creek, to record ambient levels of eleven potentially toxic air contaminants: benzene, 1,1,1-trichloroethane, trichloroethylene, chloroform, 1,2-dichloroethane, 1,2-dibromoethane, methylene dichloride, carbon tetrachloride, tetrachloroethylene, vinyl chloride, and toluene. Table III-J-5 summarizes preliminary results from these monitoring stations.[18]

Table III-J-5
TOXIC AIR POLLUTANT DATA SUMMARY FOR BAY AREA: AVERAGE CONCENTRATIONS[1]
(parts per billion)

	Concord		Fremont		Richmond		San Francisco		San Jose	
	Value	No.[2]	Value	No.[2]	Value	No.[2]	Value	No.[2]	Value	No.[2]
Acetaldehyde	1.90	21	1.73	21	1.19	20	1.96	18	1.63	20
Benzene	1.89	24	1.68	22	1.60	22	1.69	19	3.59	22
Benzo(a)pyrene	0.593	16	0.040	8	0.059	7	0.321	14	1.01	15
1,3-Butadiene	0.237	20	0.209	22	0.158	20	0.203	18	0.420	20
Carbon Tetrachloride	0.158	23	0.123	24	0.123	24	0.118	19	0.120	24
Chloroform	0.035	23	0.020	24	0.040	23	0.028	19	0.025	24
Ethylene Dibromide	0.005	23	0.005	24	0.005	23	0.005	19	0.005	22
Ethylene Dichloride	0.10	23	0.10	23	0.10	21	0.10	19	0.10	22
Formaldehyde	3.79	24	3.13	25	2.48	24	2.99	22	3.29	24
Methyl Chloroform	0.472	18	4.20	19	1.04	21	0.972	16	1.17	24
Methylene Chloride	0.70	22	0.65	23	0.94	24	2.51	19	0.80	22
Perchloroethylene	0.746	21	0.287	23	0.110	23	0.219	17	0.229	22
Trichloroethane	0.055	21	0.141	23	0.402	23	0.088	18	0.105	22

Notes: 1 = Monitoring conducted from July 1988 through June 1989.
2 = Number of Readings

Source: California Air Resources Board, Technical Support Division, Air Quality Data Review, unpublished, November 1, 1990, as shown in *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan, Volume 1: Draft EIR*, prepared by the Bay Area Air Quality Management District, July 1991, p. 4.1-15.

According to BAAQMD, more than one-half of the monitored background concentration of toxic air contaminants in the Bay Area originates from automobiles, trucks, and other vehicles. The remainder is associated with emissions from industry and business, agriculture, and the use of paints, solvents, and chemicals by local residents.[19]

Cancer Risk Due to Exposure to Toxic Air Contaminants

Currently in the U.S., about one of every three people born today will develop cancer in their lifetimes.[20] Cancer can result from a number of causes, including chemical exposures. The portion of this cancer risk that is due to exposure to toxic air contaminants was recently examined by EPA in a study of cancer-related health risk due to air toxics in five cities.[21] The study evaluated the relative

contribution to cancer incidence of a number of common city sources of air toxics. Some of these common sources include road vehicles (55 percent), chrome platers, solvent use, woodsmoke (including fireplaces), cooling towers and external combustion or incineration.[22] (See Table III-J-6)

Table III-J-6
SOURCES OF CITY RESIDENT CANCER CASES (From EPA Five-City Cancer Study)

Carcinogenic Air Emissions Source	Relative Contribution to Toxic Air Contaminant Cancer Incidence (%)
Road vehicles (includes automobiles and trucks)	55%
Chrome platers	9
Solvent use	7
Wood smoke (includes fireplaces)	6
Comfort cooling towers	5
External combustion or incineration	4
Industrial cooling towers	3
Gasoline marketing	2
Ethylene oxide sterilizers	2
Chemical manufacturing	1.3
Refining	1
Iron and steel industry	0.7
Glass manufacturing	0.7
Refractory manufacturing (includes aluminum and silica industry)	0.5
Publicly-owned treatment works (includes sewage treatment plants)	0.5
Non-ferrous metal industry	0.2
Other	3.1
TOTAL	**101.0%**

Source: Lahre, 1989

Overall, the study found that the average cancer incidence that could be attributed to exposure to airborne toxic substances was 5.8 cases of cancer per year per 1,000,000 city residents. If this is considered over the 70-year lifetime typically used as a standard in health risk assessments, such as the one performed for this project, the lifetime cancer risk from toxic air contaminants would be 400 cases

of cancer per 1,000,000 city residents.[23] In the Bay Area, the calculated background risk due to ambient concentrations of measured air pollutants is about 700 in a 1,000,000.[24]

3) Radionuclides

Special regulatory requirements apply to emissions of radionuclides; in addition, there are detailed radioactive materials handling and disposal requirements to reduce the likelihood and levels of radioactive air emissions. [See Section IV, Hazardous Materials.]

Both the EPA and the Department of Energy have emissions requirements for radionuclides applicable to facilities such as LBL. EPA has established its rules as part of the NESHAPs regulation. These requirements are more stringent than those of the DOE. Unlike the EPA regulation, however, the DOE Order establishes specific concentration guidelines for individual radionuclides.

The NESHAPs requirements for radionuclide emissions from facilities owned or operated by the Department of Energy, including LBL, are specified in *40 CFR 61, Subpart H*. This regulation provides that facility-wide radionuclide emissions to the ambient air may not exceed an annual effective dose equivalent (AEDE) of 10 millirems (mrem) to any member of the public. An AEDE is calculated by summing the products of the annual dosage absorbed by specific tissues or organs, a quality factor assigned to the radiation type (e.g., gamma rays = 1, alpha rays = 20), and a tissue-specific weighting factor (e.g., lungs = 0.12, thyroid = 0.03). A rem is a unit of measure for ionizing radiation. It represents the amount of ionizing radiation required to produce the same biological effect as one roentgen of high penetration x-rays (i.e., Roentgen Equivalent in Man). NESHAPs also requires that radionuclide emissions from a facility must be monitored in accordance with EPA approved procedures and that the facility must maintain detailed records regarding such emissions. *40 CFR 61.9 et seq.*

DOE Order 5400.5, applicable to all DOE-owned or -operated facilities, requires that airborne emissions of radionuclides may not exceed an annual effective dose equivalent limit of 100 mrem from all exposure modes (air, water, etc.) to any member of the public. The DOE Order also establishes Derived Concentration Guidelines (DCGs) for individual airborne radionuclides. Airborne DCGs are concentrations for a specific radionuclide that would result in an effective dose equivalent of 100 mrem if continuous inhalation of that radionuclide occurred for a one-year period.

c. LBL Air Emissions

1) Emissions of Criteria Pollutants

Permits to Operate Stationary Sources of Criteria Pollutants

LBL currently has ten types of permits from BAAQMD to operate 29 stationary sources of criteria air pollutants. These include:

Cold solvent cleaning equipment located in Buildings 76 (2), 77, and 934;
Gasoline dispensing facility located near Building 76;
Machine shop exhaust systems in Buildings 53, 58, 70A, 76, 77 (4), and 88 (2);
Paint drying oven in Building 77;
Paint spray booth in Buildings 76 and 77;
Sandblast exhaust equipment in Building 77;
Saw dust exhaust systems in Buildings 74, 76, and 79 (2);
Sulfur Hexafluoride Chamber in Building 58;
Ultrasonic Degreaser in Buildings 53 and 76;
Vapor Degreaser in Buildings 25A, 53 and 77.

In addition, LBL currently has six permit applications pending before BAAQMD to authorize construction of five additional sources. These include:

Cold Solvent Cleaning equipment located in Building 77;
Epitaxy Research Laboratory for Semiconductor studies in Building 2;
Epoxy Mining and Curing Ovens in Building 53;
Gallium Arsenide Crystal Growth Furnace for Semiconductor studies located in Building 2;
Silicon Technology Wafer Saw in Building 2 (associated with Gallium Arsenide Crystal Growth Furnace);
Vacuum Coating Laboratory in Building 25.

The above-mentioned stationary sources require permits, because BAAQMD has established such requirements to control emissions of criteria pollutants or precursors to these pollutants. Thus, some

of the sources listed above may emit criteria pollutants directly, while others may emit various materials that are considered precursors to criteria pollutants (e.g., BAAQMD Regulation 8 establishes rules for Organic Compounds).

Besides the above-mentioned permitted stationary sources, other activities may produce emissions of criteria air pollutants that are currently exempt from BAAQMD regulations. These include LBL-related traffic, on- and off-site emissions resulting from providing heat and electricity to LBL facilities, and numerous miscellaneous shop activities such as sawing, drilling, and milling. While not required to report these to any regulatory agency, LBL has identified and registered 78 of these permit-exempt activities with the BAAQMD. It should also be noted that BAAQMD's regulations provide that bench-scale laboratory equipment or that used exclusively for chemical or physical analyses are exempt from permit requirements unless the equipment emits more than 150 pounds (68 kilograms) per day of any single criteria pollutant. Thus, most laboratory equipment at LBL (e.g., fume hoods) do not require permits.

Because LBL's population, traffic and facility development levels remain within the levels projected in the 1987 LRDP and mitigated in the 1987 LRDP EIR, more detailed consideration of these types of emissions of criteria pollutants is not required under CEQA for purposes of this SEIR.

2) Toxic Air Contaminants

Existing sources that may emit toxic air contaminants at LBL include: boilers, cooling towers, bright dip tanks, plating tanks, cold solvent cleaners, part cleaners, vapor degreasers, epoxy mixing and curing ovens, spray paint booths and drying ovens, gasoline dispensing facility, chemical laboratories, fume hoods, non-destructive testing hoods, oil tank hoods, sink hoods, soldering hoods, vacuum coating hoods, storage tanks, sulfur hexafluoride chamber, grinding, lead pot, welding, printing press, sandblasters, and steam evaporator.

LBL submitted its plan for conducting a TAC inventory to the BAAQMD on October 17, 1989 as part of complying with AB2588.[25] Following BAAQMD's approval of LBL's inventory plan, LBL completed and submitted its air toxics inventory in July 1990.[26] As listed in the Toxics Inventory issued by BAAQMD (January 15, 1991), the most significant toxic air contaminant emissions from LBL

include benzene, 1,4-dioxane, freon, toluene, 1,1,1-trichloroethane, and xylene.[27] Based upon that LBL inventory, BAAQMD has classified LBL as a "medium priority" facility which is not required, at present, to prepare a facility-wide risk assessment. BAAQMD is expected to update its priority list annually based upon information provided by facilities during the annual permit renewal process.

LBL also uses and stores materials or has building components that may be toxic and could be released to the environment under certain conditions. However, potential emissions associated with these materials are below the levels specified by the BAAQMD for purposes of reporting under AB2588. Some of these materials, however, are also regulated under the federal NESHAPs and BAAQMD's Regulation 11 on Hazardous Air Pollutants; these include asbestos and mercury. No sources at the facility routinely emit either asbestos or mercury to the atmosphere and as such, LBL does not conduct ambient monitoring for either pollutant. However, demolition or renovation projects around the facility may disturb regulated asbestos-containing materials and LBL must, therefore, adhere to the reporting, sampling, and removal procedures of the BAAQMD regulation (for more information on asbestos as a building component at LBL, see Chapter IV, the Hazardous Materials Section of this SEIR.) Mercury is found in most buildings at LBL, but typically in contained sources such as thermometers and hygrometers. The primary source of any mercury emissions at LBL would come from occasional accidental spills (e.g., accidentally dropping and breaking a thermometer). However, such spills, should they occur, are small and generally of short duration and do not trigger any of the requirements of the NESHAP.

3) Radionuclides

There are three types of radiation: alpha, beta, and gamma radiation. Alpha radiation is emitted from the nucleus of a radioactive isotope. Alpha radiation can be halted by a sheet of paper and can scarcely penetrate the dead outer layers of skin. In general, alpha radiation is not dangerous, unless it enters the body through either an open wound, or is ingested or inhaled. Beta radiation forms when particles are ejected from unstable radioactive atoms as certain parts of these atoms transform. Beta radiation is more penetrating, capable of passing through a centimeter or two of living tissue. Gamma radiation does not involve the emission of particles. Instead, this type of radiation emits a burst of electromagnetic energy. Gamma radiation is extremely penetrating and can pass through most

materials. However, it is significantly attenuated by thick slabs of dense materials such as lead or concrete.

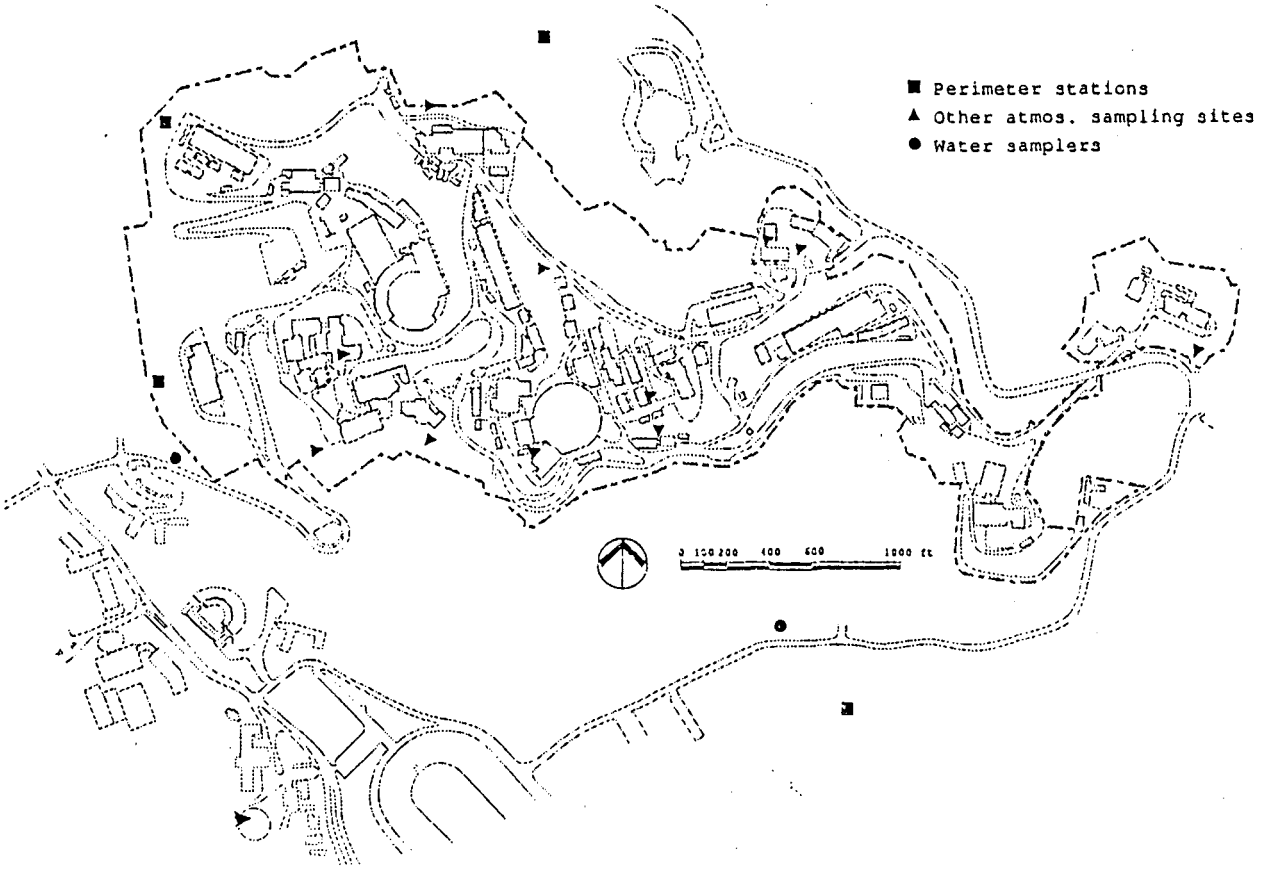
The primary source of radioactive emissions from LBL is the National Tritium Labeling Facility (NTLF) in Building 75. This facility is unique in the United States, and provides scientists from around the world with the equipment and expertise to make biochemical tracer products used in a variety of biological and biomedical analyses and experimental protocols both at LBL as well as nationally and internationally. Because the NTLF's primary function is the production of tritium labeled products, it is authorized to have kilocurie amounts of tritium in the facility. Several other laboratories at LBL are also involved in radiochemical and radiobiological studies that typically use various radionuclides, including carbon-14, iodine-125, and sulfur-35 in millicurie amounts.

Primarily because of its use at the NTLF, the major radionuclide emitted from LBL is tritium in the form of tritiated water vapor (HTO). These emissions constitute almost all airborne radionuclides released from LBL.[28] Much smaller amounts of various other radioactive materials (typically less than one Ci/yr total) are released from laboratory stacks at locations distributed throughout LBL. Those sources that may emit quantities of radioactive materials with the potential to result in a concentration greater than one percent of the off-site radiation protection standard are confined to glovebox operations with exhaust controlled through high-efficiency particulate air (HEPA) filters.[29] HEPA filters are designed to capture 99.97% of the particulate matter that is at least 0.3 microns in diameter.

In conformance with applicable regulations and orders, LBL routinely monitors radioactive air emissions. Measurements are taken continuously at sites near sources as well as along all sides of the Laboratory (See Exhibit III-J-1 for locations of monitoring stations). The monitoring methods, equipment and results are reviewed by DOE and EPA, Region 9 as a part of the NESHAPs program.

The core of the sampling network consists of four perimeter-based environmental monitoring stations. Eight monitoring sites located primarily on the LBL perimeter sample ambient air for tritium. The average concentration sampled in 1990 at each monitoring site was less than one percent of the DOE standard for tritium, based on its Derived Concentration Guidel (DCG) value. Gross alpha and beta atmospheric particulate activities are measured at 14 on-site, perimeter, and off-site monitoring sites.

Exhibit III-J-1
LOCATION OF MONITORING STATIONS



Source: Lawrence Berkeley Laboratory

Average alpha concentrations for 1990 were less than ten percent of the DOE standard with the exception of one perimeter station where the average was approximately 18 percent of the DOE DCG value. Average beta concentrations for 1990 at each monitoring location were less than 0.2 percent of the DOE standard. Radioiodines and $^{14}CO_2$ are also monitored at LBL. The average concentrations for each of these radionuclides in 1990 were well less than one percent of the DOE standard.

Penetrating radiation (gamma and neutron) from LBL accelerator operations is also monitored. Real-time neutron and gamma monitoring data are transmitted from four perimeter locations to a central facility for processing and long-term storage. Data from 1990 indicate that LBL operations contribute less than two percent of the DOE standard of 100 mrem AEDE to off-site individuals.

Environmental Monitoring Program Reporting

LBL annually reports the results of its environmental monitoring program for airborne radionuclides. Table III-J-7 contains a summary of perimeter airborne environmental tritium and carbon-14 sampling data over the ten year period 1981 through 1990. As shown in the table, LBL annually collects between 100 and 200 samples for tritium and approximately 50 samples for carbon-14. The DOE standard for comparison for tritium and carbon-14 are the DCG values of 100×10^{-9} µCi/ml and 500×10^{-9} µCi/ml, respectively. As the table illustrates, the airborne emissions of tritium and carbon-14 have been slightly above detection limits and generally are significantly less than one percent of their respective DCG values.

Table III-J-8 provides a summary of radioiodine in perimeter air samples for the year 1990. As shown in this table, the average concentration for iodine-125, is less than 0.03 percent of the appropriate DCG value.

This environmental monitoring program helps determine the impact of LBL's airborne radionuclide releases to off-site individuals.[30] Data from the monitoring program are an essential element of LBL's annual compliance requirements under NESHAPs, as well as with the DOE Order. The stack monitoring data on emitted radionuclides provide input for an EPA-approved dispersion model (COMPLY) that is required to be used to predict annual dosages at receptor locations. This model is approved by EPA specifically for NESHAPs compliance. COMPLY applies a simple Gaussian plume

Table III-J-7
SUMMARY OF PERIMETER AIRBORNE ENVIRONMENTAL HTO AND $^{14}CO_2$ SAMPLING, 1981-1990

Year	No. of Samples	HTO Avg. (10^{-9} µCi/ml)	HTO Max.	No. of Samples	$^{14}CO_2$ Avg. (10^{-9} µCi/ml)	$^{14}CO_2$ Max.
1981	100	<0.2	1.1	50	<0.06	0.2
1982	102	0.3±0.1	3±1	51	<0.04	0.3±0.2
1983	101	0.4±0.1	3±1	49	<0.01	0.3±0.2
1984	97	0.5	7±3	51	0.6	30±10
1985	102	0.3	5±1	50	0.1	1.1
1986	100	0.5±0.1	12±3	51	0.07±0.02	0.4±0.1
1987	97	<0.5	5±1	51	<0.05	0.4±0.1
1988	144	0.2±0.1	3±1	51	<0.05	0.2±0.1
1989	142	0.2±0.07	3±1	50	<0.06	<0.3
1990	204	0.1	3±1	49	0.03	0.4±0.1
DOE Derived Concentration Guide Standard for comparison		100 x 10^{-9} µCi/ml			500 x 10^{-9} µCi/ml	

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 37.

Table III-J-8
SUMMARY OF RADIOIODINE IN PERIMETER AIR SAMPLES, 1990

Perimeter Station	No. of Samples	^{125}I Avg.	^{125}I Min. (10^{-15} µCi/ml)	^{125}I Max.	Average as % of DCG ^{125}I
Bldg. 88	51	1.4	10	16±9	0.0003
Bldg. 90	51	1.4	10	<11	0.0003
Panoramic Way	51	1.4	10	<11	0.0003
Olympus Gate	51	1.4	10	21±10	0.0003
DOE Derived Concentration Guide Standard for Comparison		500,000 x 10^{-15} µCi/ml			

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 37.

air dispersion algorithm to estimate dispersion of airborne radionuclides. The COMPLY model requires data on parameters such as mean wind speed, building dimensions, release point, receptor distances, and radionuclide release rates. For a multi-source facility such as LBL, the modeled impacts from all sources are summed to determine the dose expected to be received by the maximally exposed individual. For 1990, using LBL's stack monitoring data, the estimated dose predicted by COMPLY at the Maximally Exposed Individual (MEI) totaled less than one percent of the NESHAPs limit of 10 mrem.

NESHAPs Compliance

On April 23, 1991, an EPA Order and Finding of Violation were received by the University of California, LBL, and DOE stating that LBL was out of compliance with NESHAPs (40CFR Part 61, Subparts A and H.) These subparts require that all radionuclide sources be included in NESHAPs calculations and that monitoring equipment and procedures meet certain requirements specified in the regulations. The findings were the result of a detailed review by the Tiger Team which revealed that some radionuclide sources had not been included in past NESHAPs calculations and that LBL equipment was in need of replacement or upgrade. LBL has submitted reports to EPA which address both of these findings. UC, DOE and LBL are finalizing a Federal Facility Compliance Agreement which addresses the scope and schedule for bringing LBL's NESHAPs program into full compliance.

2. Environmental Impacts and Mitigation Measures

a. Criteria Pollutants

This section addresses air quality impacts from project-related potential emissions of criteria air pollutants at LBL. According to CEQA guidelines, a project would be considered to have a significant adverse impact on the environment if project-related criteria air pollutant emission levels would violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations. For purposes of this SEIR, since the project is located within the Bay Area Air Quality Management District, which does not meet ozone, CO, and PM_{10} standards, any air pollutant emissions which contribute substantially to exceedances of standards for these pollutants would be considered to have a significant impact.

Air quality impacts associated with potential emissions of criteria pollutants from this project can be categorized generally as those resulting from construction activities or those resulting from activities associated with LBL's operation of the new buildings identified by the project, occurring during the term of the contract with DOE. Construction impacts would be expected to have a short-term effect while operational emissions would continue throughout the lifetime of the project.

Unless otherwise noted, all of the impacts identified are considered significant adverse impacts. Unless otherwise indicated by an asterisk (*), implementation of the recommended mitigation measures would be sufficient to reduce the impacts to a less than significant level. Although not required by CEQA, some less-than-significant air quality impacts are discussed below; while no mitigation measures are required, this SEIR identifies measures that would further reduce these less-than-significant impacts.

Impact III-J-1: **Construction of new facilities projected in the 1987 LRDP would generate short-term emissions of air pollutants.**

Discussion: Short-term impacts of construction-related emissions at LBL would include: suspended particulate matter generated from earthmoving, excavation and grading, facility construction, and landscaping; Volatile Organic Compounds (VOC) emissions from paints and asphalt; and exhaust emissions from powered construction equipment and motor vehicles coming to and from the site. Due to these suspended particulate emissions, the state 24-hour PM_{10} standard may be violated at times in the vicinity of the construction activity and visibility in the vicinity could be affected temporarily. This temporary impact is not considered to be significant.

VOCs are precursor pollutants of ozone, a pollutant for which the Bay Area is declared a nonattainment area with respect to both the federal and state standards. Although the project itself would conform to applicable regulations regarding the use of VOC-emitting materials, it may contribute to a temporary increase in ozone levels in the Bay Area. This temporary increase is not considered to be significant.

Mitigation 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.

***Impact III-J-2: The proposed project at LBL would generate long term emissions of criteria air pollutants.**

Discussion: The proposed project at LBL will result in additional emissions of criteria pollutants or their precursors. For purposes of this project, emissions increases are conservatively projected to increase in an amount proportionate to the increase in square footage of the proposed project. This approach likely overstates the impacts associated with the project since LBL would comply with all applicable requirements of NSR (see earlier description) for any new or modified sources resulting from implementation of the proposed project.

For purposes of this analysis, emissions are assumed to increase by 8.5 percent. Using this assumption, the resulting pollutant levels associated with the proposed project are shown in Table III-J-9. Typically in reviewing proposed projects, the BAAQMD considers a net increase in emissions of one percent over existing countywide emissions, or a net increase of 150 pounds per day of CO, POC, NOx, SO_2, or PM_{10} to be thresholds of significance. As shown in Table III-J-9, projected emissions from the proposed project would not exceed the one percent of county-wide emissions threshold. However, for purposes of this SEIR, since the Bay Area remains non-attainment for ozone under the federal and state Clean Air Acts, any increase in ozone-related emissions is considered significant and unavoidable.

Table III-J-9
ESTIMATED LBL EXISTING AND PROJECT EMISSIONS OF CRITERIA POLLUTANTS COMPARED TO ALAMEDA COUNTY EMISSIONS

	Criteria Pollutant Emissions tons/day				
Setting	**CO**	**POC**	**NO_x**	**SO_2**	**PM_{10}**
LBL Existing (1991)	0.002	0.021	0.024	0	0.006
LBL Project (1992-1997)	0.0002	0.0018	0.0020	0	0.0005
Alameda Countywide (1991)	538	140	113	19	109
LBL-to-Alameda County Ratio (%)	0.0004	0.0013	0.0018	0	0.0005
Exceeds 1% threshold	No	No	No	No	No

Source: BAAQMD, February 1992.

Mitigation III-J-2: LBL will design building ventilation systems to minimize emission 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.

b. Toxic Air Contaminants

As stated above, according to CEQA standards, a project would be considered to have a significant adverse impact on the environment if project-related emissions would violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations.

Neither ambient air quality standards nor emission control standards have been established for most toxic air contaminants. Hence, any potential for the project to cause a significant adverse impact on the environment cannot be determined by a simple comparison of project emissions to existing air quality standards. For that reason, potential environmental impacts resulting from the project's toxic air emissions were analyzed through preparation of a health risk assessment.[31]

The risk assessment methodology results in a "risk number" that is expressed as a probability (e.g., a one in 1,000,000 chance that an individual will develop cancer if continually exposed to chemical X for 70 years). It is important to understand that the probability expressed as one in 1,000,000 means that each individual exposed has a one-in-a-million chance of developing cancer, if exposed as described above. It does not mean that one person will get cancer if a million individuals are exposed.

When a risk assessment is used as a tool to estimate the risk associated with exposure to carcinogens, it is also necessary to establish a level of risk considered acceptable (i.e., a standard of significance for carcinogenic risk). The determination of an acceptable level of risk is typically viewed as a risk management decision. At this time, varying acceptable levels of carcinogenic risk are used as thresholds by various regulatory agencies, and there is no agreed upon standard among either Federal, state or local agencies. For example, under the Air Toxics "Hot Spots" legislation,

facilities with screening risk levels greater than ten in 1,000,000 are required to notify the public and conduct public meetings. See Table III-J-10 for other examples of established regulatory risk levels.

A recent review of cancer risk management decisions by the federal government has shown that under nearly all circumstances, no action was taken to reduce cancer risks where risks were less than one additional cancer cases in 1,000,000 people, and action was taken in every studied case with risk exceeding 10,000 in 1,000,000.[32] In reviewing federal carcinogen regulations, Travis et al. found that approximately 30 percent of carcinogenic chemicals regulated to reduce risks to public health have a post-regulatory risk of less than or equal to one in a million. They also found that the median public risks from regulated carcinogens was approximately 8.6 cases per 1,000,000 people.

Because neither CEQA nor the CEQA guidelines establish acceptable risk levels (i.e., standards of significance) for TACs, and because of the wide variety of levels established by numerous regulatory agencies, for purposes of this SEIR, a project expected to have an excess human cancer risk greater than 10 in 1,000,000 would be considered to have a significant effect on the environment.

The potential for acute or chronic non-carcinogenic health effects resulting from project-related TAC emissions also must be considered. As more fully described in Section 10.0 of the risk assessment prepared for this project, these chronic non-carcinogenic health effects are usually presented as hazard indices.[33] Hazard indices are standard tools used to compare a reference dose or other health criteria to the lifetime average daily dose expected for the maximally exposed individual. According to guidelines established by various regulatory agencies, where the hazard index is less than one, no adverse non-carcinogenic health effects are expected. For purposes of this SEIR, the standard of significance for chronic non-carcinogenic health effects is a hazard index greater than one when the individual hazard indices for each chemical are summed.

Another term called the exposure index is used to determine the possibility of acute non-carcinogenic health effects due to the project. The exposure index compares the maximum emission level to one-tenth of the threshold limit value (TLV) established to protect worker health. According to standard published risk assessment guidelines, where the exposure index is less than one, no acute adverse health effects are expected. The exposure index is described in detail in Section 10.0 of the risk assessment. Thus for purposes of this SEIR, the standard of significance for

Table III-J-10
KEY REGULATORY RISK LEVELS

Risk Range		Regulatory Driver
One-in-one thousand	10^{-3}	OSHA: Acceptable individual cancer risk for occupational exposures.
One-in-ten thousand	10^{-4}	EPA: Presumptively unacceptable maximum individual risk level under Clean Air Act, Section 112.
	10^{-4} to 10^{-5}	EPA: Actual estimated maximum individual risk levels achieved under Clean Air Act, Section 112.
		FDA: Risk levels allowed by FDA for inadvertent environmental contaminants in food.
One-in-a hundred thousand	10^{-5}	BAAQMD: Maximum cancer risk from project under proposed permit rule Regulation 2, Rule 5 on toxics risk management.
		SCAQMD: Maximum individual cancer risk if permit unit is constructed with T-BACT under Proposed Rule 1401.
		California Proposition 65 significant risks level.
One-in-one million	10^{-6}	EPA: Guideline for individual cancer risk from carcinogenic pesticide residues.
		FDA: Maximum individual risk allowed for carcinogenic animal drug residues in meats.
		SCAQMD: Maximum individual cancer risk if permit unit is constructed without T-BACT under proposed Rule 1401.
One-in-ten million	10^{-7}	
One-in-a hundred million	10^{-8}	
	10^{-8} to 10^{-9}	FDA: Risk levels for carcinogenic impurities in food and color additives which "clearly present no public health concerns," promulgated under constraints of Delaney clause banning carcinogens.
One-in-one billion	10^{-9}	

Sources: *University of California, Los Angeles, 1990 Long Range Development Plan Final Environmental Impact Report, Volume I.* Prepared by: Capital Programs, Capital Planning, University of California, Los Angeles, November 1990, p. I-29.
"Risk Management for New and Modified Sources of Potentially Toxic Air Contaminants", Bay Area Air Quality Management District, July 23, 1991.

acute non-carcinogenic health effects is an exposure index of greater than one when the individual hazard indices for each chemical are summed.

Although not required by CEQA, some less-than-significant toxic air emissions impacts potentially associated with the project are discussed below. While no mitigation measures are required for such impacts, this SEIR identifies measures that would further reduce these less-than-significant impacts.

Risk Assessment Overview

The health risk assessment for emissions associated with the proposed project at LBL was performed using the Air Toxics "Hot Spots" Program Risk Assessment Guidelines (CAPCOA, January 1991) as primary guidance. However, the health risk assessment was not confined solely to contaminants identified under the initial LBL Air Toxics Inventory submitted to BAAQMD. Additional chemicals from sources subsequently permitted, declared permit-exempt, or currently undergoing permit review with the BAAQMD were evaluated if appropriate toxicological data were available. As noted in the CAPCOA guidance, risk assessments may be presented as a series of four primary components: hazard identification, dose-response assessment, exposure assessment, and risk characterization. The following paragraphs elaborate the methods used to complete these tasks.

Hazard Identification

Hazard identification was accomplished by compiling a list of chemicals that are potentially emitted from various stationary sources at LBL. The LBL Air Toxics Inventory submitted to BAAQMD (July 1990) served as the primary reference for this task. In addition, that list was updated to include toxic air contaminants associated with potential emissions from sources added at LBL since submission of the inventory. For purposes of this SEIR, chemicals associated with these new sources were added to the original Air Toxics Inventory list if they appeared likely to present health risks based on information in the following sources:

Integrated Risk Information System (IRIS), U.S. Environmental Protection Agency (1991)

Applied Action Levels (AALs), California Department of Health Services (now the Department of Toxic Substances Control, Cal-EPA, 1991)

Health Effects Assessment Summary Tables (HEAST), U.S. Environmental Protection Agency (1991 annual)

Threshold Limit Values (TLVs), American Conference of Governmental Industrial Hygienists (1990-1991)

Dose-response Assessment

Once the list of chemicals was compiled, a dose-response estimate was identified for each chemical. Dose-response estimates describe effects in three categories: carcinogenic, chronic (longer-term) non-carcinogenic, and acute (shorter-term). All chemicals have chronic non-carcinogenic and acute effects at some dose; fewer chemicals are identified as carcinogenic. Dose-response data are typically extrapolated from experiments conducted on laboratory animals. Consequently, there is some uncertainty related to the prediction of toxic effects in humans. For the LBL risk assessment, published dose-response estimates were taken from the references listed above (including the "Hot Spots" guidance). Where more than one published criterion existed for a given toxic effect, the order of priority was:

1. Air Toxics "Hot Spots" Program Risk Assessment Guidelines
2. Applied Action Levels (AALs), California Department of Health Services (now the Department of Toxic Substances Control, Cal-EPA)
3. Integrated Risk Information System (IRIS), U.S. Environmental Protection Agency
4. Health Effects Assessment Summary Tables (HEAST), U.S. Environmental Protection Agency
5. Threshold Limit Values (TLVs), American Conference of Governmental Industrial Hygienists

The dose-response criteria compiled from these sources were used to estimate risk in the risk characterization step. This analysis will be further discussed in the risk characterization section of this summary.

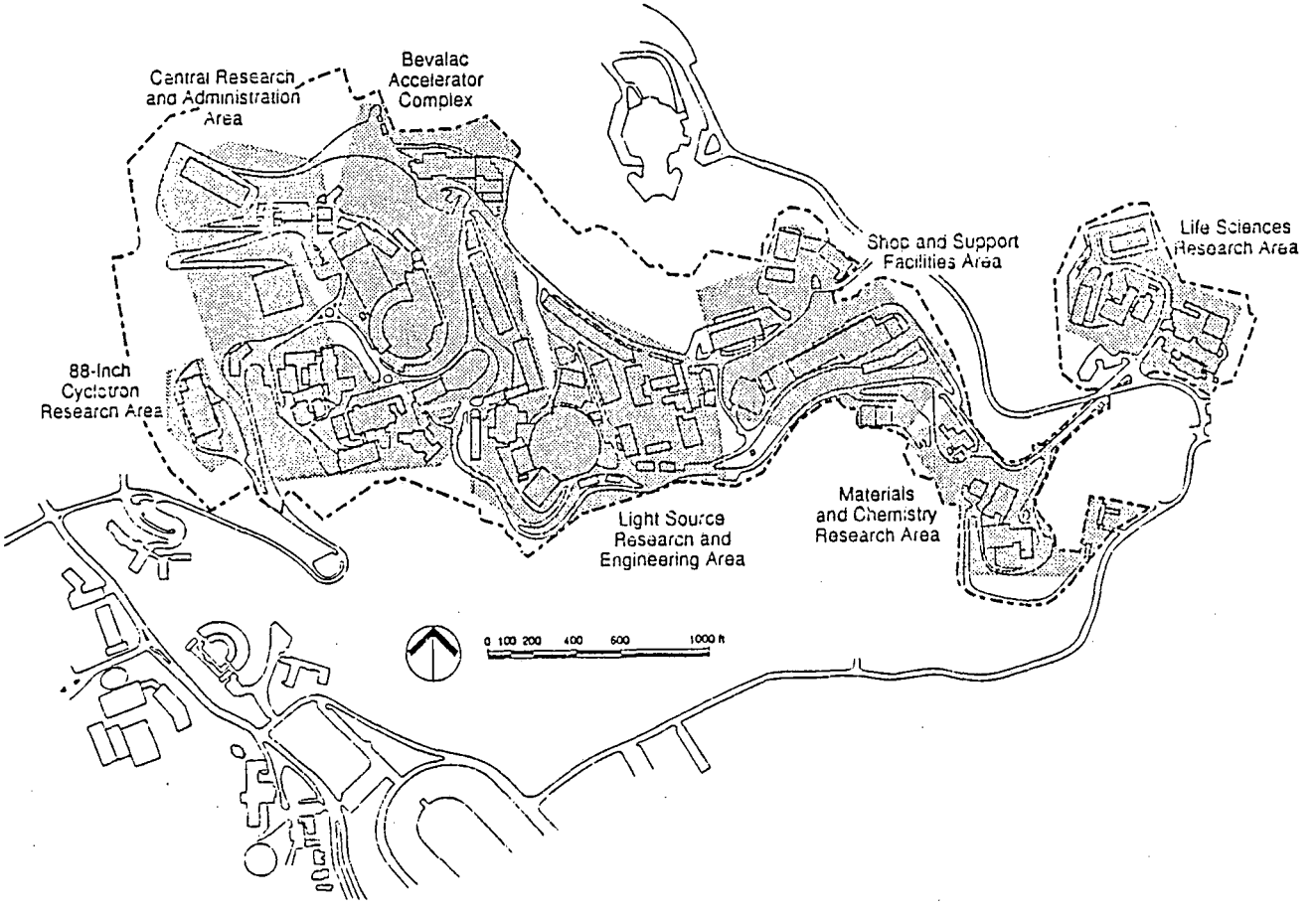
Exposure Assessment

The exposure assessment step in the risk assessment covers two broad areas: fate and transport of chemicals in the environment, and uptake of chemicals into individuals. In order to model the fate and transport of chemicals emitted from LBL, chemical emissions were quantified from known sources. After emissions quantification, mathematical models were applied to predict atmospheric dispersion. To estimate chemical uptake, modeled chemical concentrations in air were used to predict doses in individual receptors. The following paragraphs elaborate emission estimation, atmospheric dispersion, and potential human uptake.

Emissions estimates were based upon chemical data gathered in the hazard identification section, the LBL FY 1992 Institutional Plan, and the LBL 1987 Long Range Development Plan (LRDP). Because it is not possible to accurately predict future chemical usage in a research facility some conservative assumptions were used throughout this risk assessment process to ensure that assessment results overstated actual risks that might result from implementation of the proposed project. For example, for purposes of this SEIR emissions of TAC were assumed to increase in proportion to the increase in square footage of research space associated with the proposed project. Because of various regulatory requirements associated with the use of hazardous materials, emissions could not practically increase in this fashion. Therefore this analysis is designed to overstate emissions that would result from the proposed action and present a worst case scenario of risk for TACs. The following method was used to project potential emissions and exposures.

Projected increases in research space (LBL FY 1992 Institutional Plan) during the project period were compared with existing research space to obtain the percentage increase in emissions for the proposed project. This approach yielded a projected increase in emissions of toxic air contaminants of 8.5 percent associated with the project. Both annual and hourly project-related emission rates were determined by scaling upward current LBL emission estimates for research facilities, based on this projected increase. For modeling purposes, LBL was partitioned into seven functional areas as identified in the LRDP (See Exhibit III-J-2). For purposes of this SEIR, centroid locations in each of the functional areas were established as emission points since exact locations for project-related facilities do not yet exist. Point source characteristics were based on similar sources at the existing facility and chosen to conservatively model the proposed project.

Exhibit III-J-2
LBL FUNCTIONAL AREAS



Source: Lawrence Berkeley Laboratory

Two models were used to calculate atmospheric dispersion. The Industrial Source Complex (ISC) dispersion model and the SHORTZ dispersion model are both EPA approved models. ISC was used because its use is required by the BAAQMD for risk assessments. SHORTZ was also used because it is an appropriate model for complex terrain such as the hills upon which LBL is situated. Of the two models, those results with the highest potential exposures were used in the analysis. In both cases, worst-case meteorological conditions were applied since appropriate meteorological data from a site close to the facility were not available. Worst-case meteorological conditions are those which reduce the dispersion of chemicals, such as low wind speeds, restrictive inversion layers, and no change in wind direction during the modeling period. The models predict ground-level concentrations for an array of receptors around the facility. In this case, a regular grid of receptor points was augmented with a smaller number of actual residences near the facility. The results identified both the maximally exposed individual and the maximally exposed residence. In this case, the MEI is a theoretical individual located at the point of maximum impact, whereas the maximally exposed residence is based on the current residential layout surrounding LBL. Ground-level chemical concentrations were expressed in units of micrograms-per-cubic meter of air. Because of the use of worst-case meteorological conditions, modeled concentrations are expected to be overestimates of concentrations compared with actual meteorological conditions.

Ground-level concentrations were used to evaluate potential exposure to individuals. Exposure may be possible by several pathways. For volatile chemicals (such as organic solvents) emitted to the air, only inhalation is considered a significant pathway. Less volatile chemicals (such as metals) may present an exposure potential through additional pathways. For LBL, additional pathways were considered for chemicals identified in the "Hot Spots" guidance as requiring multi-pathway analysis. Considering LBL's location, additional pathways included deposition of chemicals to soil followed by incidental ingestion of soil, dermal contact with soil, and uptake of chemicals from soil into garden vegetables with subsequent ingestion. Exposures for all of the potential exposure pathways were calculated with the algorithms given in the "Hot Spots" guidance.

Risk Characterization

Risk characterization was designed to conservatively evaluate the potential for adverse effects on human health from increased emissions of TACs at LBL. Risks were calculated for a hypothetical

"maximally exposed individual" (MEI), which corresponds to the location outside of the facility boundary where the modeled concentrations were highest, regardless of land use at that point. Risks were also calculated for the nearest actual residence. To estimate cancer risk, the annual average ground-level chemical concentrations were assumed constant for a 70-year exposure period at either the residence or the point outside the facility boundary where concentrations were highest. In addition, the resident was assumed to be present 24 hours per day for 70 years. This overestimates risk because:

Worst-case meteorological conditions cannot exist continuously for 70 years;
People do not generally stay in one place 24 hours per day; and,
People do not typically reside in one place for 70 years (the average residence time in the U.S. is 9 years; the 95th percentile for residence time is 30 years)

Details, including modeling results and calculations are provided in the risk assessment report.

Impact 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 exposures indices of 0.0003 and 0.002, respectively.**

Discussion: With the worst-case exposure scenario in mind, the lifetime incremental increase in cancer risk is estimated to be 0.6 in 1,000,000. This is well below the ten in 1,000,000 threshold considered significant for purposes of this SEIR, and below all regulatory thresholds that have triggered implementation of risk management.

The potential for chronic, non-carcinogenic effects was also estimated for the MEI. Again, exposure was assumed to be continuous under worst-case conditions. The hazard index summed for all chemicals was 0.0003. Because this is substantially less than one, chronic, non-carcinogenic effects are not expected from potential increased emissions from this project.

Finally, the potential for acute effects was also estimated. In this case, maximum one-hour concentrations modeled under worst-case conditions were used to evaluate the potential for adverse

effects. The exposure index was 0.002. Because this is substantially less than one, acute effects are not expected from potential increased emissions from this project.

Although no significant impacts are expected to result from the emission of toxic air contaminants from the project, certain measures will continue to be employed by LBL on both existing and future operations and facilities associated with the project to further limit potential health risks. For example, LBL is implementing an Air Toxics Facility Assessment and Rehabilitation Program on a phased in basis during the next several years. This program also responds to many of the issues the Tiger Team noted about LBL's network of indoor air, ambient air and meteorological monitors. The Tiger Team report noted the following specific issues: lack of documentation regarding the criteria used for establishing the monitoring network; lack of calibration, inspection, maintenance and review of network performance; insufficient distribution of monitoring stations; improperly sited samplers; and inadequate training of technicians.[34] This program consists of a site-wide assessment of identified laboratory facilities for existing and planned hazardous materials use and related air exhaust systems to determine the potential impact of emissions on the off-site environment. This program also responds to requirements of NESHAPs, the Tanner Act and the Toxics "Hot Spots" Act.[35]

In addition, continued enforcement of both the federal and state Clean Air Acts by the regulatory agencies and LBL's implementation of the requirements imposed by these Acts will lead to reduced health risks associated with operations at LBL during the term of the project. Also, as described in earlier sections of this Chapter, the BAAQMD's "No Net Increase" rule as well as its Toxic Air Contaminant Reduction Plan and a forthcoming risk management rule for TACs will have significant implications on LBL operations related to toxic air contaminants. These requirements should ensure that TACs are reduced to the maximum extent practicable for LBL facilities and operations.

Mitigation: None required.

c. Radionuclides

In contrast to the few emissions requirements for toxic air contaminants, emissions standards for radionuclides exist under NESHAPs. As described earlier, NESHAPs establish annual effective dose

equivalents (AEDE) that may not be exceeded at a particular facility. For purposes of this SEIR, to facilitate comparison of potential impacts associated with emissions of radionuclides with those of TACs (presented above), the dose estimates required under NESHAPs have been converted to risk numbers.

Risk Assessment Overview

The sections below describe the radionuclide risk calculation process used for purposes of this impacts analysis. Project-related radionuclides were evaluated by the same four-step risk assessment methodology that was used for toxic air contaminants: hazard identification, dose-response assessment, exposure assessment, and risk characterization.

Hazard Assessment

The airborne radionuclides that currently contribute more than one percent of LBL's off-site exposure made up the list of radionuclides used in the assessment of impacts for purposes of this SEIR. This list totaled 49 different airborne radionuclides in 1990. The source of this information was the most recent annual NESHAPs compliance report.[36]

Dose-response Assessment

As described above, NESHAPs establish dose limits for airborne radionuclides in units of millirems per year. For purposes of this SEIR, to facilitate comparison with TAC risk estimates, radionuclide dosages were converted to risk numbers using an EPA recognized dose-to-risk conversion factor of 1×10^{-1} risk/mrem/year. This conversion factor was applied to the project-related doses resulting from the steps outlined below.

Exposure Assessment

Paralleling the approach used with TACs, the exposure assessment step used covers two areas: fate and transport of airborne radionuclides in the environment, and subsequent uptake of radionuclides into individuals. In order to model the fate and transport of radionuclides emitted from LBL,

existing quantifiable emissions data for the 23 most significant airborne radionuclides identified in the hazard assessment were used. As prescribed in the NESHAPs, the COMPLY dispersion model was then used to predict ground-level concentrations at the same critical receptor points (nearest residences and off-site receptors) modeled for project-related toxic air contaminants. These ground level concentrations were then used to predict radionuclide uptake at the individual receptors.

Emissions estimates were based upon data gathered in the hazard identification of radionuclides section, the FY 1992 Institutional Plan, and the LBL 1987 Long Range Development Plan. As described in the TACs section above, it is not possible to predict precisely the amounts of radionuclides that might be emitted in the future from a facility such as LBL. Thus, some conservative assumptions were used throughout the risk assessment for radionuclides as they were for TACs. As in the TAC assessment, radionuclides were assumed to increase in proportion to the increase in square footage of research space associated with the proposed project. Because of various regulatory requirements, an increase of this magnitude cannot realistically occur. Therefore, this analysis is designed to overstate emissions that would result from the proposed action and present a worst case scenario of risk for radionuclides. The following method was used to assess exposure for purposes of this SEIR.

Projected increases in research space during the project period were computed in an identical fashion as with TACs. This approach yielded a projected increase in emissions of radionuclides of 8.5 percent associated with the proposed project. Emission rates were expressed in units of curies per year. For purposes of this SEIR, for consistency with the methodology of the toxic air contaminant section, the number of modeling zones and the location of the modeled sources matched those used for the TAC analysis (See Exhibit III-J-2, as shown earlier). Since the kinds of sources likely to emit radionuclides in the future at the facility are similar to those already at LBL, point source characteristics were based on existing radionuclide sources at LBL and chosen to conservatively model the proposed project.

Consistent with NESHAPs compliance requirements, data on alternative pathways were also supplied to the COMPLY model. Besides the inhalation pathway that the model automatically assumes, it was also assumed that the impacted resident produced vegetables at the site. It was further assumed that farming activities producing both milk and meat, which would be consumed by

the impacted resident, took place a distance of two kilometers downwind from the release point. The additional pathways are meant to provide an overestimation of the risk associated with anticipated project-related releases of radionuclides.

Risk Characterization

Impact 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).

Discussion: The predicted impacts from the COMPLY modeling produced two results for the maximally exposed individual: an annual effective dose equivalent exposure and a risk value. The total project-related dose impact from potential airborne radionuclides at the nearest receptor was 0.01 mrem AEDE for all isotopes and 0.002 mrem AEDE for iodine only. This is well below the NESHAPs compliance standard of 10 mrem AEDE. Using the EPA-approved dose-to-risk conversion for a 70-year continuous exposure, the estimated cancer risk associated with radionuclides from the project is 0.1 in a million. This is less than the 10 in a million standard of significance established for purposes of this SEIR.

While emissions of radionuclides are projected to be low, LBL also has programs designed to ensure that all on-site and off-site exposures remain as low as reasonably achievable (ALARA). These are currently being augmented to respond to some of the findings of the Tiger Team. For example, the Tiger Team found that LBL site personnel did not consistently adhere to air sampling exchange protocols and that onsite practices did not adequately safeguard the integrity of radiological air samples.[37] In addition, LBL's annual NESHAPs compliance assessment was considered inadequate since LBL did not fully assess all potential sources of radionuclides at the site (including requirements for emissions monitoring), and since LBL's use of off-site meteorological data from Oakland Airport may not be representative of onsite conditions.[38]

LBL has therefore increased its airborne radiological program to include a self-assessment component. This component has identified the need to upgrade LBL's ambient air monitoring network and to document and implement procedures for calibration of equipment. To this end,

LBL has allocated funds for improvement of the monitoring program and the development of a maintenance and calibration program. LBL has begun to evaluate and determine requirements regarding the monitoring networks, operation practices and quality assurance.

In addition, existing sources of radionuclide emissions have been assessed and future sources will be assessed in conformance with the appropriate regulations and the self-assessment program. A plan for upgrading monitoring equipment has been prepared and will be implemented for current and future operations. All of these measures should ensure that the predicted low risks associated with the proposed project remain as low as reasonably achievable.

Mitigation: None required.

d. Combined Impact: Toxic Air Contaminants and Radionuclides

Impact 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).**

Discussion: To determine the impacts associated with the increases in both TAC and radionuclides from the proposed project the risk numbers were summed (added together). This results in an estimated cancer risk from the proposed project of approximately 0.7 in a million. This projection, using numerous health-conservative assumptions in the process, is considerably below any regulatory criteria for significant risk impacts.

Mitigation: None required.

3. Cumulative Impacts

Regional growth and development will continue to impact the current exceedances of air quality standards. Projects developed in the San Francisco Bay Area are expected to result in increased vehicle trips and increased emissions of pollutants from stationary and mobile sources that

contribute to the Bay Area's non-attainment status. LBL will comply with applicable transportation management and emission control measures imposed by the BAAQMD pursuant to the 1991 Clean Air Plan and the California Clean Air Act. As discussed above, the BAAQMD is expected to adopt emission control measures on a phased-in basis to implement the plan and to attain ambient air quality standards in the San Francisco Bay Area basin. Since these regional measures are not within the jurisdiction of The Regents to implement, the cumulative air quality impacts of regional growth are considered to be significant and unavoidable for purposes of this SEIR.[39]

The project would contribute to cumulative toxic air emissions in the LBL vicinity. Again, it should be noted that a precise methodology for estimating cumulative TAC risks does not exist; the discussion and conclusion of significance above represents a prudent way to consider project-related impacts for purposes of this SEIR. However, at this time, because of the lack of established guidelines and principles, the same methodology cannot be readily applied to the region as a whole. Some could conclude in accordance with CEQA that the real cumulative impacts associated with TAC and radionuclides over the planning horizon of this project are too speculative to determine at this time.[40]

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 are not within the jurisdiction of LBL's management to implement. Therefore, the cumulative air quality impacts of toxic air contaminant emission increases due to regional growth and development remain significant for purposes of this SEIR.[41]

Notes for Section III-J:

1. California Air Quality Data. Annual Summary of 1986 through 1990 Air Quality Data. Gaseous and Particulate Pollutants. Annual Summary. Vols. XVIII-XXII. Sacramento: California Air Resource Board, Technical Support Division.

2. Degree-days are a measure of the deviation of the average daily temperature (in degrees Fahrenheit) from 65° F. Degree-days are accumulated over a season, such as winter or summer. The total can be used as an index of past temperature effect upon some quantity, such as fuel consumption, power output, or plant growth. There are two types of degree-days: heating degree-days and cooling degree-days. A one-day heating degree-day total of 20 represents an average daily temperature for that day of 45° F. Similarly, a one-day cooling degree-day total of 20 represents an average daily temperature for that day of 85° F. A larger total for either type of degree-day signifies a greater requirement for that product. Source: "*Glossary of Meteorology*", American Meteorological Society. 1970.

3. *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report*. Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 170.

4. *Draft Bay Area '91 Clean Air Plan (CAP): Implementing All "Feasible" Controls.* San Francisco: Bay Area Air Quality Management District, April 1991, p. 6.

5. Ed Miller, BAAQMD, December 10, 1991.

6. *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan. Volume 1 of 2 Volumes.* San Francisco: Bay Area Air Quality Management District, July 1991, p. 2–6.

7. *Ibid.*, p. 2–6.

8. *Ibid.*, pp. 2–6 and 4.1–7.

9. *Ibid.*, p. 4.1–9.

10. *Ibid.*, p. 4.1–9.

11. Mike Basso, BAAQMD, January 13, 1992.

12. *University of California, Berkeley, University Health Service Building, Draft Environmental Impact Report*. Prepared for the Campus Planning Office, University of California, Berkeley, April 16, 1990, pp. 4.9–5 and 4.9–7.

13. Mike Basso, BAAQMD, January 13, 1992.

14. *Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans.* Prepared by the Bay Area Air Quality Management District, November 1985, pp. V-9 - V-11. Information was updated by phone conversation with Dick Duker, BAAQMD, on March 11, 1992.

15. *Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead and Hydrogen Sulfide.* A Report to the (California) Legislature, approved by the California Air Resources Board. Sacramento: April 11, 1991.

16. *Toxic Air Contaminant Control Program. Annual Report. 1991. Volume III: Reduction Plan.* San Francisco: Bay Area Air Quality Management District. Prepared by the Staff of the Toxic Air Contaminant Section, August 1991, p. 1.

17. *Toxic Air Contaminant Control Program, Annual Report, 1991. Volume II: Reference Material.* Prepared by the Staff of the Toxic Air Contaminant Section, Bay Area Air Quality Management District, August 7, 1991, various pages.

18. *Draft Environmental Impact Report for the Bay Area 1991 Clean Air Plan. Volume I: Draft EIR.* Prepared by the Bay Area Quality Management District, July 1991, p. 4.1-13.

19. *Toxic Air Contaminant Control Program, Annual Report, 1991. Volume III: Reduction Plan.* Prepared by the Staff of the Toxic Air Contaminant Section, Bay Area Air Quality Management District, August 7, 1991, pp. 6-12.

20. Seidman, Hebert, et. al., "Probabilities of Eventually Developing or Dying of Cancer - United States, 1985," *CA-A Cancer Journal for Clinicians* (January/February 1985, Volume 35, Number 1), pp. 35-56.

21. Lahre, Tom. "STAAPA/ALAPCO-U.S.E.P.A. Urban Air Toxics Workshop," Anaheim, California, February 17, 1989.

22. *Ibid.*

23. *1990 Long Range Development Plan Environmental Impact Report. Volume I. Final Environmental Impact Report.* Prepared by: Capital Programs, Capital Planning, University of California, Los Angeles, November 1990, p. I-24.

24. *Toxic Air Contaminant Control Program. Annual Report. 1991. Volume III: Reduction Plan.* San Francisco: Bay Area Air Quality Management District. Prepared by the Staff of the Toxic Air Contaminant Section, August 7, 1991 (Incorporating Bay Area Air Quality Management District, AB2588 Q&A, February 27, 1991, p. 2).

25. Air Toxics Emission Inventory Plan (Assembly Bill 2588) prepared for Lawrence Berkeley Laboratory, Office of Environmental Health and Safety, ENSR Consulting and Engineering, October 17, 1989.

26. Air Toxics Emissions Estimates (Assembly 2588), Lawrence Berkeley Laboratory, Office of Environmental Health and Safety. Prepared by ENSR Consulting and Engineering, July 1990.

27. *Workbook on Toxic Air Contaminants, Volume II: Reference Material.* Bay Area Air Quality Management District, January 15, 1991.

28. *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* Lawrence Berkeley Laboratory, Environment, Health and Safety Division, May 1991. pp.

29. *U.S. Department of Energy, Office of Environment, Safety and Health, Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3–13.

30. *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* Lawrence Berkeley Laboratory, Environment, Health and Safety Division, May 1991, pp.

31. "Risk Assessment of Potentially Emitted Air Toxic Contaminants, Lawrence Berkeley Laboratory, University of California, Berkeley". Prepared for Graham and James, prepared by ENSR Consulting and Engineering, April 2, 1992.

32. Travis, et. al. "Cancer Rick Management, A Review of 132 Federal Regulation Decisions," *Environmental Science and Technology* (1987) Volume 21, Number 5.

33. "Risk Assessment of Potentially Emitted Air Toxic Contaminants, Lawrence Berkeley Laboratory, University of California, Berkeley". Prepared for Graham and James, prepared by ENSR Consulting and Engineering, April 2, 1992.

34. *U.S. Department of Energy, Office of Environment, Safety and Health, Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 3–29 and 3–30.

35. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-3.

36. As contained in the *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* Lawrence Berkeley Laboratory, Environmental Health and Safety Division, May 1991, pp. 30-31.

37. *Ibid.,* p. 3–18.

38. *Ibid.,* pp. 3–20 and 3–21.

39. *1990 Long Range Development Plan Environmental Impact Report. Volume I. Final Environmental Impact Report.* Prepared by: Capital Programs, Capital Planning, University of California, Los Angeles, November 1990, p. I–20.

40. *Ibid.,* p. I–43.

41. *Ibid.,* pp. I–43 and I–44.

K. NOISE

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, the University's continued operation of LBL, including continued implementation of the 1987 LRDP, could create noise during construction and operational activities.

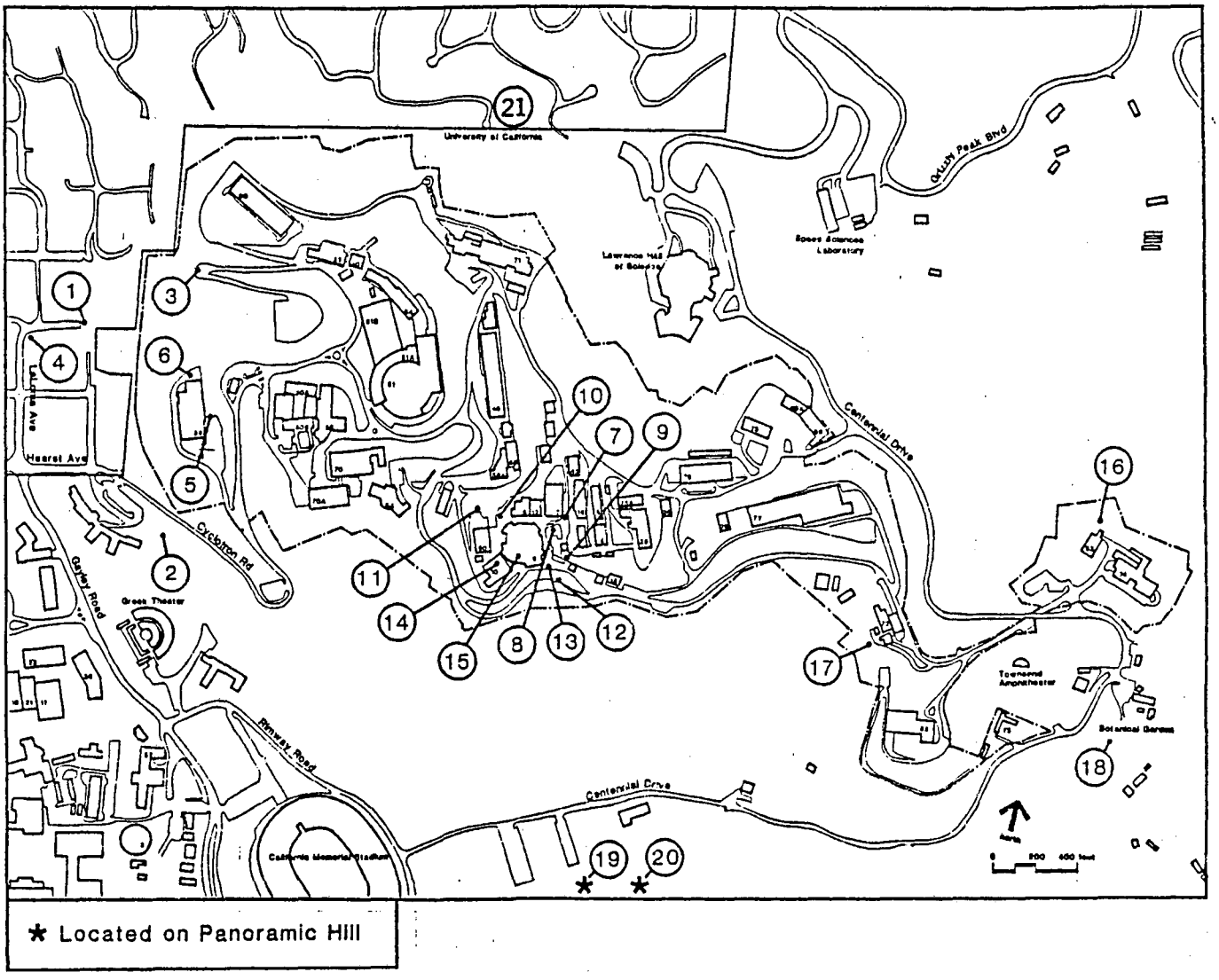
Because of LBL's site location, it does not immediately border residential areas, except along its western and northern boundary near the 88-inch Cyclotron. Since 1979, ambient noise levels have been measured at LBL and in off-site residential neighborhoods for various proposed LBL projects. These measurements for off-site residential neighborhoods are shown in Table III-K-1, and their locations are shown in Exhibit III-K-1. [While some of the noise measurements were conducted continuously over a 24-hour period, all have been reported as of a particular time to illustrate typical ambient (or background) noise.]

As part of this current environmental assessment, additional acoustical measurements were made in November 1991 at the end of Campus Drive in the residential neighborhood north of Building 71, at the end of LeConte Avenue in the neighborhood west of Building 88, and along Mosswood Road and Canyon Road, south of and across Strawberry Canyon from LBL and Buildings 62 and 66. Noise measurements are summarized in Table III-K-1.

As shown in Table III-K-1, there is one location in the LBL environs where the ambient (background) noise limits already exceed the City of Berkeley ordinance. [Note: The City of Oakland does not have a quantitative noise ordinance. The City of Berkeley has a noise ordinance which includes exterior noise limits. These limits are based on the state model noise ordinance and describe noise limits which are not to be exceeded more than 30 minutes per hour. This is equal to a noise measurement described as L_{50}. In the City of Berkeley residential zones R1 and R2, the daytime ambient noise levels (7 a.m. to 10 p.m.) are set at 55 dB, and the evening ambient noise levels (10 p.m. to 7 a.m.) at 45 dB.]

A series of long-term 24- to 48-hour noise measurements were made at the end of Campus Drive (Location 21), in November 1991 with follow up measurements in March-April 1992. Both of these

Exhibit III-K-1
LOCATIONS OF NOISE MEASUREMENTS



Source: Ira Fink and Associates, Inc.

Table III-K-1
AMBIENT NOISE LEVELS, RESIDENTIAL AREAS NEAR LBL (dBA)

Location of Noise Measurement				Time	Sound Levels L_{10}*	L_{50}*	$L_{eq}(5)$**
1.	1736 Highland Place	(a)	07/03/86	1:45 p.m.	48	45	46
		(a)	07/27/86	3:15 p.m.	51	46	47
		(a)	08/07/86	10:42 p.m.	46	42	44
1A.	End of LeConte Avenue		11/06/91	8:20 p.m.	50	46	49
2.	East of Stern Hall		07/03/86	2:05 p.m.	55	50	52
			07/27/86	1:55 p.m.	56	50	56
3.	Road to Blackberry Canyon		07/03/86	3:15 p.m.	56	48	52
			07/27/86	1:32 p.m.	54	50	53
4.	LaLoma and Ridge Road		07/03/86	3:45 p.m.	66	61	62
			07/27/86	3:29 p.m.	58	53	55
18.	Botanical Gardens 200 feet from Centennial Drive		12/18/84		56	50	53
19.	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
19A.	37/39 Canyon Road		11/25/91	10:00 p.m.	49	44	46
			11/26/91	10:00 p.m.	54	47	53
20.	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
20A.	44 Mosswood Road		11/06/91	8:10 p.m.	49	48	48
21.	Cul-de-sac at end of Campus Drive	(b)	08/07/86	10:15 p.m.	42	41	42
		(c)	10/30/86	10:02 p.m.	49	45	47
		(c)	11/06/91	8:30 p.m.	53	47	50
		(c)	11/06/91	10:00 p.m.	47	46	46

Notes: * = A-weighted sound levels in decibels which were exceeded x percent of the measurement period. For example, a typical laboratory in LBL had a decibel reading exceeding 55 dBA ten percent of the time, and 49 dBA 50 percent of the time.
** = Average A-weighted sound level.
(a) With Building 88 equipment operating.
(b) With Building 71 Cooling Towers turned off.
(c) With Building 71 Cooling Towers turned on.

Source: Noise Measurements, Charles Salter Associates, dates as indicated.

measurements show the nighttime L_{50} sometimes slightly exceeds 45 dB and sometimes is below 45 dB. (An earlier reading in this location made in October 1986 indicated a background ambient noise level of 45 dB.)

Assuming the LBL equipment produces a steady-state noise during the evening, late night, and pre-dawn period (approximately 10 p.m. to 7 a.m.), it is concluded, based upon the measurements made, that on a daily basis at the Location 21 survey site (a telephone pole at the end of Campus Drive) the noise contribution from LBL is 42 dB to 44 dB or less than the 45 dB specified in the Berkeley ordinance. Based on short-term measurements and long-term (24-hour) measurements, the variation in noise levels above 42 dB to 44 dB is assumed to be from other sources, including aircraft and local traffic.

Site specific noise measurements were also made at LBL Building 71 which is visible from portions of Campus Drive and homes along Campus Drive. These site specific measurements were taken during the period of 10:30 p.m. to 11:00 p.m. on March 30, 1992, and included measurements when pumps and fans as part of the Building 71 cooling towers were operating. Measurements were also made when one pump and four fans were turned off. Noise measurements simultaneously taken at Location 21 on Campus Drive showed an ambient background of 42 dB to 44 dB, an ambient background below the City of Berkeley ordinance. These tests were not able to identify specifically other equipment which may be contributing to the ambient.

As part of a scheduled maintenance activity, the equipment in Building 71 will be shut down for a period in May 1992. During this shut down LBL will again conduct noise measurements at Location 21 to try and identify sources contributing to the ambient background noise in this area.

A review of evening L_{50} noise measurements across Strawberry Canyon, south of LBL, did not indicate any ambient noise in excess of 50 dB. As part of preparation of this SEIR, 24-hour noise measurements were made from 5 p.m. on November 25 through 8 a.m. on November 27, 1991 at Location 19A, from equipment mounted on a telephone pole near 37-39 Canyon Road. These 24-hour noise measurements did not indicate any L_{50} ambient noise exceeding 45 dB from the period 9:45 p.m. through 6:30 a.m. After that time, the L_{50} noise level increased reaching a high of 54 dB at 8 p.m. on November 26. At 10 p.m. on November 26 the L_{50} ambient was 47 dB. During the evening it declined to a low of 34 dB at 2:45 a.m. on November 27 and reached 45 dB at 6:30 a.m. From 6:30 a.m. to 8:00 a.m., when the

noise measurements were completed the ambient increased to 50 dB. (The letter from Mr. Raymond Mathis, 39 Canyon Road, Berkeley, dated October 4, 1991, included a noise measurement taken during the weekend of March 16-18, 1990. These measurements, which accompanied Mr. Mathis' letter are reproduced in Appendix A. It should be noted that these measurements were taken during the Paul McCartney concert performance held that weekend in the UC Berkeley Memorial Stadium and do not represent a typical ambient background as suggested by Mr. Mathis.)

Within the boundaries of LBL, the ambient noise environment is generated by vehicular traffic on the roadway network, jet aircraft and general aviation aircraft over flights, and the heating, ventilating, and air-conditioning equipment associated with the buildings.[2] Traffic to and from LBL also contributes to the overall traffic noise in the residential neighborhoods.[3]

As noted in the 1987 LRDP Draft EIR (December 1986, pp. 216-217, Table VI-Q-1), the existing LBL original laboratory site area is not a quiet area due to noise generated by the cooling towers and the continued activity of trucks, cars, service vehicles, fork lift vehicles, and other on-site activities. The existing ambient noise level was 53 dBA in areas outside of Buildings 58 and 58A. Within Building 6, the average ambient noise level was 61 dBA. The same average noise level of 61 dBA was also recorded in a laboratory in adjacent Building 10.[4]

Construction projects have been undertaken continuously on the LBL site over the past few years. The LBL Advanced Light Source (ALS), currently under construction, is expected to be completed in 1993. The expected timing of the proposed projects in the LBL FY 1991 Site Development Plan are shown earlier in Table II-4 and Table II-5.

As shown in Table II-5, the next proposed major construction projects pending environmental and funding approvals would include projects such as the Human Genome Laboratory, the ALS Life Sciences Center, the Chemical Dynamics Research Laboratory, the Advanced Light Source Second Complement, and the Induction Linac Systems Experiments.

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and

the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP.

Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels or cause any significant new impacts, no further analysis of potential noise impacts was required under CEQA. The following summary of impacts and mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impacts due to noise from UC's continued operation and development of LBL would be considered significant if the contract renewal, including continued implementation of the 1987 LRDP, would:

Generate noise that would conflict with local noise ordinances and standards, including State of California and local guidelines for long-term exposures, acceptable interior noise levels, and 24-hour average noise levels;

Propose land uses that substantially increase noise levels in areas of sensitive receptors; and

Propose land uses not compatible with the baseline noise levels.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact 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.**

Discussion: The City of Oakland does not have a quantitative noise ordinance. The City of Berkeley has a noise ordinance which includes exterior noise limits. These limits are based on the state model noise ordinance and describe noise limits which are not to be exceeded more than 30 minutes per hour. This is equal to a noise measurement described as L_{50} in Table III-K-1.

In the City of Berkeley residential zones R1 and R2, the daytime ambient noise levels (7 a.m. to 10 p.m.) are set at 55 dB, and the evening ambient noise levels (10 p.m. to 7 a.m.) at 45 dB.

Mitigation III-K-1: Projected noise levels will be compared with ambient noise levels and the Berkeley Noise Ordinance limits, or other applicable regulations.[5] Acoustical performance standards would be included in future construction documents.[6] LBL will continue to design, construct and operate buildings and building equipment taking into account measures to reduce the potential for excessive noise transmission.

Impact III-K-2: **Construction activities resulting from continued implementation of the 1987 LRDP could create significant adverse noise impacts on-site.**

Discussion: During the demolition, site preparation, excavation and erection of facilities, the noise level in adjacent buildings could be expected to reach 70dB.[7]

Mitigation 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.[8]

Impact III-K-3: **Since construction periods are of a short term, approximately one to two years for site work and exterior construction, the overall off-site construction noise impacts are not expected to be significant.**[9]

Discussion: To the extent feasible, scheduling construction of the individual components of the site development plan will ensure that construction impacts are not compounded. Conditions will be included in the construction contracts to limit construction to daytime activities.[10]

Mitigation: None required.

3. Cumulative Impacts

Noise impacts resulting from cumulative development at and in the vicinity of LBL are not expected to be significant.

Mitigation measures described above will minimize noise conflicts between LBL and its neighbors; mitigation measures proposed under the 1987 LRDP are also projected to mitigate potential impacts of development. Any private development proposed in the vicinity would be subject to local noise ordinances and standards.

Notes for Section III-K:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-Q of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 215.

3. *Ibid.*, p. 215.

4. *Ibid.*, p. 215.

5. *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-30, No. Q-2(b).

6. *Ibid.*, p. F-30, No. Q-2(c).

7. *Lawrence Berkeley Laboratory Site Development Plan Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, pp. 220.

8. *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-31, No. R-2(c).

9. *Ibid.*, p. 220.

10. *Lawrence Berkeley Laboratory Site Development Plan Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 223.

L. PUBLIC SERVICES

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential adverse impacts on public services could result from the University's continued operation of LBL, including the increased population at LBL which is projected to occur due to continued implementation of the 1987 LRDP.

Fire Suppression

LBL has four emergency vehicles available at all times: three fire trucks and an ambulance. The fire apparatus is located in the center of LBL and adjacent to the Advanced Light Source.[2]

Police Protection

LBL has its own security force, the LBL Protective Services Department, a part of the University of California Police Services. They have co-jurisdiction with the UC Berkeley campus wherever UC Berkeley has agreements to provide services.

In addition to providing service to the LBL properties on the hill, the LBL Protective Services also cover the Donner Laboratory, the Calvin Laboratory, and Building 73 on the UC Berkeley campus as well as the LBL properties in Emeryville and in Berkeley.[3]

In addition to the sworn officers, the LBL unit also includes protective service officers. The gates to LBL are staffed by a contract service who provides personnel for this function.[4]

Schools and Libraries

There are 17 public schools in the City of Berkeley. They consist of one kindergarten; six primary schools (kindergarten through third grade); one elementary school (first through sixth grade); three intermediate schools (fourth through sixth grade); two junior high schools (seventh through eighth grade); one high school, one continuation high school; and one adult school. In addition, there are two kindergarten through sixth grade schools that have a special focus. One is the Berkeley Arts Magnet and the other is John Muir School, which integrates disabled and abled body children into one program.

Currently there is a surplus capacity in the City of Berkeley Schools caused by decreases in enrollment.[5]

The Berkeley public library system consists of a central main library and four branches.

Recreational Services

Public recreational facilities and services for LBL employees and visitors to the area are provided by LBL, the UC Berkeley campus, the City of Berkeley, and the East Bay Regional Park District. LBL maintains a "PAR Course" recreation area on its site. LBL sponsors recreational events and a small baseball league. Volleyball areas, jogging areas, and showers are available on site.

In addition, for LBL staff, the major recreational facilities available at UC Berkeley include the recreational sports facility building on Bancroft Way; Strawberry Canyon Recreation Area; the Clark Kerr campus site; the Hearst Gymnasium; tennis courts at various locations around the campus; and a number of natural and artificial turf playing fields.

The Strawberry Canyon facilities serve both student population and the community, with peak usage by the community during the summer months. Strawberry Canyon area is used extensively by joggers. Clark Kerr campus facilities also provide recreational services to the community, as well as to students. All of the campus recreational facilities are currently at capacity.

The City of Berkeley recreational facilities include citywide and neighborhood parks and playgrounds. The East Bay Regional Park District provides extensive open space and recreation facilities in the East Bay area. Tilden Regional Park, Wildcat Canyon Regional Park, and the Tilden Nature Area are the closest facilities to LBL in the planning area east and northeast of LBL.[6]

As noted earlier, 1991 LBL hillside population totalled 3,055 and overall LBL population totalled 3,940. Both of these are significantly less than the 1992 projections of 3,550 persons on the main hill area site of LBL and an overall employment of 4,200. The number of LBL employees on the hill site is projected to increase from 3,055 in 1991 to 3,590 in 1997, and the total LBL population (now 3,940) is projected to increase to 4,220 by fiscal year 1996, in part due to the increase of approximately 200 guests who will

be users of the Advanced Light Source.[7] Anticipated population increases for the contract renewal term are below levels projected in the 1987 LRDP.

Since LBL is within the growth levels approved and mitigated in the 1987 LRDP EIR, and the contract renewal will not cause LBL to exceed these growth levels, there are no significant project-specific new impacts, and no further analysis of potential project impacts is required under CEQA. The following summary of impacts and mitigation measures from the 1987 LRDP remain binding commitments of LBL during the term of the contract renewal in conformance with the LRDP EIR.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impacts on public services of UC's continued operation and development of LBL would be considered significant if:

Police/Sheriff: Require additional staff and equipment to maintain acceptable service ratios;

Fire: Require additional staff or equipment to maintain an acceptable level of service (i.e., response time, equipment);

Schools: Require expansion or realignment of the existing school system; and

Parks and Recreation: Affect or require the designation of substantial additional parkland to remain in conformance with locally acceptable or adopted park standards.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact III-L-1: The construction of additional facilities and any increased population would not cause increased impacts on local police and fire protection services.

Discussion: LBL operates its own police, fire and security units. These units will continue to be staffed in proportion to the needs for fire suppression and police protection at LBL. LBL police and fire services are available to surrounding cities on mutual aid agreements. LBL maintains a minimum fire crew of five staff, seven days per week, plus two to three chiefs and an inspector.

During the October 1991 firestorm in the Oakland/Berkeley hills, LBL committed two first line pumpers to the fire fighting efforts. To offer protection to the laboratory, the LBL fire department equipped their smaller rigs with hose. They also spotted fire hoses along the perimeter of LBL to be prepared had the fire advanced north into Strawberry Canyon.

LBL also had extra protective services staff at the laboratory. For patrol purposes, the laboratory was divided into four sections. In each section there were lookouts trying to identify any potential embers which might cause a fire. Additionally, the staff at LBL identified buildings which had archival materials with irreplaceable records, including the computer center, and had staff on-hand to move these materials to a safe location should the fire have advanced in that area.

Because fires can occur in Strawberry Canyon, and because it is not possible to anticipate every type of incident, LBL's management procedure is to apply to good practice and have emergency preparedness plans. Additionally, almost all buildings at LBL contain fire sprinkler systems, and most buildings are of fire resistive construction.

As a result of the October 1991 fire, LBL began a program to reduce the amount of growth near its buildings and remove vegetation along the perimeter areas that needed to be cleared.

The two-200,000 gallon water reserve tanks on the LBL site are equipped with diesel operated pumps. The system acts as a backup to the capacity of the EBMUD system.

LBL will continue its commitment to maintain an adequate ratio of police protection and fire suppression personnel and equipment.

Mitigation: None required.

Impact 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.**

Discussion: As shown earlier in Table III-H-1, the growth in LBL full-time staff is expected to be spread across a number of Bay Area communities. In some communities, such as the City of Berkeley, the full-time LBL staff living in the City of Berkeley has declined considerably (e.g., from a high of 602 in 1980 to 470 in 1986 and to 356 in 1991). In other areas, such as the communities of San Pablo and north, the number of LBL full-time staff living in these communities has gradually increased from 125 in 1980, to 160 in 1986, to 219 in 1991, slightly exceeding LBL population projected for 1992 as shown in the 1987 LRDP EIR.

Based upon a spring 1986 demographic, housing and transportation survey of LBL staff, 58 percent of the full-time staff did not have children at home, 20 percent had one child at home, 18 percent had two children at home, and four percent had three or more children at home. Assuming all of these children were of school age, which they would not be, this would amount to an average of approximately 0.7 school age children per LBL full-time employee. Assuming the proportion of LBL full-time employees remains stable into the future, at approximately 50 percent of total LBL population, then the growth of LBL population by 450 persons between 1991 and 1997 would result in approximately 225 additional full-time employees and approximately 158 additional school age children.

Since, based upon LBL historical data, no single Bay Area community serves as home to more than 25 percent of LBL full-time staff, then no single community would likely accommodate more than 25 percent of the additional LBL generated school age children. This would amount to none of the communities needing to accommodate more than approximately 40 children of LBL full-time employees. Because the LBL employees whose children would enroll in public school systems would be living in

these communities and thus be contributing through their taxes to the revenues of their local school district and since some of the school districts have excess capacity, and in many instances the LBL full-time population projected to 1992 is less than the LBL full-time population in that community in the year 1980, it is concluded that the growth of LBL will not cause a significant adverse impact on local school systems.

Additionally, not all of the new LBL employees will be new to the communities in which they live. In other words, many of the LBL employees will already be residents of their local community at the time they accept employment at LBL. Based on the results of the 1986 LBL Full-Time Staff Demographic, Housing and Transportation Survey, of those new LBL employees who had been at LBL for less than a year, more than 35 percent of them had been at their place of residence for one or more years. In other words, approximately 65 percent of the new LBL employees were both new to their job and new to their place of residence, and 35 percent were new to their job at LBL but were already residents of the community.

Mitigation: None required.

Impact III-L-3: **Development proposed under the 1987 LBL LRDP would increase demand for recreational services.**

Discussion: LBL full-time employment is estimated to grow by 225 persons between 1992 and 1997, and approximately 225 persons who will be part-time employees or guests. Of the 225 new full-time employees, approximately 150 will be new to their place of residence as well as new to LBL, and 75 will already be living in the community at the time of their LBL employment. These 150 employees will create a demand for recreational services in the various communities in which they live. Since, on average, no single community houses more than 25 percent of LBL employees, any single community would see any increase in recreational services based upon less than 40 new LBL employees living in their community plus their family members. This could result in demand for recreational services of approximately 100 additional persons per community. Because the largest of these communities as a single city is Berkeley with the population of approximately 100,000, and the largest of these communities in terms of combined geographic area are the communities of Orinda and east of Orinda

with population of a total of 300,000 persons or more, the impact of 100 additional persons requiring local and regional recreational facilities, over a five year period, is not considered significant.

Mitigation: None required.

(Note: The reader is also advised that an extensive discussion of LBL emergency preparedness issues appears in Section IV regarding Hazardous Materials.)

3. Cumulative Impacts

No significant impact upon public services is projected as a result of cumulative development at or in the vicinity of LBL.

Mitigation measures presented above and in the 1987 LRDP EIR sufficiently mitigate impacts of development to less than significant levels; private development proposed in the vicinity would be subject to local approvals and controls. Cumulative population growth is not projected to have significant impacts upon community services.

Notes for Section III-L:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-P of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 214.

3. *Ibid.*, p. 214.

4. *Ibid.*, p. 214.

5. Sue Self, Public Information Office, Berkeley Unified School District, March 10, 1992.

6. *University of California, Berkeley, Long Range Development Plan, Draft Environmental Impact Report.* Prepared by the UC Berkeley Campus Planning Office, January 1990, p. 4.12-6.

7. *Lawrence Berkeley Laboratory FY 1991 Site Development Plan.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, March 1991, p. 4.

M. UTILITIES

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, potential impacts on utilities and waste services could result from continued University operation of LBL, including continued facility development as contemplated in the 1987 LRDP.

a. Domestic Water System[2]

LBL receives its water from the East Bay Municipal Utility District (EBMUD) at two separate connections. The primary connection (which furnishes most of LBL water) is to the EBMUD Shasta Reservoir which has a 2,000,000 gallon capacity, and the secondary connection is EBMUD Berkeley View tank, which has a 1,000,000 gallon capacity as shown in the 1987 LBL LRDP Draft EIR (December 1986, p. 178, Exhibit VI-J-1).

Both of the EBMUD facilities are part of the EBMUD system and are backed by many additional reservoirs, pumping facilities, aqueducts and transmission lines. The EBMUD system has been reliable over the years and has been properly maintained, monitored and operated.

The LBL system which distributes the EBMUD water within the site consists of an extensive piping layout providing domestic water and fire protection water to all LBL installations. The LBL system also supplies make-up water for cooling towers, irrigation water and water for other miscellaneous uses. The system includes fire hydrants and fire department connections and sprinkler services to almost all buildings.

The LBL system is looped in many areas and is equipped with block valves which can be used to isolate portions of the pipe for repair or replacement while still maintaining full service to most facilities.

Because of the differences in elevation at the LBL site, there are two main pressure zones which operate at the nominal pressure of about 70 psi. The system is entirely a gravity system, except for the emergency fire protection system described later. Most of the existing pipe is either cement lined and coated

steel pipe with welded joints or cast iron and/or ductile iron pressure pipe with mechanical joints. Much of the pipe has been designed and installed to resist forces caused by earth movement due to slides and/or earthquakes. All of the newer lines have been located to avoid potential unstable earth areas.

The LBL emergency fire protection system consists of two 200,000 gallon water storage tanks, one of which is located near Building 75 and the other near Building 71. At each 200,000 gallon tank site there is a diesel-driven fire pump with automatic controls which can pressurize the LBL system if EBMUD service is interrupted. In normal operation, water is slowly circulated from the LBL system through the 200,000 gallon tanks so they are always filled with potable water and the full 400,000 gallons are always available if required. The emergency fire water system was installed in about 1979. Additional water storage is also being reviewed by LBL, as a part of LBL long range planning activities.

Water usage at LBL during 1985 was 122,872 CCF (CCF equals one hundred cubic feet) or 91,908,256 gallons. Based on an average population at LBL main hill site of 2,844 during 1985, this amounts to a per capita use of about 88.5 gallons per calendar day.

By 1990, water usage at LBL had declined to an estimated 105,103 CCF, or a reduction of 14 percent below 1986 levels. Using the 1991 LBL main site population of 3,055 as an estimated base, this would amount to a per capita use of about 70.5 gallons per calendar day. This reduction was due to water conservation activities at LBL in response to the five-year drought occurring in the San Francisco Bay Area and Northern California.[3]

The water system at LBL has a high degree of reliability for both domestic use and emergency purposes. This reliability exists by virtue of the two separate connections to EBMUD sources, the two 200,000 gallon storage tanks, and the high quality of both the LBL and EBMUD systems. The system has sufficient capacity to meet the flow rate and duration requirements for fire protection; in the case where EBMUD service is not available, the capacity is limited to 400,000 gallons. There is no present restriction on the volume of water available from EBMUD, except the capacity of the existing pipes.[4]

b. Natural Gas System[5]

The existing LBL natural gas system receives its supply from a six inch PG&E line operating at 50 psi. The point of delivery is a meter vault located in the hillside area above Cyclotron Road and below Building 88. From the PG&E meter vault there is a firm gas service to Building 88 and the Building 50 complex through a four inch line operating at about 13 psi. The remainder of LBL, except Buildings 74, 74B and 73A, is served by interruptible natural gas, starting with a six inch line from the PG&E meter vault and distributed throughout LBL by lines of various sizes, all of which operate at about 13 psi. Pressure regulating stations, of which there are 45 to 50 on the LBL site, further reduce the gas pressure for distribution and use in the various LBL buildings.

The natural gas system piping consists of bare steel pipe, coated and wrapped steel pipe, and a portion of copper pipe; newer pipe in the system is polyethylene. The system includes pipes, valves, fittings, pressure reducing stations, earthquake emergency shut-off valves, meters and appurtenances.

LBL Buildings 74, 74B and 73A are served by a two inch diameter line which runs up Centennial Drive to the Botanical Gardens. This line provides PG&E uninterruptible service. Buildings 74 and 74B can also obtain gas from a nearby six inch line which is part of the LBL interruptible system.

LBL also owns and maintains a propane fuel standby plant capable of delivering gas to those portions of LBL on interruptible service. This plant can be put on line when PG&E notifies LBL that the interruptible gas will be cut off.

Certain portions of the LBL system are connected to the UC Berkeley distribution system to serve the UC Berkeley Lawrence Hall of Science and the UC Berkeley Space Sciences Laboratory. Gas from the LBL system to these facilities is metered and UC Berkeley is back-charged for its portion of use.

Gas is used primarily for the heating of all buildings and is also supplied to shops and laboratories as required for equipment and experimental use. The gas usage during 1985 was 493,937 therms used under the G-50 (interruptible) rate schedule and 1,078,633 therms used under the G-2 (firm) rate schedule, a total of 1,572,570 therms. Based on a 1985 population of 2,844 persons, use of natural gas was about 553 therms per person per year.[6]

In 1990, LBL natural gas usage totalled 1,772,338 therms, including off-site leased space. Based on a 1991 population of 3,175 (excluding LBL staff on the UC Berkeley campus, but including LBL off-site population of 120 persons), use of natural gas was about 558 therms per person per year.[7]

c. Sanitary Sewer System[8]

The sanitary sewer system at LBL consists of pipe, manholes and two monitoring stations. Pipe in the system is cast iron or ductile iron. The system is entirely gravity flow and discharges either through a monitoring station in Hearst Avenue or one located in Centennial Drive in Strawberry Canyon. The Hearst Avenue monitoring system services most of the buildings on the hill, except those which lie within the South Strawberry Canyon watershed.

Effluent from the Hearst Avenue monitoring station flows to a manhole located above the intersection of Cyclotron Road and Highland where it enters the City of Berkeley pipe system which transports it to the East Bay Municipal Utility District (EBMUD) North Interceptor sewer. The EBMUD north Interceptor carries the effluent to the waste water treatment plant south of the Bay Bridge toll plaza.

Effluent from the Strawberry Canyon monitoring station flows through a campus sewer which ties to the City of Berkeley system at a manhole near the intersection of Rimway Road and Canyon Road, just south and east of the UC Memorial Stadium. The City system then delivers the sewage to the EBMUD North Interceptor.

Several of the main sewer lines have been in service since before 1950, and some are as small as six inches in diameter. However, most of the lines are on a steep gradient and have operated satisfactorily. The monitoring stations measure the volume and the pH of the effluent on a continuous basis. Proportional samples of the sewage are also taken at regular intervals and analyzed for heavy metal content and radioactivity. After the effluent leaves the monitoring stations it enters the City of Berkeley system as described above. Part of the effluent flowing through the LBL monitoring stations originates from University of California, Berkeley campus facilities, mainly the UC Berkeley Lawrence Hall of Science and the UC Berkeley Space Science Laboratory.

LBL in 1991 initiated a program to check for breaks in its sewer lines and repair them. This program will reduce storm water infiltration and potential releases of sewage to the soil. Projects to improve the sewer lines are included in the proposed building program (SEIR Section II).

The capability for measuring the volume of effluent has only recently been added to the monitoring stations. The calculated waste water volume for calendar year 1985 was 87,772 CCF, or 65,653,456 gallons from LBL facilities. This was about 71.4 percent of the total amount of water purchased from EBMUD during the same period. The amount which EBMUD charges to LBL for transporting sewage through its North Interceptor and treating it at the waste water treatment plant is based on the flow volume.[9]

The volume of waste water produced at LBL is a function of the domestic water usage which is in turn a function of the population of the Laboratory. As noted earlier, water usage at LBL for calendar year 1990 was 105,103 CCF or 78,617,044 gallons. Approximately 70.0 percent of the total water used is discharged as wastewater into the sanitary sewer system. The calculated wastewater volume at LBL for calendar year 1990 was therefore 75,057 CCF or 56,142,636 gallons. Assuming a population at LBL of 3,000 people in calendar year 1990, and using an ultimate population of 4,100 people at LBL Hill Area, the ultimate total annual sewage flow would be 102,558 CCF or 76,728,269 gallons. The average daily volume of wastewater is then about 51.3 gallons per person.

The sanitary sewage from LBL has two points of discharge into other systems. About 60 percent of the total flows into the City of Berkeley Hearst Avenue sewer at a location below Building 88. The rest of the sanitary sewage, about 40 percent, flows into the University system in Strawberry Canyon near the old Chicken House.

The City of Berkeley Hearst Avenue sanitary sewer system, into which a portion of the LBL system discharges, apparently has adequate dry weather capacity, but has reportedly been overloaded during wet weather.[10] The City of Berkeley Hearst Avenue sewer experiences wet weather flows which cause surcharge conditions, and these conditions will continue until the source of the excessive flow (suspected to be a storm sewer cross connection) is isolated and corrected.[11]

The calculated waste water volume for calendar year 1990 at LBL was 75,057 CCF, or 56,142,636 gallons. This was approximately 70.0 percent of water purchased from EBMUD during this period.

A regional sewage project recently has been undertaken in the East Bay. The purpose of the project is to decrease the amount of storm water infiltration into the sanitary sewers and to provide additional transport capacity in sewer lines so that raw sewage will no longer overflow manholes or be discharged into the bay during the rainy season.

The City of Berkeley, pursuant to their part of the regional project, has instituted a twenty year program to upgrade the size and quality of their sanitary sewers, and has levied a user charge to finance the work.

d. Electrical System[12]

Electrical power to LBL is taken at the LBL Grizzly substation located adjacent to Building 77. Pacific Gas and Electric Company (PG&E) delivers this power to LBL on two overhead 120 KV transmission lines with a joint capacity of approximately 100 MVA. Both these transmission lines feed the power from PG&E's El Sobrante switching station to the Grizzly substation. The Grizzly substation consists of two PG&E owned 120/12 KV power transformers with a combined capacity of 50 MVA. This substation is for the exclusive use of LBL, with the exception of three 12 KV feeders which transmit power to the Berkeley campus through an underground right-of-way. In addition, LBL can be supplied from PG&E's Berkeley station to the campus, which runs underground to the LBL Big C switching stations. This is an emergency line which can supply five megawatts which must be shared with UC Berkeley.

The main power distribution system within LBL proper consists of a 12 KV underground system with smaller substations and transformers which reduce voltage to 480/277 V or 208/120 V. The 12 KV distribution system has dual primary feeders to provide reliable power. Certain buildings are equipped with special voltage regulation in order that critical experiments will not be disrupted by transient voltages within the system. LBL schedules its bigger loads (to the Bevalac and 88-inch cyclotron) so that the peak demand will be kept to a minimum.

Total electrical power consumption at LBL during 1985 was 99,824 megawatt hours (MWH).[13] By 1990, total electrical power consumption at LBL was down to 74,045 megawatt, due primarily to reduced energy use in the LBL accelerator areas.[14]

e. Non-Hazardous Solid Wastes

It is estimated that each employee at LBL generates, on average, 280 pounds of solid waste material per year. In 1990, the approximately 3,940 employees and guests at LBL generated an estimated 550 tons of solid (office type) waste. In 1990, LBL also generated approximately 750 tons of construction and grounds waste. Of the office waste materials approximately 500 tons are recycled. UC Berkeley, which collects LBL's non-hazardous solid waste, takes LBL's dumpster contents to a private recycling service in Oakland. Recyclable materials are sorted, with the result that about 90 percent of the materials are reused, and only ten percent (by volume) are baled and sent to a landfill. The approximately 750 tons of construction and grounds waste are hauled by Oakland Scavenger Company under contract to UC Berkeley. These non-recyclable materials are sent to the Altamont land fill in Livermore.

LBL facility construction projects are proposed to have a balance between cut and fill. In the event there is excess cut material, it will usually be accommodated on the LBL site. Other construction wastes are considered minimal due to the small size of the projects. Disposal of these waste materials is the contractor's responsibility.[15]

f. Sanitary Sewage Discharges

Each LBL laboratory building has two separate sewage systems: the waste from restrooms, janitorial closets, drinking fountains, and other non-laboratory sources is collected as sanitary waste and piped directly into the municipal sewage system. The waste from lab sinks in some research areas is collected in a laboratory waste handling system where it may be tested before disposal to the municipal sewer system. This waste water disposal from laboratory areas is addressed in Section IV-B of this SEIR.

As noted in Section II-E, the 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LBL LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. Although new programmatic facilities

are planned, the total space associated with the proposed modernization of LBL will remain relatively constant as construction projects are offset by demolition of obsolete facilities. Similarly, LBL's 1991 population of 3,940 is below the 4,200 projected in the LRDP EIR for 1992. Thus, current and anticipated facility construction and population levels for the contract renewal term is below levels projected in the 1987 LRDP, and no new project-specific utilities impacts will occur, since utility use is a function of facility space and population levels.

The following summary of utilities impacts and mitigation measures remain binding commitments of LBL during the term of the contract renewal in conformance with the 1987 LRDP EIR and other CEQA documentation.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impact on utilities services would be considered significant if UC's continued operation and development of LBL would:

Water: Propose a significant increase in the consumption of potable water, or require a substantial expansion of water supply treatment or distribution facilities;

Wastewater Treatment: Require substantial expansion of wastewater treatment and distribution capacity; and

Solid Waste: Utilize a landfill which does not have sufficient available capacity to accommodate the proposed project.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Projected development according to the 1987 LRDP would not create demands in excess of the capacity of existing and planned water supply, natural gas and electrical capacity wastewater and sanitary waste capacity.

Impact III-M-1: **Projected development according to the 1987 LRDP may create demands with regard to existing waste water and sanitary sewer systems.**

Discussion: The LBL discharge into the Hearst Avenue system is not expected to increase greatly since most of the proposed new development will be in the area served by the Strawberry sanitary sewer. There is adequate dry weather flow capacity in the Hearst Avenue sewer and proposed additional LBL facilities will not cause a significant increase in the existing wet weather surcharge.

The LBL discharge near the Chicken House in Strawberry Canyon flows through a section of the City of Berkeley sewer on Dwight Way between Warring and College which has been predicted to have inadequate capacity to accommodate future growth.[16] The projected total flow rate for this section of sewer is 1,242 gallons per minute (gpm) 21 percent of which would be contributed by LBL during peak flow periods. At the Strawberry Canyon location, forty percent of the ultimate total annual wastewater usage (76,728,269 gallons) or 30,691,308 gallons would be discharged. Assuming 250 working days a year, the average daily discharge would be 122, 765 gallons or 85.25 gpm for 24 hours. It is assumed that the peak rate would be three times the average, or 256 gallons per minute. The flow rate of 256 gpm is 21 percent of the projected total flow of 1,242 gpm.

In July 1990, as part of the completion of the UC Berkeley Long Range Development Plan, the University agreed to contribute $250,000 per year to the City of Berkeley as the University's fair share of the marginal capital cost of new sewer improvements to mitigate the impact of and to accommodate new University projects.

Mitigation 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 impact of the project on the city system.[17] 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.[18] 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.

Impact 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.**

Mitigation: None required.

Impact 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.**

Mitigation: None required.

Impact 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.**

Mitigation 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.

Impact 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.**

Mitigation: None required.

3. Cumulative Impacts

Cumulative development at and in the vicinity of LBL is not expected to result in adverse impacts to utilities and waste services.

Cumulative increases in water consumption and distribution needs, wastewater treatment capacity, or solid waste landfill capacity are expected to be accommodated within existing systems. Sanitary sewer cumulative impacts will be accommodated within the 20-year sewer rehabilitation program undertaken by the City of Berkeley. Without these programmed improvements, cumulative development in the vicinity of LBL could potentially overburden the aging sanitary sewer system.

Currently, solid waste generated by LBL is taken to a private recycling service in Oakland. About 90 percent of the materials are reused, and only ten percent (by volume) are baled and sent to a landfill. Construction and grounds waste are also sent to landfills. Despite the implementation of aggressive solid waste recycling and reduction programs by many facilities (including LBL) and municipalities, there is a shortage in solid waste capacity for the Bay Area and many other regions in California. California has enacted recent legislation aimed at reducing solid waste levels by 50 percent over the next several years, coupled with a planning process designed to ensure adequate new solid waste disposal capacity. If the (primary local) agencies charged with implementing the requirements of this solid waste planning system fail to do so, it is probable that shortfalls in solid waste capacity will become acute within the foreseeable future.

Notes for Section III-M:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-J of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 177.

3. Jeffrey Bell, LBL In-House Energy Management, November 18, 1991.

4. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 179.

5. *Ibid.,* p. 180.

6. *Ibid.,* 180.

7. Jeffrey Bell, LBL In-House Energy Management, November 18, 1991.

8. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 181.

9. *Ibid.,* p. 182.

10. *University of California, Berkeley, Computer Science/ College of Engineering Building, Revised Draft Environmental Impact Report.* Prepared by the Campus Planning Office, UC Berkeley, with the assistance of ERC Environmental and Energy Services Co., June 1990, Appendix 8.12, Letter from Kennedy/Jenks/Chilton to Ms. Joanne Cory, UC Berkeley Planning Department, dated September 26, 1989.

11. *Ibid.*

12. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 183.

13. *Ibid.,* p. 184.

14. Jeffrey Bell, LBL In-House Energy Management, November 18, 1991.

15. *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 198.

16. *University of California, Berkeley, Long Range Development Plan, Draft Environmental Impact Report, Technical Appendices.* Prepared by the Campus Planning Office, UC Berkeley, January 1990, Appendix J, Letter from Kennedy/Jenks/Chilton to Mr. Paul Tabolt, Director, UC Berkeley Physical Plant Operations, dated March 27, 1989.

17. *Lawrence Berkeley Laboratory, Site Development Plan, Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-24, No. J-3(b)(1).

18. *Ibid.*, p. F-24, No. J-3(b)(2).

N. ENERGY

1. Setting Summary[1]

As more fully described in the 1987 LRDP EIR, continued University operation of LBL, including continued implementation of the 1987 LRDP, could have an adverse impact on energy resources and consumption.

The Lawrence Berkeley Laboratory is very conscious of its energy conservation programs.[2] The LBL "Ten Year In House Energy Management Plan" is updated each year, and sets target goals.

Important components of meeting LBL goals include a survey and study program to identify cost effective energy savings measures; a retrofit program to implement the cost effective projects; and, a new buildings program which will ensure that new facilities meet all applicable energy performance standards, including both those developed by the Department of Energy Executive Order 12003 and 10 Code of Federal Regulations Part 436 and those issued by the State of California, Title 24.[3]

Additional activities include a central plant improvement program which would include utility areas of compressed air, cooling towers, and utility distribution systems for electricity, natural gas, water and sewage.[4]

Additional components of the plan include a program to obtain favorable rates for electricity, natural gas, and water/sewage services used by LBL. The implementation of the program places the greatest emphasis on electricity tariffs because electricity represents the most costly component of the LBL utility bill.[5] As shown in Table III-N-1, electrical energy consumption at LBL declined from 98,003 megawatt hours (MWH) in 1985 to 74,045 MWH in 1990, a reduction of 24 percent in use.

Another component of the program is the transportation program to promote and facilitate energy efficient transportation options for LBL personnel to and from the site, and to increase the fleet efficiency of LBL-owned or leased vehicles.[6]

Table III-N-1
ENERGY CONSUMPTION, LBL, 1975, 1985, 1990

	1975[a] (000's Square Feet)	1985[a] (000's Square Feet)	1990[b] (000's Square Feet)
Buildings	689.4	773.7	1,066.0*
Metered Process Areas (Accelerator, Computer Center)	492.5	605.3	626.0
	1,181.9	1,379.0	1,692.0
Energy Consumption			
Electrical Use (Buildings) (MWH)	23,172	28,492	29,383*
Electrical Use (Metered Process Areas) (MWH)	73,407	69,511	44,662
Natural Gas (MCF)	130,380	122,847	138,452*

Notes: a = *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report*, December 1986, p. 213.
b = Jeffrey Bell, LBL In-House Energy Management, November 18, 1991.

*Includes 142,000 square feet of leased space.

As noted in Section II-E, the current 1.62 million gross square feet of facilities on the LBL main hill area site is less than the 1.68 million gross square feet projected in the 1987 LRDP EIR for the year 1992 and the 2.00 million gross square feet projected for the year 20xx. New programmatic facilities and the proposed modernization of LBL general purpose facilities, as offset by demolition of obsolete facilities, will add less than an estimated net 190,000 gsf during the period of contract renewal. Thus, current and anticipated facility growth for the contract renewal term is below levels projected in the 1987 LRDP. Since energy consumption is primarily a function of facility development levels, no new project-specific energy impacts are anticipated as a result of continued UC operation of LBL in conformance

with the LRDP. The binding mitigation measures included in the 1987 LRDP EIR are summarized below for the convenience of the reader.

2. Impacts and Mitigation Measures

a. Standards of Significance

Potential adverse impacts on energy consumption and conservation from UC's continued operations and development of LBL 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 energy, oil or natural gas;

Utilize an energy supplier which does not have the capacity to supply the project's energy needs with existing and planned energy capacity; and

Require the development of new sources of energy.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), implementation of the recommended mitigation measures will reduce these impacts to a less than significant level.

b. Impacts and Mitigation

Impact III-N-1: **Increased energy demand from new facilities will occur in conjunction with continued implementation of the 1987 LRDP.**

Mitigation III-N-1: Buildings 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.[7]

3. Cumulative Impacts

Cumulative development at and in the vicinity of LBL is not expected to result in significant adverse impacts upon energy resources. Increases in energy demands would be met through existing regional energy sources; new development would be constructed in accordance with Title 24 energy conservation standards. While beyond the scope of a CEQA document, the consumption of fossil fuels and other materials has caused a global increase in the quantities of certain gases in the earth's atmosphere.

Notes for Section III-N:

1. This abbreviated setting summary is based upon, and incorporates by reference, the setting analysis presented in Section VI-O of the 1987 LRDP EIR. The purpose of the setting summary is to provide the reader with a brief overview of this resource area in order to place in context the standard for measuring significant impacts, and the restatement of impacts and mitigation measures from the 1987 LRDP EIR.

2. *Lawrence Berkeley Laboratory Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, p. 212.

3. *Ibid.*, p. 212.

4. *Ibid.*, p. 212.

5. *Ibid.*, p. 212.

6. *Ibid.*, p. 212.

7. *Lawrence Berkeley Laboratory Site Development Plan Final Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., August 1987, p. F-29, No. O-2.

HAZARDOUS MATERIALS

Introduction and Overview of Analytical Approach

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

Hazardous Materials - Impacts and Mitigation Measures

IV. HAZARDOUS MATERIALS SETTING IMPACTS AND MITIGATION MEASURES

A. INTRODUCTION AND OVERVIEW OF ANALYTICAL APPROACH

Research activities are subject to numerous environment, health and safety laws and regulations. Compliance with all applicable laws is the policy of UC and DOE, and is thus considered part of the project for purposes of this SEIR. Because the scope and applicability of environmental legal requirements have expanded since the 1987 LRDP EIR was prepared, and because hazardous materials issues are of significant public interest, this SEIR examines hazardous materials issues in considerable detail.

1. LBL's Compliance with Environment, Health and Safety Requirements Required by Law and Policy

The University's policy on environmental compliance is set forth in the University Policy entitled, "Environmental Health and Safety." LBL most recently defined this commitment in its *Institutional Plan*, which provides that it is the policy of LBL to integrate environmental, safety and health performance in the planning and conduct of all Laboratory operations, to ensure employee and public safety and the protection of the environment.[1]

It is also DOE policy "to conduct the Department's operations in compliance with the letter and the spirit of applicable environmental statutes, regulations, and standards. In addition, DOE is committed to good environmental management of all its programs and at all its facilities to correct existing environmental problems to minimize risks to the environment and public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public welfare."[2]

Increased emphasis on environmental issues, including remediation of past problems, is a part of LBL's programmatic operations policies during the proposed contract renewal term. LBL has adopted a comprehensive program to provide environmental compliance at LBL. This program is administered primarily by LBL's Division of Environment, Health and Safety (EH&S). As of October 1, 1991, the

EH&S Director reports to the Associate Laboratory Director for Operations, to ensure that EH&S compliance is adequately funded and effectively administered at all levels of LBL.

2. Management and Compliance Issues

Since the 1987 LRDP was adopted, environmental regulations in general, and as applied to DOE facilities in particular, have become more rigorous. Ensuring compliance with these expanded environmental requirements is now a major policy objective and management commitment of the University, LBL and DOE. Accordingly, this SEIR identifies a variety of environmental management and compliance issues, and describes the status of LBL activities undertaken in response to these issues.

Management and compliance issues described in this SEIR were identified by interviewing LBL personnel, reviewing LBL's own assessments of its environmental compliance program, including LBL's Environmental Compliance Quarterly Reports, reviewing the draft report of DOE's "Tiger Team" environmental assessment, and reviewing prior inspections and enforcement activities by federal, state and local agencies with jurisdiction to enforce environmental requirements at LBL. Because the DOE Tiger Team program is unique to DOE facilities, further background on the scope of this assessment and the Tiger Team's findings is appropriate.

On June 27, 1989, the Secretary of Energy, Admiral James D. Watkins, announced a ten-point initiative to strengthen environment, safety and health (ES&H) programs and waste management operations in facilities managed or funded by DOE. One of the initiatives involved conducting independent "Tiger Team" Assessments at DOE operating facilities. The DOE's Tiger Team Assessment of LBL was conducted from January 14 through February 15, 1991. The Tiger Team Report, and LBL's followup compliance activities, provide the most recent comprehensive information about the safety of LBL's handling of hazardous materials. Accordingly, this Report and LBL's response are referenced in detail in this section of the SEIR. The executive summary of the DOE Tiger Team Assessment is included as Appendix E of this SEIR, and, as noted in Section I-H, the entirety of the report is hereby incorporated by reference.

The Tiger Team itself was comprised of professionals from DOE, contractors, and consultants, with participation by representatives from the United States Environmental Protection Agency (US/EPA),

the California Department of Health Services (DHS) now Cal/EPA's Department of Toxic Substances Control (DTSC), and other state and local agencies with jurisdiction over environmental issues.

The purpose of the Tiger Team assessment was to inform the Secretary of Energy and other interested parties of the status of environmental compliance at LBL.[3] Accordingly, the scope of the LBL Tiger Team Assessment included an evaluation of LBL's site management systems, facilities, and operations. Among the principal ES&H issues reviewed by the Tiger Team were:

- compliance with applicable Federal, state, and local regulations, requirements, permits, agreements, and enforcement actions;
- compliance with DOE Order requirements for ES&H activities;
- compliance with the Occupational Safety and Health Administration/Act (OSHA) regulations and standards;
- adequacy of DOE and LBL ES&H management programs, including policy and procedures, internal oversight, planning and budgeting, organization, resources, training, and quality assurance;
- conformance with applicable "best" or "accepted" industry practices;
- identification of root causes; and
- identification of noteworthy practices.

The onsite Tiger Team inspections and other activities took place from January 14 through February 15, 1991. These activities included field observations; document reviews; observation of routine operations, emergency exercises, and the physical condition of the site and facilities; reviews of previous audits and assessments; and interviews with DOE, contractor, and subcontractor site personnel, as well as personnel from federal, state, and local regulatory agencies.[4]

The Tiger Team itself was divided into three subteams: Environmental, Worker Safety and Health, and Management. The three subteams each focused on major facilities, operations, and systems to ensure a comprehensive evaluation that was representative of the overall status of LBL's EH&S programs.

The Environmental Subteam also performed an assessment of all required elements of LBL environmental programs. Environmental issues related to management were referred to the Management Subteam for followup. The Safety and Health Subteam conducted an evaluation of the adequacy of LBL occupational safety/industrial safety programs and a comprehensive multidisciplinary Technical Safety Appraisal.[5] The Tiger Team then reported on issues that were reported as findings (Environmental and Management Subteams), concerns (Safety and Health Subteam), and noteworthy practices (all three subteams).[6]

While finding numerous areas in need of improvement, The Tiger Team concluded that curtailment or cessation of any operations at LBL because of potential adverse environmental impacts was not warranted because ". . . none of the Tiger Team findings represents a substantial threat of large-scale environmental contamination or danger to human health."[7] Additionally, the Tiger Team reported that ". . . operations at LBL do not involve large sources of potential environmental contaminants."[8] However, the number of findings and concerns identified by the Tiger Team demanded further attention and funding by LBL, the University and DOE itself.

For example, although many of the Tiger Team's findings and concerns had been previously identified in an earlier Environmental Survey and Technical Safety Appraisal, these issues had not received aggressive management attention as of the Tiger Team Assessment.[9] While some corrective action proposals being considered at the time of the Tiger Team audit were judged inadequate, the Tiger Team did note that renewed and more comprehensive efforts were underway.

In response to the increased scope of environmental laws and regulations, the management and compliance concerns identified by the Tiger Team, and compliance oversight by other federal, state and local agencies with jurisdiction over LBL environmental issues, DOE, UC and LBL have enhanced environmental compliance funding commitments, personnel levels, and programs at all levels. For example, DOE has authorized, and LBL has allocated, increased resources (staff and funding) for ES&H and has implemented a task-specific corrective action plan designed to implement changes

identified in LBL's formal response to the Tiger Team assessment (the *LBL Corrective Action Plan*). LBL has also reorganized its ES&H organization for ongoing environmental health and safety compliance and improvement at LBL.

LBL's self-assessment, the findings and recommendations of the DOE Tiger Team, and findings from periodic inspections by federal, state and local environmental agencies identify actual or potential LBL activities which involve the use of hazardous materials that could cause or contribute to adverse health, safety or environmental impacts if not adequately managed. Implementation of LBL's environment, health and safety program to comply with applicable environmental laws in conformance with adopted UC and DOE policy will mitigate these actual or potential adverse impacts to a less than significant level.

In addition, the implementation of a mitigation monitoring program will in turn ensure that LBL's compliance is documented and that the inherent risks of conducting research activities which involve the use of hazardous materials will be minimized to the greatest extent feasible.

3. Organization of Hazardous Materials SEIR Analysis

Because of the complexity of environmental laws affecting research facilities, this section is divided into several major subsections, including: Hazardous Materials Handling; Disposal of Hazardous Materials; Hazardous Materials Transportation; Regulated Building Components; Worker Safety and Health; Emergency Preparedness and Response; and Remediation Activities. Within each of these major areas, the environmental setting discussion describes the regulatory background, regulated activities at LBL, and management and compliance issues. A consolidated set of impacts and mitigation measures relating to all of these major areas are set forth in Section IV-J.

Notes for Section IV-A:

1. *Institutional Plan FY 1992-1997. Lawrence Berkeley Laboratory, University of California.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, November 1991, p. 6-1.

2. DOE Order 5400.1, "General Environmental Protection Program," paragraph 5, page 6.

3. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 1-1 to 1-4.

4. *Ibid.*, p. 1-2.

5. *Ibid.*, pp. 1-2 to 1-4.

6. *Ibid.*, p. 1-2.

7. *Ibid.*, p. ES-1.

8. *Ibid.*, p. ES-1.

9. *Ibid.*, p. ES-1.

B. HAZARDOUS MATERIALS HANDLING

Research facilities such as LBL use many types of chemicals in research activities and in facility construction and maintenance activities. Many of these chemicals are considered "hazardous materials" or "hazardous substances" under various federal, state or local environmental laws; these laws in turn include both lists of regulated hazardous materials and criteria by which a chemical or other product is considered "hazardous."

1. Hazardous Materials Handling - Regulatory Setting

a. Definition of Hazardous Materials

A number of properties may cause a substance to be considered hazardous, including toxicity, ignitability, corrosivity, or reactivity. Because the term "hazardous material" is defined in different ways for different regulatory programs, this SEIR adopts a broad definition of "hazardous material", to include a "substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed."[1]

Toxic, ignitable, corrosive and reactive materials are all subsets of hazardous materials. For example, if a material is toxic, it is hazardous, but not all hazardous materials are toxic. Specific tests for toxicity, ignitability, corrosivity and reactivity are set forth in *Title 22 California Code of Regulations Sections 66693-66708.* Each type of hazardous material is defined below.

Toxic substances may cause short-term or long-lasting health effects, ranging from temporary effects to permanent disability, or even death. For example, such substances can cause disorientation, acute allergic reactions, asphyxiation, skin irritation or other adverse health effects if human exposure exceeds certain levels (the level depends on the substance involved). Carcinogens (substances known or suspected to cause cancer) are a special class of toxic substances. Examples of toxic substances include

benzene, which is a component of gasoline and a suspected carcinogen, and methylene chloride, a common laboratory solvent.

Ignitable substances are hazardous because of their ability to burn. Gasoline, hexane and natural gas are examples of ignitable substances. **Corrosive materials** can cause severe burns or damage materials; these include strong acids and bases, such as lye or sulfuric (battery) acid. **Reactive materials** may cause explosions or generate toxic gases. Explosives, pure sodium or potassium metal (which react violently with water), and cyanides are examples of reactive materials.

Other types of hazardous materials include radioactive and infectious (biohazardous) materials. Radioactive materials and wastes contain atoms that emit radiation from the transformation of an unstable atomic nucleus. Infectious materials include anything contaminated with disease-causing agents, such as bacteria or viruses.

It is also important to note that hazardous materials are used, or lawfully discharged during use, in a variety of contexts. Most types of paint coatings, for example, are regulated as "hazardous materials" which are "used" when applied to walls or other surfaces. Most types of leftover paints having no further use are considered "hazardous wastes" and must be disposed of in conformance with the regulations described in Subsection IV-C-2, below. Because paints also contain solvents which contain volatile organic compounds, some quantity of the paint coating will evaporate, or volatilize, during the paint application and drying process. This evaporative process results in air emissions. Similarly, laboratory chemicals containing volatile solvents or other materials may also evaporate, generally via fumehoods or the building exhaust system. These air emissions are also subject to a comprehensive regulatory program for toxic air contaminants; the potential environmental impacts associated with air emissions from hazardous materials use are addressed in Section III-J, Air Quality.

b. Hazardous Materials Handling Laws

Many federal, state and local laws regulate hazardous materials handling activities. Because of the complexity of these legal requirements, other subsections of this SEIR address laws relating specifically to disposal of hazardous materials (Section IV-C), hazardous materials transportation (Section IV-E), regulated building components (Section IV-F), worker safety and health (Section IV-G), emergency

preparedness and response (Section IV-H), and remediation activities (Section IV-I). In contrast to these specific categories of environmental requirements, what follows are the principal laws regulating the general handling of hazardous materials used in laboratories, and in facility construction and maintenance activities, at LBL.

The *Atomic Energy Act* (AEA)[2] establishes the basic regulatory structure governing the use of radioactive materials and the disposal of radioactive waste. The AEA is administered by the Nuclear Regulatory Commission (NRC). Oversight and enforcement of the use of radioactive materials at LBL is provided by the DOE.

The *Emergency Planning and Community Right-to-Know Act* (EPCRA), enacted as Title III of the *Superfund Amendment and Reauthorization Act* (SARA)[3], requires facilities handling in excess of designated threshold quantities of hazardous materials to provide hazardous material, hazardous waste, and emission information to public agencies, to prepare emergency response plans for accidents or other unauthorized releases of hazardous materials, and to report unauthorized releases of designated threshold quantities of hazardous materials. More stringent emergency response planning is required for facilities handling designated "extremely hazardous substances." Hazardous materials present in exempt quantities or under the direct supervision of a technically qualified individual are exempt from the EPCRA reporting, inventory and emergency planning requirements.[4] The U.S. Environmental Protection Agency enforces this law.

The City of Berkeley is the administering agency for state and local laws and regulations governing the handling of hazardous materials at LBL. These laws include the California Health and Safety Code, the State's Code of Regulations, and the applicable portions of the City of Berkeley Municipal Code.[5]

The *Hazardous Materials Release Response Plans and Inventory Law of 1985 (the Business Plan Act)*[6] requires businesses to prepare "business plans" that can provide local fire and emergency response teams with information and emergency procedures necessary to prevent or mitigate damage to human health and the environment from the release of hazardous materials. Each business which handles a hazardous material must prepare and submit to local "administering agencies" a business plan that includes both an inventory of hazardous materials stored at the facility and emergency response plans and procedures it will follow in the event of a release or threatened release of a hazardous material.

Business plans must be submitted to local administering agencies for review. This act, as well as other laws and regulations, also requires a business to report a release or threatened release immediately to the local emergency responders, local administering agency, and the State Office of Emergency Services.

State agencies, including the University of California and LBL, were required to submit to the local administering agency a business plan consistent with state regulations by January 1, 1990. For LBL, the agency designated to receive business plans is the City of Berkeley. According to the provisions of the Business Plan Act, local jurisdictions may adopt more stringent requirements or ordinances than those specified in the Law; the City of Berkeley has done this. As of January 1, 1992, state agencies, including facilities administered by the University of California, must comply with these local regulations implementing the Business Plan Act.

Another aspect of the Business Plan Act requires facilities handling designated types of "acutely hazardous materials" (AHM) to prepare *Risk Management & Prevention Programs* (RMPPs). While RMPPs include emergency response prevention and planning components, an RMPP is also subject to the discretionary approval of the local administering agency; this agency may require affected facilities to implement "administrative or operational programs to prevent acutely hazardous material accident risks."[7] The AHM list is the same as the EPCRA "extremely hazardous substance" list, and is set forth in *40 CFR Part 355, Appendix A*. The scope of inventory reporting thresholds varies by local jurisdiction.

2. Hazardous Materials Handling - LBL Activities

LBL conducts operations in well over 150 laboratories, both at LBL and at the UCB campus.*[8] Hazardous materials are used in many of these operations. Generally, small quantities of a large variety of materials are used in LBL research activities; larger quantities of a relatively smaller variety of materials (e.g., paints and solvents) are used in LBL construction and maintenance activities.

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*Information relating to hazardous materials usage at the University of California, Berkeley campus, including hazardous materials usage in campus laboratories which are administered in whole or in part by LBL, are addressed in the 1990 *University of California, Berkeley LRDP EIR*, which has been previously incorporated by reference into this SEIR.

In general, the kinds and quantities of materials to be used in the future at a research facility cannot be known with certainty. It can be expected, however, that the types of future hazardous materials usage will be similar to those presently used at LBL. Accordingly, this SEIR presumes that the types of materials currently used at LBL are representative of those that will be used in the future.

The LBL Materiels Management Department (MMD) has the responsibility for procurement, storage and transport of hazardous materials used in research and facility construction/maintenance activities. The majority of chemicals used at LBL are purchased under the terms of a large procurement contract through outside vendors. The contract covers chemicals which are routinely used in laboratories and/or maintenance shops. Chemicals that are listed by regulatory agencies as "extremely hazardous" are not supplied under the terms of this contract and require separate purchasing arrangements.[9]

In conformance with the requirements of EPCRA (SARA Title III) and the Business Plan Act, LBL maintains an inventory of hazardous materials in its facilities. With respect to EPCRA requirements, LBL prepares annual inventory reports which identify locations and quantities of specific chemicals in storage, as required by EPCRA Sections 311 and 312. The reporting requirements of EPCRA 311 and 312 are also met by preparing and submitting the Annual Business Plan to the City of Berkeley as required by the Business Plan Act. LBL persons responsible for chemical storage or usage at the site prepare and maintain individual chemical inventories which are used to prepare the facility-wide business plan inventory.[10] On January 2, 1992, LBL submitted its most recent inventory to the City of Berkeley.

Currently, the LBL chemical inventory includes all types of hazardous materials and consists of over 20,000 compounds. Many of the chemicals listed on the inventory are used in relatively small quantities. Higher volumes of certain types of materials, including solvents, fuel and refrigerants comprise over 50 percent of the chemical inventory. To comply with the Business Plan Act, LBL provided the City of Berkeley with its initial chemical inventory in 1990 and has provided the requisite updates since that time. The chemical inventory submitted by LBL to comply with the Business Plan Act and other compliance programs is hereby incorporated by reference into this document. The inventory includes approximately 162,200 pounds of solid hazardous materials, 172,400 gallons of liquid hazardous materials, and 4,367,500 cubic feet of hazardous gases.

In addition, since the complete inventory is quite large (three four-inch volumes), Appendix C and Appendix D of this SEIR are provided to give readers a better understanding of the most significant subsets of the inventory. To derive the list of chemicals in Appendix C, the LBL chemical inventory was sorted by volume; those chemicals in excess of the threshold amounts defined in the Business Plan Act are presented in this Appendix. To derive the list presented in Appendix D, the inventory was sorted for chemicals that met the regulatory definitions of "highly toxic and or acutely hazardous."

MMD operates three facilities through which hazardous materials are handled: the Building 901 warehouse located off-site in Emeryville several miles west of LBL, and Building 7 and Building 69 on the site.[11] Chemicals purchased are delivered to Building 7 or to Building 69 (for drum-sized quantities) and then distributed to the chemical users at LBL. Building 7 maintains a small stock (less than 100 gallons) of photochemicals. The approved area for bulk chemical storage at LBL is the Drum Storage Area at Building 69. The area contains spill cleanup kits and an area-wide secondary containment/collection system for spilled materials.[12] Building 69 receives and the EH&S Division distributes hazardous gases, listed extremely hazardous chemicals (e.g., carcinogens and reactives), and radioactive materials. Building 69 also stores a limited amount (approximately 40 to 50 drums) of product solvents and lubricating oils.

The Building 901 warehouse only stores gallon-sized containers of 190- and 200-proof undenatured ethyl alcohol under control conditions specified by the State of California. The Building 901 warehouse receives but does not store chemicals which are purchased from a number of vendors that do not fall under the large chemical procurement agreement described earlier in this section.[13]

In addition to the building storage sites mentioned above, LBL also has 14 diesel fuel Above Ground Storage Tanks (ASTs) each with more than 30 gallons capacity. These tanks are associated with fixed electrical generation units at certain LBL buildings located throughout the site.[14] Also, smaller quantities of flammable and hazardous chemicals are stored in production areas, laboratories and laboratory buildings at LBL.[15]

Radioactive materials handled at LBL include radionuclides, radiopharmaceuticals, as well as materials handled at the National Tritium Labeling Facility (NTLF), and sealed sources. In addition, LBL has radiation-producing equipment, such as particle accelerators, gamma irradiators, and x-ray units.[16]

The National Tritium Labeling Facility (NTLF) in Building 75 is unique in the United States, and provides scientists from around the world with the equipment and expertise to make biochemical tracer products used in a variety of biological and biomedical analyses and experimental protocols both at LBL as well as nationally and internationally. Because the NTLF's primary function is the production of tritium labeled products, it is authorized to have kilocurie amounts of tritium in the facility. Several other laboratories at LBL are involved in radiochemical and radiobiological studies that typically use various radionuclides, including carbon-14, iodine-125, and sulfur-35 in millicurie amounts. Biological research programs, which often utilize radiolabeled materials, have grown and continue to expand (within the scope of the 1987 LRDP), and the delivery of low-level radioisotopes has increased in the last several years.[17] LBL's use of radioactive materials is overseen and regulated directly by DOE under applicable federal and state laws. In 1991, LBL had approximately 19,600 curies of radioactive materials in sealed sources and approximately 10,025 curies of other radionuclides, of which nearly all was tritium.

In addition to the health, safety, and environmental protection laws mentioned above, fire and building codes also impose materials handling and storage requirements. At LBL, the onsite Building Official (Plant Engineering Department Head) and Fire Marshal administer the requirements of the Uniform Fire and Building Codes. These include inspections to ensure code compliance, reviews of design specifications, ministerial permitting , and the payment of applicable fees.

3. Hazardous Materials Handling - Management and Compliance

Hazardous materials handling in laboratories is governed by LBL policies and procedures embodied in the LBL *Health and Safety Manual (PUB-3000)*, and various Materials Handling Procedures (Procedures SP 10.01, SP 10.05, SP 11.01, SP 12.01, SP 16.02 and SP 17.01).[18] In general, the protocols for the procurement, storage, handling, and transport of hazardous materials at LBL are documented in written procedures developed by MMD. The Department of Energy's San Francisco Operations Office (DOE/SF) has also participated in the development and oversight of chemical handling procedures for LBL.[19]

The Tiger Team found that as an overall matter hazardous materials management at LBL has been good in that there have been no significant recorded releases of toxic chemicals to the environment.

Most of the LBL personnel who work closely with hazardous chemicals were aware of the appropriate safety measures and potential risks associated with these materials, and were aware of the basic safety procedures required by LBL.[20] The Tiger Team also found that in general, the Environment, Safety and Health Division was effective in hazardous materials management.[21]

There are, however, areas of hazardous materials management which require improvement, and LBL is undertaking these improvements. For example, there were no detailed written LBL procedures for, or oversight of, the maintenance of a chemical inventory.[22] The documentation of environmental hazards associated with hazardous/toxic chemicals through the use of Material Safety Data Sheets (MSDSs) was not consistent throughout LBL facilities. When chemicals were delivered to the individual user, the MSDS forms, which are shipped with the chemicals when they arrive at LBL, were not routinely provided to the user. Rather, the MSDSs were stored in a central file at ES&H, where they were available for dissemination if requested by the user.[23]

In addition, several of the older storage locations at LBL did not have adequate secondary containment or other management provisions to help contain potential spills of petroleum products and hazardous chemicals. In individual laboratories, the Tiger Team found that overall chemical storage was good and there were many new, safety-approved storage cabinets for flammable and hazardous chemicals. However, there were several instances of improper chemical segregation and container/cabinet labeling by individual researchers.

Although not required by applicable law, LBL has responded to these and other Tiger Team management recommendations by revising the hazardous materials tracking and tagging procedures which have been approved and published as Material Management Department Standard Procedure 12.01, "Warehoused Material Held for Future Projects". This procedure provides that specified items released from storage in Material Management Department facilities have tags identifying the item and its ultimate destination at LBL, thus allowing continuous identification and tracking of all such items. Existing procedures for more formally tracking the distribution of items and chemicals which pass through Building 69 are also being revised.[24] Also, LBL is currently integrating chemical inventory data and Material Safety Data Sheet information into the laboratory's distributed computer network, to ensure widespread availability of this information throughout the facility.[25]

The Tiger Team also identified record keeping and housekeeping compliance issues related to radioactive materials. For example, Tiger Team findings addressed radioactive materials inventories, auditing, monitoring instrumentation and dosimetry. To address these concerns and enhance its existing radiation safety program, LBL is developing and implementing an internal radiation work approval permit system, as well as a standard which specifies types of controls required for work activities that involve radioactive materials.[26] LBL is also implementing a program to identify and test radioactive sources, as well as procedures to inventory and leak test sealed sources on an ongoing basis.[27]

With respect to all types of hazardous materials, LBL is also continuing efforts to (1) identify nonconforming lab areas through an expanded Self-Assessment Program (SAP) and EH&S Division inspections; (2) provide continuing training to employees who use chemicals; and (3) provide guidance to employees with special chemical needs.[28] The SAP is a program of regular evaluation of work spaces and employee readiness for compliance with applicable health, safety and environmental requirements. The SAP includes annual walk-throughs of work areas and reviews of procedures and training documentation. Corrective actions are identified and tracked through to completion. Details of the SAP may be obtained from the LBL Office of Assessment and Assurance.

Notes for Section IV-B:

1. See *Title 22, California Code of Regulations, Section 66084.*

2. *42 USC § 2114, et seq.*

3. *42 U.S.C. § 11001, et seq.*

4. *40 CFR § 355.30.*

5. Letter from City of Berkeley to LBL, Oct. 8, 1991, p. 2. *(Reproduced in Appendix A of this SEIR.)*

6. *California Health & Safety (H&S) Code § 25500, et seq.*

7. *H&S Code § 25532(g).*

8. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-130.

9. *Ibid.*, p. 3-117.

10. *Ibid.*, p. 3-167.

11. *Ibid.*, p. 3-117.

12. *Ibid.*, p. 3-120.

13. *Ibid.*, p. 3-117.

14. *Ibid.*, p. 3-120.

15. *Ibid.*, p. 3-129.

16. *Draft Institutional Plan FY 1992-1997. Lawrence Berkeley Laboratory, University of California.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, May 1991, p. 7-2.

17. *Ibid.*, p. 7-2.

18. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-119.

19. *Ibid.*, p. 3-117.

20. *Ibid.*, p. 3-120.

21. *Ibid.*, p. 3-122.

22. *Ibid.*, p. 3-120.

23. *Ibid.*, p. 3-120.

24. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Tasks 2037, 2038, p. 5-175.

25. *Draft Institutional Plan FY 1992-1997. Lawrence Berkeley Laboratory, University of California.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, May 1991, p. 7-5.

26. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Response to Concern RP.3-4, p. 6-338, Tasks 4026, 1086, 1062, 9195.

27. *Ibid.*, Tasks 1090, 9079, 1062, 9195.

28. *Ibid.*, Tasks 2058, 3020, p. 5-170.

C. DISPOSAL OF HAZARDOUS MATERIALS

Used hazardous materials may be recycled, disposed of or discharged during the course of research, facility construction, and maintenance operations in a variety of ways. When used hazardous materials are ready for discard, abandoned, or recycled they are generally classified by law and regulated as "hazardous waste." In addition to regulations that address chemical wastes, there are also separate regulatory programs that prescribe disposal requirements for radioactive wastes, medical wastes, and non-hazardous solid wastes including ordinary trash. This Section IV-C addresses these waste regulatory programs, LBL's waste-related activities, and compliance issues.

As mentioned in the previous section of this Chapter, it is important to note that hazardous materials are also used, or lawfully discharged during use, in a variety of contexts which do not create one of these specific types of "waste". Most types of paint coatings, for example, are regulated as "hazardous materials" which are "used" when applied to walls or other surfaces. Most types of leftover paints having no further use are considered "hazardous wastes" and must be disposed of in conformance with the regulations described in Subsection IV-C-2, below. Because paints also contain solvents which contain volatile organic compounds, some quantity of the paint coating will evaporate, or volatilize, during the paint application and drying process. This evaporative process results in air emissions. Similarly, laboratory chemicals containing volatile solvents or other materials may also evaporate, generally via fumehoods or the building exhaust system. These air emissions are subject to a comprehensive regulatory program rather than being regulated as "waste" *per se*; the potential environmental impacts associated with air emissions from hazardous materials use are addressed in Section III-J, Air Quality.

Some types of materials classified as hazardous may also be lawfully discharged into the sanitary sewage system for ultimate treatment by the East Bay Municipal Utility District (EBMUD) pursuant to the terms of the LBL Wastewater Pretreatment Permit. For example, building ventilation systems include cooling towers which use water which is mixed with a small quantity of hazardous materials to prevent corrosion and growth of microorganisms; periodically, this cooling tower water is discharged into the sewage system. The EBMUD permit for LBL sets limitations on a variety of wastewater constituents to ensure that LBL's wastewater can be safely and lawfully conveyed to and treated in the EBMUD

sewage facility. To ensure LBL's compliance with the EBMUD permit limitations, EBMUD requires ongoing monitoring and reporting of LBL's wastewater flows. Like air emissions, wastewater discharges are subject to a separate, comprehensive regulatory program and are generally not considered "waste" per se. Discharges to the EBMUD system are discussed in this subsection IV-C.

1. Disposal of Hazardous Materials – Regulatory Setting

a. Hazardous Waste Disposal

For purposes of this SEIR, a "hazardous waste" is any hazardous material that is abandoned, discarded, or recycled.[1] The same criteria that render a material "hazardous" also make a waste hazardous: toxicity, ignitability, corrosivity, or reactivity. In addition, federal and state laws include specific lists of wastes which are regulated as hazardous wastes, including most common laboratory wastes. Hazardous wastes must be handled and disposed of by authorized on-site personnel, licensed hazardous waste haulers, and permitted treatment, storage or disposal facilities.

The *Resource Conservation and Recovery Act* (RCRA) (*42 USC § 6902, et seq.*) establishes a "cradle-to-grave" system for regulating hazardous wastes, and prescribes facility standards, waste handling protocols, land disposal restrictions, recordkeeping, and training requirements. These requirements apply to generators and transporters of hazardous wastes, and to hazardous waste treatment, storage and disposal facilities. Generators who store hazardous waste onsite for 90 days or less must register with US/EPA, obtain an identification number, and comply with hazardous waste recordkeeping, labelling, training, and other handling requirements. Generators who store waste for longer than 90 days, or who treat or dispose of hazardous wastes onsite, are subject to far more extensive requirements, and must obtain a discretionary permit from US/EPA. Although RCRA continues to be administered by US/EPA in California, delegation of the basic RCRA program (including all generator requirements) to Cal/EPA is expected in 1992. As a practical matter, Cal/EPA is already administering RCRA requirements, both by agreement with US/EPA and in the course of implementing the more stringent state *Hazardous Waste Control Laws* (HWCL) (*H&S Code § 25100, et seq.*) (*see below*). Both RCRA and the HWCL govern the disposal of hazardous wastes, including the disposal of mixed radioactive/hazardous chemical wastes.

In the context of hazardous wastes, five more stringent requirements of the HWCL are of particular relevance:

1). *Larger universe of hazardous wastes.* The statutory definition of "hazardous waste," the regulatory list of hazardous wastes, and the regulatory characteristics for designating a waste as "hazardous" are broader under the HWCL than RCRA, resulting in a larger universe of regulated hazardous wastes.

2). *Treatment and land disposal restrictions.* Use of small, portable solvent recovery units, simple base/acid neutralization processes, and solidification are all commonly available methods for reducing the quantity and/or toxicity of small quantity generator wastes. Each of these processes, as well as other processes that change the physical or chemical characteristics of a hazardous waste, are considered "treatment" under the HWCL and may only be performed by authorized hazardous waste treatment facilities. In the past, laboratory or similar facilities could apply for and obtain variances authorizing these routine treatment activities; however, as a practical matter Cal/EPA no longer grants these variances for a variety of reasons. "Permit-by-rule" authorizations for these types of treatment processes have recently been adopted by the California legislature and Cal/EPA. The agency may issue such permits only for facilities that are not required to have Federal RCRA permits and only for specified wastes and treatment technologies. Land disposal of hazardous waste is more stringently regulated under HWCL.

3). *Recycling restrictions.* For a variety of reasons, including but not limited to the HWCL's broader definitions of "hazardous waste" and "treatment," the HWCL generally prohibits onsite recycling activities that would be permissible under RCRA.

4). *Requirements for small quantity generators.* Small- and mid-sized generators are exempt from certain RCRA requirements applicable to larger generators; as a general matter, the HWCL does not include these exemptions.

5). *Prohibition of drain disposal of hazardous waste.* Under RCRA, disposal of hazardous materials to public sewer systems is authorized if the facility complies with applicable

pretreatment requirements. Under the more stringent requirements of the HWCL, all laboratory wastes are classified as hazardous wastes and thus may not be poured down the drain; these laboratory wastes must be disposed of at authorized hazardous waste treatment, storage or disposal facilities.

Hazardous waste treatment, storage and disposal facilities have facility-specific license and permit conditions which may effectively impose more stringent labelling or recordkeeping restrictions on generators; such facilities may also accept only designated types of hazardous wastes.

As discussed in greater detail in Subsections IV-C-2 and IV-C-3, the State has delegated enforcement authority for certain aspects of the HWCL to the City of Berkeley. Through its Toxics Program, Berkeley, therefore, enforces provisions of the HWCL applicable to LBL's hazardous waste generator activities; LBL's onsite treatment and storage facility is subject to the ongoing jurisdiction of Cal/EPA's Department of Toxic Substances Control (DTSC) and US/EPA.

Stringent licensing, recordkeeping and financial assurance requirements also apply to haulers of hazardous wastes pursuant to both RCRA and the HWCL. Uniform Hazardous Waste Manifests accompany hazardous waste from its point of generation to its point of ultimate disposal; this document requires a description of the waste being carried, its intended destination, and emergency response, safety and other information about the waste. Under both RCRA and the HWCL, hazardous waste manifests must be retained by the generator for a minimum of three years. A copy of each manifest must be filed with Cal/EPA's DTSC and other agencies. The generator must match copies of hazardous waste manifests with receipts from the treatment/disposal/recycling facility.

The following DOE orders are also applicable to hazardous waste management at LBL: General Environmental Protection Program (DOE Order 5400.1); Hazardous and Radioactive Mixed Waste Program (5400.3); Environment, Safety and Health Appraisal Program (5482.1B); Environmental Protection, Safety and Health Protection Standards (5480.4); General Design Criteria (6430.1A); Conduct of Operations for DOE Facilities (5480.19); and Secretary of Energy Notices (Notice No. SEN-0-89).[2] These DOE orders establish detailed operational and handling requirements applicable to specific types of LBL activities involving hazardous wastes.

b. Radioactive Waste Disposal

The *Atomic Energy Act* (AEA)[3] establishes the basic structure governing the disposal of radioactive waste; the *Low Level Radioactive Waste Policy Act* (LLRWPA)[4] establishes a national program for the siting of facilities for the disposal of low level radioactive wastes (LLRW). The LLRWPA and the Nuclear Regulatory Commission (NRC) define LLRW as radioactive material that is not highly radioactive, spent nuclear fuel, or by-product material such as uranium or thorium tailings and waste as specified in the AEA. According to the LLRWPA, atomic energy activities conducted by the federal government such as those associated with DOE facilities, must dispose of radioactive wastes at disposal sites operated exclusively for the federal government.

c. Medical, Biohazardous and Infectious Waste Disposal

There are to date no federal requirements governing the disposal of medical and biohazardous wastes generated in California. The *State Medical Waste Management Act* (MWMA)[5] applies to medical and biohazardous wastes, including laboratory research wastes generated in the course of human, animal or biologic testing; cultures and stocks of infectious agents and wastes containing any microbiological specimens; and sharp wastes generally, including hypodermic syringes, blades and needles with attached tubing, and broken glass items such as Pasteur pipettes. The Act requires that Department of Health Services (DHS) develop a regulatory program to be implemented by county health departments; mandatory program elements include registration of medical waste generators and treatment facilities, review of medical waste management plans, and recordkeeping requirements. DHS has not yet issued final regulations to implement the MWMA. Small-quantity generators producing less than 200 pounds of medical waste monthly need not register unless they conduct onsite treatment (e.g., by steam sterilization, incineration or microwave technologies); such small quantity generators must nevertheless keep on file a medical waste management plan and two years of medical waste transportation and disposal documentation.

In addition to the requirements for medical waste generators, local solid waste disposal facilities operate pursuant to license restrictions which may prohibit the land disposal of some or all types of medical wastes. While some of the larger generators (e.g., hospitals) have onsite incinerators for medical wastes,

smaller generators often use third party incinerator or microwave treatment facilities as an alternative to local sanitary landfills.

d. Wastewater

The *Clean Water Act*[6] establishes categories of regulated waters (including surface waters and wetlands), applicable water quality standards and objectives, and permit programs regulating the discharge of facility wastewater to surface waters. US/EPA administers the program generally, but in California Cal/EPA (which includes the State Water Resources Board and the various Regional Water Quality Control Boards) administers the federal permit and enforcement programs for direct dischargers (facilities that discharge wastewater directly into surface water) and indirect dischargers (facilities that discharge wastewater to public sewage treatment facilities which in turn discharge the treated effluent into surface waters). Indirect dischargers are often several steps removed from any direct interaction with US/EPA; however, significant, ongoing controversies regarding appropriate water quality standards for surface water discharge areas can result in more stringent discharge limitations for sewage treatment facilities, which in turn can impose on their customers increasingly stringent wastewater discharge limitations and "pretreatment" standards.

The *Porter-Cologne Water Quality Control Law*[7] establishes a comprehensive program for protecting the quality of surface waters, groundwater aquifers, and wetlands in California; this program includes Waste Discharge Requirement (WDR) permits for direct dischargers. WDR permits also include applicable requirements from the federal Clean Water Act. Proposition 65 prohibits discharges of designated hazardous materials to water or land where the discharge would pass into actual or potential sources of drinking water, and would cause significant risk of exposure.

In conformance with both the federal and state water quality regulatory programs, local public sewage treatment facilities must adopt pretreatment standards to ensure that the sewage facility can adequately treat the wastewater it receives from its industrial and commercial customers. Permit requirements mainly affect facilities which discharge very large quantities of wastewater, or wastewater streams, which would contaminate the sewage sludge, injure a sewage treatment worker, or cause any other significant adverse impacts to public health or the environment; most local pretreatment permits do not have specific permit requirements for specific types of industries. At LBL, pretreatment standards are

enforced by the East Bay Municipal Utility District (EBMUD). These standards have been incorporated into EBMUD Ordinance No. 311, which establishes the regulations for the interception, treatment, and disposal of wastewater.[8] LBL has a wastewater discharge permit for the site.

e. Stormwater

Recent amendments to the Clean Water Act require US/EPA to develop a permit system for stormwater runoff which may adversely affect water quality. (33 USC § 1342(p)). In brief, the permit system is designed to apply to facilities (or portions of facilities) where stormwater could intermingle with hazardous materials. In California, this program is being implemented by Cal/EPA through the Regional Water Quality Control Boards. All "industrial dischargers" must file an application for a stormwater permit by October 1, 1992.[9] Any discharger wishing instead to be included in the State of California General Industrial Stormwater Permit must file a Notice of Intent (NOI) to this effect by March 30, 1992.

2. Disposal of Hazardous Materials – LBL Activities

a. Hazardous Waste Disposal

Consistent with waste disposal trends in other research institutions, individual laboratory research activities at LBL result in the generation of a large variety of hazardous wastes, typically in relatively small quantities. For example, the Materials Chemistry and Science Division (MCSD), which conducts research on materials (e.g., plastics, metals, and ceramics), generates organic solvent wastes, chemical reagent wastes, ceramic materials, heavy metals, and other liquid and solid wastes. The Applied Sciences Division generates similar types of wastes. Particle accelerator facilities generate waste from cleaning solutions, vacuum pump and hydraulic oils, organic solvents and solid chemical wastes.

The Engineering Division operates shops that generate solid metallic (lead, chromium, and cadmium) wastes, waste oils, spent solvents and residual Trimsol chemical (water-soluble machine lubricant), as well as oil/solvent-contaminated rags. The plating shop and circuit board production activities generate waste etchants, acids, and solvents; a hazardous waste sludge is generated after treatment. The Life Sciences Divisions, including the divisions of Cell and Molecular Biology, Chemical Biodynamics, and

Research Medicine and Radiation Biophysics, generate solvent wastes, solid chemical wastes, and infectious waste.

Administrative Services, which includes LBL maintenance activities, generates solvents, waste machine oils, and motor oils from shops or motor pool activities.[10] Construction activities also produce hazardous wastes, including paints and solvents.

When hazardous wastes are generated through research or other activities at LBL they are usually accumulated in satellite accumulation areas (SAAs). After accumulation at the SAA wastes are either transferred to 90-day waste storage areas (WSAs) and then transported to LBL's Hazardous Waste Handling Facility (HWHF), or are transferred directly from the SAAs to the HWHF. LBL has retained a contractor, United States Pollution Control, Inc. (USPCI), to transfer wastes from the various points of generation and accumulation to the HWHF and to package wastes for shipment to offsite licensed commercial treatment and disposal facilities.[11] As of April 1, 1992, a new contractor, Advanced Environmental Technology Corporation (AETC), began performing these activities.

The HWHF is centrally located and receives wastes delivered in small quantities from various locations within LBL.[12] Activities taking place at the HWHF consist of waste receipt, treatment, storage, packaging and shipment. The existing facility consists of several indoor and outdoor handling and storage areas. Hazardous waste consolidation takes place at Building 75 and associated safety-type storage buildings located in the Building 75 yard. Laboratory packing and a bench scale hazardous waste treatment operation (Room 131) and mixed waste treatment (Room 127) also take place at the HWHF. Building 69 has a flammable and combustible waste container storage area. The HWHF yard is used for loading, unloading, and waste staging.[13]

LBL ships hazardous waste to approved EPA and DOE off-site disposal facilities. As is true at most research institutions, much of LBL's hazardous waste is classified as "laboratory pack" wastes which are small containers of compatible laboratory wastes that are packed in absorbent materials, then placed in larger containers, such as 55-gallon drums. Other hazardous wastes from LBL are generated from activities at shops and maintenance of the physical plant. In 1990, the most recent year for which data are currently available, LBL generated 106,900 pounds of solid hazardous waste, and approximately 13,400 gallons of liquid hazardous waste.

b. Radioactive Waste Disposal

LBL generates low-level radioactive and mixed waste, as well as a small quantity of transuranic waste. The most recent data for LBL indicates that in 1990 LBL operations generated approximately 200 cubic feet of radioactive waste (approximately 3,582,200 curies). Approximately one hundred and twenty 55-gallon drums of low-level radioactive waste, and from five to twenty 55-gallon drums of "mixed" radioactive and hazardous waste are generated annually; approximately one 55-gallon drum of transuranic waste per three-year period is also generated by LBL.[14] Low-level radioactive wastes generated include absorbed tritium, compactable solids, noncompactable solids, liquid wastes, induced metals, and animal carcasses. Liquid low-level wastes are generated primarily from the biological laboratories, while low-level solid wastes are generated at laboratories throughout LBL. Nearly all tritium waste is generated by the National Tritium Labeling Facility (NTLF), with some additional small quantities generated at locations primarily associated with the biomedical research.[15]

At LBL, most of the mixed waste is generated in the life sciences programs, which use solvents for purifying radiolabeled products and conduct radioassays which may generate mixed wastes depending upon the type of scintillation fluid used. Currently, LBL generates approximately two to five drums of compactable solid, liquid, and organic mixed wastes annually. Larger quantities may at times be generated due to the decontamination and decommissioning of equipment used in radioactive materials research activities.[16] Solid compactable mixed wastes consist of laboratory equipment contaminated with radioactive and hazardous substances. Noncompactable solid mixed wastes typically are materials such as lead shielding.

Solid and liquid mixed wastes are sent to the HWHF (described in previous sections of this chapter) for treatment and accumulation in Building 75A and Building 75, Room 127. Due to the lack of acceptable mixed waste disposal sites, LBL is currently accumulating drums of mixed waste on-site. Currently there are 70 drums of mixed wastes at Building 75A. Liquid organic mixed wastes are placed into 55-gallon drums with absorbent and accumulated at the facility.[17] Both compactable and noncompactable solid mixed wastes are also accumulated in Building 75A. When a required permit is approved by EPA and Cal/EPA's DTSC, liquid inorganic mixed wastes (usually corrosive and/or metal-containing) will be treated at Building 75A by neutralization and/or precipitation, then solidified. Due

to an ongoing re-evaluation of the regulatory program applicable to mixed wastes, LBL expects the generation of mixed waste to increase in future years.

LBL also generates small quantities of transuranic (TRU) wastes. Transuranic wastes total 150 pounds per year. Currently, LBL has two drums of transuranic waste on-site, representing 20 years of accumulation of this type of waste. The radioactive constituents are present in trace quantities. TRU wastes are stored as dry salt crystals and oxide solids, in laboratory glassware and metals capsules.[18]

Low-level radioactive wastes are stored and treated at the HWHF. Liquid wastes are analyzed for organics, heavy metals, and activity, and then solidified. Solid low-level wastes are compacted whenever possible (according to regulations). Scintillation vials are crushed to separate the solids from the liquids. Liquids are collected in drums and shipped offsite for incineration if below 50 nano-Ci/gram. Radioactive waste carcasses are kept in freezers until ready to be shipped.[19]

LBL itself does not operate any radioactive waste disposal facilities.[20] LBL uses the Hanford Site, in Washington State, for disposal of its low-level radioactive waste, including induced metal wastes which are self-contained metals made radioactive by bombardment with neutrons or charged particles in accelerators. As a result of evaluating current and future programs and regulatory trends affecting radioactive wastes, LBL expects the amount of low-level waste generated at the facility to decrease in the future.[21]

c. Medical, Biohazardous and Infectious Waste Disposal

Medical wastes are generated at several biomedical research laboratories throughout the facility. LBL has a program for the management of its medical wastes. Sharps are collected in special containers and infectious waste is autoclaved on-site before weekly collection by a licensed medical waste transporter. Currently LBL generates approximately 1,870 pounds of medical waste monthly. Ultimate disposal of LBL medical waste occurs off-site at licensed medical waste disposal facilities.

d. Wastewater

The LBL sanitary sewer system is described in greater detail in Subsection III-M, above. In addition to domestic sewage, LBL generates wastewater from a printed circuit board shop, plating shop, research laboratories, photo processing units, cooling tower blowdown, and a steam cleaning operation.[22]

LBL's wastewater discharges are regulated pursuant to three permits issued by EBMUD. General site discharges are governed by EBMUD Permit No. 066-00791, while the printed circuit board shop in Building 25 and the plating shop in Building 77 have separate EBMUD permits (Nos. 776-00077 and 776-00025, respectively). In conformance with permit conditions, the printed circuit board shop (Building 25) and plating shop (Building 77) have pretreatment systems that remove heavy metals from the rinse water prior to discharge. LBL has submitted to Cal/EPA's DTSC an Initial Notification of Intent to operate these pretreatment systems under a Permit-by-Rule, and intends to submit Facility-Specific Notifications for these pretreatment systems to DTSC on or by the August 1, 1992 deadline for doing so. LBL discharges approximately 27,000 gallons of rinse water yearly to EBMUD from Building 25, and approximately 1,800,000 gallons from Building 77. In addition, about 605 gallons of liquid waste from Building 25 operations, and about 4,730 gallons of liquid waste from Building 77, are transported and disposed of as hazardous waste each year.[23]

Wastewaters discharged to EBMUD are analyzed periodically to ensure that contaminant levels do not exceed permissible levels as established in the permits.[24] In addition, LBL has made consistent efforts to minimize the quantities of waste generated by these two facilities.

A Waste Minimization Opportunity Assessment Report for Buildings 25 and 77 (the Report) was submitted to EBMUD on March 29, 1991.[25] This study was designed to meet not only the requirements of EBMUD, but also to incorporate the process-specific requirements outlined in the draft implementation regulations (No. R-90-31) for SB 14.

In the Report, LBL noted that although waste minimization opportunities were somewhat limited in the Building 25 and Building 77 facilities, due to limited space and highly variable workloads, many waste minimization practices were currently in place.[26] LBL analyzed 25 additional possible techniques for minimizing waste generated by Building 25 operations, selecting ten for implementation by the end of

1992.[27] LBL analyzed 29 additional possible techniques for minimizing waste generated by Building 77 operations, also selecting ten for implementation by the end of 1992.[28]

LBL also has two acid neutralization systems (Building 2 and Building 70A) which treat laboratory wastewaters prior to discharge to the sanitary sewer system. Photo processing wastes are treated via silver recovery units, while spent fixer and developer solutions are collected and shipped offsite; accordingly, only rinse wastewaters from the photo processing units are discharged to the sanitary sewer. Cooling tower blowdown is discharged directly to the sanitary sewer. An oil/water separator discharges wastewater from the steam cleaning operation at Building 76.[29]

e. Stormwater

The surface water drainage pattern and storm sewer system are described in greater detail in Subsections III-C and III-L, above. Stormwater runoff could potentially mingle with hazardous materials near the Hazardous Waste Handling Facility (HWHF), and other areas on the site.[30] LBL submitted a Notice of Intent (NOI) to comply with the State of California General Industrial Stormwater Permit on March 27, 1992.

3. Disposal of Hazardous Materials - Management and Compliance

As a general matter, a formal program for hazardous waste management is fully implemented at LBL, but additional improvements with respect to certain recordkeeping, training and management oversight are needed.

For example, the Tiger Team found that the training program for generators and handlers of radioactive, hazardous and mixed wastes at LBL was not well coordinated or well documented. This and other training related issues are discussed in greater detail in Subsection IV-G, Worker Safety and Health. The Tiger Team also recommended as a general matter that LBL develop an internal audit program for evaluating its compliance with hazardous waste disposal requirements.[31]

As a result of LBL's self-assessment efforts, including a review of the findings and recommendations of the Tiger Team and other sources, LBL has identified several specific categories of hazardous materials disposal issues that require improvements. These include:

a. Hazardous Waste Disposal

In addition to addressing specific hazardous materials disposal deficiencies identified by its own staff, the Tiger Team, and other enforcement agencies, LBL is implementing a comprehensive Waste Management Program Plan (WMPP) to ensure that hazardous waste management activities are in ongoing compliance with applicable laws and regulations. A critical component of the Waste Management Program is an LBL Internal Appraisal Program to ensure adequate management of waste activities at LBL. The program is designed to be responsive to applicable DOE Orders as well as to existing and future hazardous waste regulations. Oversight will be the responsibility of the individual operating division, the EH&S Division, and the Office of Assessment and Assurance, as appropriate.[32] As part of its overall effort to enhance waste management activities at the laboratory, LBL also plans to develop and implement a program to ensure Quality Assurance and Conduct of Operations for the Hazardous Waste Handling Facility.[33] The LBL Corrective Action Plan, prepared in response to the Tiger Team inspection, identifies additional detailed changes in LBL policies and procedures to ensure effective and lawful management of hazardous waste, radioactive waste and medical waste activities.

Efforts are underway to ensure compliance in areas where used hazardous laboratory materials are accumulated prior to transfer to the HWHF, in recordkeeping for land disposal restrictions, and in onsite waste characterization procedures. LBL's internal hazardous materials disposal programs are being improved in the areas of hazardous waste facility inspection protocols, waste minimization program implementation (see Section IV-D), radioactive waste management protocols, hazardous waste tracking systems, and hazardous waste contingency planning.[34] LBL also plans to implement a laboratory-wide closeout procedure when individual researchers leave or when laboratories and/or experiments are terminated.[35]

EH&S began giving improved hazardous waste training in September 1991. The training currently includes three courses. They are Hazardous Waste Generators Training (EHS-343), Radioactive and Mixed Waste Training (EHS-347), and Waste Accumulation Areas Training (EHS-344). This training

is required, for generators of chemical, radioactive and/or mixed waste, as well as for those LBL employees responsible for waste accumulation areas. In addition, two new documents -- PUB 3092 -- *Guidelines for Generators of Hazardous Chemical Waste at LBL* and *Guidelines for Generators of Radioactive and Mixed Waste*, and PUB 3093 -- *Guidelines for Waste Accumulation Areas* -- have been developed. These documents, along with the training, are part of LBL's enhanced communication program to ensure compliance with applicable regulations. In addition, LBL provides Biohazardous/Medical Waste Training (EHS-730). This course is required for all staff that generate biohazardous or medical waste.

LBL's central HWHF has been the subject of extensive review by LBL staff, the Tiger Team, and environmental enforcement agencies. For example, the Tiger Team was critical of the fact that the container staging area lacked adequate secondary containment since some of the surface area contained cracks and there was not a permanent system to drain and remove liquids resulting from leaks, spills, or precipitation.[36] The Tiger Team also identified other recordkeeping deficiencies relating to Building 75 and Building 69 hazardous waste storage facilities.[37]

Inspections and related enforcement actions at LBL's hazardous waste handling facilities are also periodically undertaken by various regulatory agencies. For example, on April 16, 1990, as a result of its annual inspection in January 1990, the toxics unit of the California Department of Health Services (now Cal/EPA's DTSC) issued a Report of Violation and Schedule of Compliance relating to a comprehensive inspection of the HWHF, 90-day Waste Accumulation Areas, Building 77 Waste Pre-treatment unit, and the Building 77 coolant evaporation unit. These problems were promptly corrected by LBL.

DTSC conducted another comprehensive inspection of LBL's hazardous waste handling activities and facilities in November and December 1990. LBL received a Report of Violation on March 21, 1991 dealing with deficiencies of LBL's hazardous waste management programs. LBL completed its corrective actions and submitted detailed responses to DTSC regarding these most recent violations.[38] LBL recently received notice that DTSC has recommended that an enforcement action be commenced based on its November and December 1990 inspection, and discussions regarding these issues are currently underway among LBL, DOE, DTSC, and the State Attorney General's office.

b. Radioactive Waste Disposal

With respect to DOE policy issues, the Tiger Team found that LBL must develop low-level radioactive and mixed waste certification plans and update its management plan for implementation of DOE Order 5820.2A, "Radioactive Waste Management."[39] LBL is in the process of updating its implementation plan for this Order.[40] In updating this Radioactive Waste Management Plan, LBL will enhance systems for compiling information, as well as systems for preparing and reviewing documents required for submittal to Federal, state, and local agencies relative to low-level and mixed waste. The new implementation plan will address all concerns raised by the Tiger Team regarding compliance with DOE Order 5820.2A.[41]

As mentioned above, LBL is also currently storing mixed wastes, containing both radioisotopes and solvents, that are subject to land disposal and onsite storage restrictions.[42] (US/EPA's land disposal restrictions prohibiting storage apply to the mixed waste scintillation solvents and possibly to the contents of some of the other mixed waste containers stored on-site now.) However, since there are no treatment or disposal options for these mixed wastes, the Tiger Team agreed that LBL must continue to store mixed wastes onsite.[43] As part of implementing the Radioactive Waste Management Plan mentioned above, LBL will characterize drums of mixed wastes currently in storage and prepare an inventory that identifies dates of storage and known contents, as per applicable Federal and state regulations, and promptly arrange for off-site disposal when an authorized disposal facility exists.[44]

Similarly, because of continued delays in authorizing operation of the Waste Isolation Pilot Plant (WIPP) facility, transuranic waste (TRU) has been accumulating at the LBL site since the mid-1970s, a situation common to most transuranic waste generators across the country. LBL, however, plans to ship its TRU wastes to the Hanford Site for interim storage pending final disposal at the Waste Isolation Pilot Plan (WIPP).[45] As a part of establishing and implementing its enhanced Radioactive Waste Management Plan, LBL will review and revise its existing certification plan for low-level radioactive wastes[46], and establish a schedule for submittal to the Hanford Site of LBL Certification Plans for mixed and TRU wastes.[47]

c. Medical, Biohazardous and Infectious Waste Disposal

In response to California's new Medical Waste Management Act and Tiger Team recommendations, LBL is developing and implementing a Medical Waste Management Program to be included in the LBL Waste Management Plan.[48] To address a specific issue raised by the Tiger Team, record keeping improvements will be made in the operation of the steam sterilizer in Room 314 of the Melvin Calvin Laboratory.[49]

d. Wastewater

There are two sanitary sewer systems serving LBL: the Strawberry Canyon Sanitary Sewer and the Hearst Sanitary Sewer. LBL wastewater in each sewer system is monitored at the LBL boundary. Periodic sampling is performed by LBL to ensure compliance with the wastewater discharge limits mandated by the East Bay Municipal Utility District (EBMUD). At both monitoring stations, representative composite and grab samples are collected according to a schedule prescribed by the EBMUD wastewater discharge permit. Composite samples are analyzed for metals; grab samples are analyzed for volatile organic compounds, oil/grease, and cyanide.

LBL has on occasion exceeded its EBMUD permit limitations for heavy metals (Building 25 Plating shop, Building 77 plating shop, Strawberry Canyon and Hearst Sanitary Sewer Monitoring Stations) and volatile organics (Strawberry Canyon and Hearst Sanitary Sewer Monitoring Stations).[50] Past enforcement actions due to wastewater discharge violations have resulted in additional compliance efforts by LBL, followed by additional EBMUD sampling to ensure compliance.

An example of a recent violation occurred in March 1991, when a routine wastewater discharge sample taken by EBMUD at the Building 25 Wastewater Treatment Facility was found to have levels of copper which exceeded the permitted level. The elevated levels were caused by the use in the facility's rinse-water of a material which interferes with established methods for testing for copper content. Steps were immediately taken to verify the elevated copper level and identify the root causes of the occurrence. As corrective action for the violation, LBL modified testing procedures for chemicals in wastewater streams, instituted independent laboratory tests of treated water prior to discharge (which included modification of the processing system so as to hold all generated wastewater while awaiting pre-

discharge test results), and retrained Engineering Division personnel regarding timely processing of occurrence reporting. LBL is also revising the relevant Standard Operating Procedures to include the requirement that all new compounds used in PC board processing be evaluated for possible interference with copper testing methods.[51]

In 1990, there were three wastewater discharge violations at the Hearst monitoring station for total chlorinated hydrocarbons. The major contaminants detected were methylene chloride and chloroform. The research activity determined to be the source of the discharge was suspended until an alternative method of handling the wastewater was installed. Also in 1990, four wastewater discharge violations were found at the Strawberry Canyon monitoring station for levels of total chlorinated hydrocarbons. The primary contaminants were 1,1,1-trichloroethane and methylene chloride. The source was determined and has since discontinued the discharges.

LBL has addressed all specific issues of non-compliance with EBMUD permit requirements to date. The LBL *Corrective Action Plan* commits to resolving the issues identified by the Tiger Team and other regulatory agencies to document ongoing compliance with applicable wastewater requirements.[52] In addition, LBL will develop as part of its comprehensive Site Restoration and Groundwater Management Plan *[see also Section IV-I, Remediation Activities]* a Sewer Assessment and Upgrade Plan to ensure additional monitoring and discharge controls.[53] Under that program, portions of the underground sanitary sewer system will be replaced on the basis of the results of a video camera survey of sanitary sewer lines outside of buildings. Sections of sanitary sewer lines ranging in size from 3" to 8" are expected to be replaced. In addition, emergency repairs are being made to correct any spot conditions that indicate separations and offsets in the lines where leakage into the soil is possible. Additional video surveys will be made under separate funding to assess the balance of the sanitary sewer system.

In addition to the legal permit, monitoring, and other compliance requirements, the Tiger Team recommended additional monitoring and more antisiphon devices on several faucets with hoses attached and lying in sinks or connected to photoprocessing baths.[54]

e. Stormwater

The Tiger Team recommended that LBL review new NPDES stormwater permit requirements, particularly with respect to the potential applicability of this new regulatory program to the HWHF.[55] In response, LBL committed in its Corrective Action Plan to determine the applicability of the NPDES stormwater requirements to the HWHF and the rest of the LBL site by reviewing the relevant US/EPA regulations and by consulting with the Regional Water Quality Control Board. LBL determined that it would comply with NPDES Stormwater Permit requirements. In January 1992, preliminary results of analyses of sediment samples that were taken from LBL's stormwater system in preparation for conducting activities that will be required to comply with a Statewide General Industrial Stormwater Permit as a tool for developing a monitoring system showed various chemicals including acetone, 2-butanone, chlorethane, chloroform, 1, 1-dichloroethane, ethylbenzene, methylene chloride, 2-butanol, ethanol, and nitromethane. These results did not, however, undergo quality control checks, and second independent laboratory analytical results have not yet been acquired. LBL provided a copy of its occurrence report for these findings to the City of Berkeley on January 15, 1992. LBL submitted a Notice of Intent (NOI) to EPA Region 9 on March 27, 1992.

f. Construction of Replacement Hazardous Waste Handling Facility

In addition to the general programmatic improvements described above, LBL has obtained preliminary approvals and funding to construct a replacement, state-of-the-art hazardous waste handling facility to respond to the need for more effective waste handling equipment, facilities and quality controls at the site. The replacement facility will consolidate scattered waste handling operations in one modern facility with enhanced safety and waste containment functions. A RCRA Part B Permit application is being prepared by Cal/EPA to authorize operation of the new facility and to continue to operate the existing one until closure. The new Part B Permit is expected to be approved during calendar year 1992.

Notes for Section IV-C:

1. *California Health & Safety Code Section 25124.*

2. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-72.

3. *42 USC § 2114, et seq.*

4. *42 USC § 20716, et seq.*

5. *H&S Code § 25015, et seq.*

6. *33 USC § 12251, et seq.*

7. *Water Code §13000, et seq.*

8. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-38.

9. *56 Federal Register 56,548.* November 5, 1991.

10. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-75.

11. *Ibid.*, p. 3-75.

12. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 1-2.

13. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-76.

14. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, pp. 1-1 to 1-2.

15. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-76.

16. *Ibid.*, p. 3-77.

17. *Ibid.*, p. 3-77.

18. *Ibid.*, p. 3-77.

19. *Ibid.*, p. 3-76.

20. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, pp. 1-1 to 1-2.

21. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, pp. 1-1 to 1-2.

22. *Ibid.*, p. 3-37.

23. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 25 section, p. 2-1; Building 77 section, p. 2-1.

24. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 25 section, p. 3-2; Building 77 section, p. 3-2.

25. Lawrence Berkeley Laboratory, letter to East Bay Municipal Utility District, re: Waste Minimization Opportunities Assessment Report, Lawrence Berkeley Laboratory, March 29, 1991.

26. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 25 section, pp. 4-1 to 4-2; Building 77 section, pp. 4-1 to 4-2.

27. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 25 section, pp. 7-1 to 7-3; p. 8-2.

28. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 77 section, pp. 7-1 to 7-4; p. 8-2.

29. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-37.

30. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, p. 5-66.

31. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, Finding WM/CF-17, p. 3-110.

32. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 9069, p. 5-134.

33. *Ibid.,* Task 2074.

34. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-78.

35. *Ibid.*, Finding WM/CF-18, p. 3-111.

36. *Ibid.*, Finding WM/CF-8, p. 3-95.

37. *Ibid.*, Finding WM/CF-14, p. 3-107.

38. Letter dated April 25, 1991 from LBL and DOE to California Department of Health Services.

39. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, Findings WM/CF-5, 6 and 7, pp. 3-89 to 3-94.

40. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 9106.

41. *Ibid.*, Tasks 4121, 4127, p. 5-103.

42. *Ibid.*, Finding WM/CF-15, p. 3-108.

43. *Ibid.*, p. 3-77.

44. *Ibid.*, Task 8686, p. 5-128.

45. *Ibid.*, p. 3-77.

46. *Ibid.*, Task 9065.

47. *Ibid.*, Task 9066.

48. *Ibid.*, p. 5-122.

49. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, Finding WM/CF-13, p. 3-106.

50. *Ibid.*, Finding SW/CF-1, p. 3-41.

51. Lawrence Berkeley Laboratory, *Unofficial Copy, Final Occurrence Report, Occurrence No. SAN-LBL-ENG-1991-1002*, November 11, 1991, pp. 3 to 5.

52. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Tasks 1010, 1011, 1017, 1018, 1019, and 1020.

53. *Ibid.*, Task 8763 (SAN ID Nos. 2004A and B).

54. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, Finding SW/CF-7 et al., p. 3-54.

55. *Ibid.*, Finding SW/BMPF-2, p. 3-56.

D. HAZARDOUS WASTE MINIMIZATION

Reducing the generation of hazardous wastes requires establishing programs to manage the acquisition, use and disposal of hazardous materials. Collectively such programs result in waste minimization. Requirements for waste minimization are a part of City of Berkeley, County of Alameda, State of California and U.S. EPA regulations (principally RCRA). LBL has a number of these programs planned or implemented. The Tiger Team and the Laboratory's Self-Assessment found that there was substantial progress in this area but that additional resources needed to be made available to address requirements.

1. Hazardous Waste Minimization – Regulatory Setting

RCRA requires generators of hazardous waste to certify, on each Uniform Hazardous Waste Manifest, that a program exists to reduce the quantity of hazardous wastes generated by the facility. While not initially considered a significant component of the RCRA enforcement program, US/EPA's new focus on pollution prevention has resulted in generator inspection protocols that include confirmation of the existence of a hazardous waste reduction plan. Generators must also identify in their biennial reports to the EPA the efforts undertaken and results actually achieved during the year to reduce the volume and toxicity of waste generated. In addition, the *Pollution Prevention Act of 1990*[1] declares that source reduction is a national policy and directs US/EPA to study and encourage source reduction opportunities.

Similarly, under the HWCL, Cal/EPA requires that facilities which treat, store or dispose of hazardous wastes certify that generators sending hazardous wastes to their facilities have established a program to reduce the quantity and/or toxicity of hazardous wastes being generated. This requirement is fulfilled, as a practical matter, when generators complete the Uniform Hazardous Waste Manifest, which includes the generator's certification that it has a hazardous waste reduction plan. California also has two other source reduction regulatory programs:

The *Hazardous Waste Management Act* (HWMA)[2] establishes state policy for managing hazardous wastes, establishing the following strategies in order of preference: source reduction, recycling, treatment, and land disposal. The HWMA imposes no direct requirements on generators.

The *Hazardous Waste Source Reduction and Management Review Act* (SB14)[3] requires generators who annually produce in excess of 12,000 kg of hazardous wastes, or 12 kilograms of extremely hazardous wastes, to evaluate source reduction opportunities, develop and implement a source reduction plan, prepare a plan summary, and prepare hazardous waste management performance reports (and report summaries) in 1991 and every four years thereafter. The plan must include detailed facility process descriptions for each process or activity that creates a hazardous waste stream, hazardous materials inventory and waste data, an evaluation of "potentially viable" source reduction strategies, and a timetable for the implementation of these strategies or a written explanation of why identified strategies will not be implemented. The implementing regulations allow generators to use knowledge of their own processes and procedures to reduce hazardous waste and prevent release of pollutants to the environment. The requirements in the regulations specify the format to be used for documenting that a serious review and evaluation is performed.

Many local agencies, including the City of Berkeley, have aggressive toxics enforcement programs which include (via delegation agreement with DTSC) enforcement of RCRA and the HWCL for generators including the RCRA/HWCL provisions requiring that all generators have a hazardous waste reduction program in place. In addition, provisions of LBL's wastewater discharge permits issued by the East Bay Municipal Utility District (EBMUD) require the preparation of a waste minimization opportunity assessment report containing an audit and plan for pollutants discharged from LBL facilities.

Waste minimization is also an active policy in the operation of DOE facilities. DOE has issued a Waste Reduction Policy Statement which requires all DOE program offices and field operations to institute policies to reduce the total amount of waste that is generated and disposed of by DOE operating facilities through waste minimization (source reduction and recycling) and waste treatment. The policy requires waste reduction to be a "prime consideration" in research activities, process design, and facility design and operations.[4]

DOE Orders 5400.1, 5400.3, and 5820.2A require that the management of hazardous, radioactive, and mixed wastes be accomplished in a manner that minimizes the generation of such wastes. DOE Order 5400.1 also requires the establishment of a Waste Minimization Program that contains goals for minimizing the volume and toxicity of all wastes that are generated, as well as a Pollution Prevention Awareness Program. The implementing guidance to DOE Order 5400.1 permits the two programs to be consolidated.[5] DOE Order 5400.3 establishes DOE hazardous and radioactive mixed waste policies and requirements, and implements RCRA requirements within the framework of the environmental programs established under DOE Order 5400.1. DOE Order 5820.2A establishes policies, guidelines, and minimum requirements by which DOE manages its radioactive, mixed waste, and contaminated facilities. The Order requires the preparation of a waste management plan for each facility that generates, treats, stores, or disposes of DOE wastes. The elements of the waste management plan are incorporated into the site-specific plan, which will indicate actions to minimize hazardous waste generation as specified in the Order. DOE Order 5280.2A contains specific waste minimization requirements for management of high-level, transuranic, and low-level waste. These requirements include the use of source reduction techniques such as process modification, process optimization, and materials substitution.[6]

2. Hazardous Waste Minimization - LBL Activities

LBL has committed to achieve an overall reduction in the generation of hazardous, radioactive, and mixed waste streams through reduced generation at the source, process changes, employee awareness, administrative control, and increased recycling activities. The goal of LBL's waste minimization program is to systematically eliminate or reduce the generation of waste from site operations to prevent or minimize the release of pollution in any environmental medium. The program seeks to make source reduction and environmentally sound recycling integral parts of the philosophy and operations of LBL. It also seeks to develop in all employees an awareness of environmental problems and participation in minimizing the generation of waste materials. The program applies to all site operations, associated support operations, and site contractors that generate any type of waste, including hazardous, radioactive, and mixed waste.[7]

LBL activities in the area of waste minimization are ongoing. LBL has developed and adopted a Waste Minimization and Pollution Prevention Awareness Plan (Waste Minimization Plan, or the Plan), which

serves as a template for future activities in the area of waste minimization. Prior to development of this Waste Minimization Plan, LBL actively pursued several waste minimization techniques, including inventory control; material and process substitution; waste segregation; and toxicity reduction.[8] All of the existing waste management and certification plans and their implementing procedures have incorporated waste minimization techniques and approaches and provided additional waste management guidance. Detailed procedures are outlined in LBL's Waste Generator Guides. Research and development programs at LBL include a waste minimization element in their program plans. Also, during the periodic project reviews, a waste minimization check is included.[9]

LBL developed and submitted an interim waste minimization plan to DOE in the fourth quarter of 1990.[10] LBL has also formulated the Waste Minimization and Pollution Prevention Awareness Plan, submitted a Waste Minimization Opportunities Assessment Report for Buildings 25 and 77 to EBMUD (discussed below), and has prepared a source reduction plan in conformance with SB14. Table IV-D-1 shows the LBL Routine Hazardous Waste Streams Categories for 1990 as included as part of the source reduction review required by SB14. As of December 1991, major waste streams had been identified and evaluated for possible source reduction measures. Each potential source reduction measure was given a weighted score to indicate relative potential savings. Of the source reduction measures chosen, time tables were established for review and implementation. *[See Table IV-D-2, Implementation Schedule for SB14 Plan.]*[11]

Future waste minimization activities at LBL will include conducting assessments on waste-generating operations and processes at LBL to gather and assemble baseline information and further application of the following waste minimization techniques to LBL processes: input material changes; operational improvements; R&D experiment and production process changes; administrative steps; recycling and reuse.[12]

In addition, all contractors to LBL that exceed the EPA criteria for small-quantity generators will be required to establish a Waste Minimization and Pollution Prevention Awareness Program which is consistent with the LBL program. Contractors will prepare program implementation plans to ensure compliance with Federal, state, and local environmental laws and regulations. Contractors will also be responsible for administering the guidance, instructions, and procedures applicable to the operations of their subcontractors temporarily working on site.[13]

Table IV-D-1
1990 ROUTINE HAZARDOUS WASTE STREAMS CATEGORIES

Waste Stream (Categories)	CWC[a]	Quantity (Lbs)
Electroless Copper	132	990
Ethylene Glycol/Water	133	990
Machining and Grinding Coolant/Water	134	13,365
Organic Solvent	214	495
Waste Oil (non-automotive)	221	2,970
Oil/Water Separator Sludge (non-automotive)	222	4
Water/Charcoal/1,1,1-Trichlororethane	343	1,830
Empty Drums from Latex Paint	512	81
Empty Drums from Lacquer Thinner	512	27
Empty Drums from Machining and Grinding Coolant	512	315
Empty Drums from Oil	512	2,673
Empty Drums from Trichlorotrifluoroethane	512	216
Empty Drums from 1,1,1-Trichloroethane	512	162
Empty Drums from Flammable Liquid	512	27
Empty Drums from Acetone	512	54
Empty Drums from Petroleum Naphtha	512	27
Empty Drums from Isopropyl Alcohol	512	54
Empty Drums from Tricholromonofluoroethane	512	27
1,1,1-Trichloroethane	741	1,868
Sulfuric Acid	791	10,993
Ammonium persulfate/Sulfuric Acid	791	2,155
Ammonium Persulfate	791	990
Sulfuric/Nitric Acid	791	10,558
Nitric Acid	791	367
Acid Waste	791	367
Chromic Acid	791	495
TOTAL		**52,100**

Note:
a = California Waste Code

Source: LBL SB14 Hazardous Waste Source Reduction and Management Review, 1990, pp. 1-7.

Table IV-D-2
TIMETABLE FOR IMPLEMENTING SOURCE REDUCTION MEASURES

Major Waste Streams	Start of Implementation
Waste Oil (Non-Automotive)	
Maintenance on Vacuum Pumps	April 1993
Maintenance of Hydraulic Machinery	April 1993
Waste Machining and Grinding Coolant Water	
Evaporate off H_2O Content	June 1994
Spent Empty Drums	
Use Bulk Containers	October 1993
Offsite Exchange of Containers	December 1993
Reduction to Environmental Exposure	Not yet determined
Onsite Exchange	March 1994
Waste Liquids with pH ≤ 2	
Drip Rack, Dragout Reduction	September 1992
Substitute Less Hazardous Material	September 1992
Eliminate Plating Processes from Building 77	Not yet determined
Waste Mercury	
Use Thermometers and Barometers with Less Hazardous Contents	June 1994
Use Different Electrical Switches	September 1994
Aqueous Waste Water	
Reduce Volume of Water	Not yet determined

Source: Lawrence Berkeley Laboratory, *Draft SB14 Report*, December 16, 1991, pp. 1-30.

3. Hazardous Waste Minimization – Management and Compliance

As a general matter, a formal program for hazardous waste minimization is implemented at LBL, but additional improvements are planned with respect to coordination, training and tracking of these activities. For example, the Tiger Team and LBL's Self-Assessment found that plans were in place for most of LBL's hazardous waste streams but that a waste minimization coordinator had not been hired

at the time of the reviews. In addition, the LBL Self-Assessment found that waste minimization plans were not well understood by all of the LBL staff.

LBL has dedicated personnel resources to further expand its hazardous wastes minimization program. LBL has requested, as part of its Environmental Restoration and Waste Management (ERWM) program budget, funding for Waste Minimization Planning Activities.[14,15] LBL has also requested from the DOE Office of Energy Research funds for implementation of Waste Minimization Activities.[16,17]

In October 1991, LBL hired a Waste Minimization Specialist for the Hazardous Waste Management Department. The Waste Minimization Specialist coordinates the waste minimization assessments, assists in establishing new waste minimization projects, reviews material handling practices, applies waste minimization principles to LBL waste generation activities, and assists with development and implementation of personnel training. The Waste Minimization Specialist will also be a member of the Waste Minimization Committee. The Waste Minimization Committee will consist of five to eight members from various departments and divisions of LBL, and will report to the Director of the Environment, Health, and Safety Division. Its primary purpose will be to provide awareness of the Waste Minimization and Pollution Prevention Awareness Program at LBL, identify tasks to be implemented, and provide a mechanism for communication within LBL, among DOE facilities, private industry, and other external entities.[18]

Notes for Section IV-D:

1. *42 USC § 13101, et seq.*

2. *H&S Code § 25179.1, et seq.*

3. *H&S Code § 25244.12, et seq.*

4. United States Department of Energy, *Waste Reduction Policy Statement*, June 27, 1990, pp. 1-2.

5. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, September 1991, p. 3.

6. *Ibid.*, p. 4.

7. Lawrence Berkeley Laboratory, *Waste Minimization Opportunities Assessment Report for Buildings 25 and 77*, March 1991, Building 25 section, pp. 4-1 to 4-2; Building 77 section, pp. 4-1 to 4-2.

8. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, September 1991, pp. 14, 21.

9. *Ibid.*, p. 11.

10. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-18.

11. Lawrence Berkeley Laboratory, *Draft SB-14 Report*, December 16, 1991, p. 1-30.

12. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, September 1991, pp. 19, 21-23.

13. *Ibid.*, p. 11.

14. *Ibid.*, p. 9

15. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-18 (SAN ID No. 2017A).

16. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, September, 1991, p. 9

17. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-19 (SAN ID No. 2017B).

18. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, September, 1991, pp. 9, 15.

E. HAZARDOUS MATERIALS TRANSPORTATION

As a general matter, hazardous materials are transported to and from LBL by authorized vehicles, including common carriers such as Federal Express and the United Parcel Service, over surface streets during ordinary business hours. Hazardous wastes are transferred within and transported from LBL by licensed hazardous waste haulers, likewise over surface streets during ordinary business hours. (For more information about hazardous waste on-site transfers and off-site transportation see subsection IV-C of this chapter.) This subsection IV-E describes the regulatory setting, LBL's activities, and LBL's compliance history, with respect to the transportation of Hazardous Materials.

1. Hazardous Materials Transportation – Regulatory Setting

The U.S. Department of Transportation (DOT) regulates the transportation of hazardous materials between states and to foreign countries. DOT regulations govern all means of transportation, except that U.S. Postal Service (USPS) regulations govern packages sent via mail. DOT regulations are contained in the *Code of Federal Regulations Title 49 (49 CFR)*; USPS regulations are found in 39 CFR. The State of California has also adopted the DOT regulations, as well as authorized routes and inspection locations, for the intrastate movement of hazardous materials. State regulations are contained in *Title 13 of the California Code of Regulations.*

In California, two state agencies have primary responsibility for enforcing federal and state hazardous materials transportation regulations: the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans).

The CHP enforces hazardous materials and hazardous waste labeling and packing regulations. The goal of these regulations is to prevent leakage and spills of material in transit and to provide detailed information to cleanup crews in the event of an accident. Vehicle and equipment inspection and licensing, shipment preparation, container identification, and shipping documentation are all part of the responsibility of CHP, which conducts regular inspections of licensed transporters to assure regulatory compliance.

Common carriers such as Federal Express are the principal transporters of hazardous materials. Common carriers are licensed by the California Highway Patrol (CHP), pursuant to the *California Vehicle Code, Section 32000, et. seq.* This section of the code requires licensing of every motor (common) carrier who transports, for a fee, in excess of 500 pounds of hazardous materials at one time and every carrier, if not for hire, who carries more than 1,000 pounds of hazardous material of the type requiring placards. Most vendors of hazardous materials have their own transportation vehicles, e.g. Van Waters & Rogers supplies and transports many types of laboratory chemicals, Matheson supplies and transports compressed gases.

Every package type used by a hazardous materials shipper must undergo tests which simulate some of the possible rigors of travel. While not every package must be put through such a test, most packages must be able to meet the following generic test: the ability to be (a) kept under running water for one-half hour without leaking; (b) dropped, fully loaded, onto a concrete floor; (c) compressed from both sides for a period of time; (d) subjected to low and high pressure; and/or (e) alternately frozen and heated.

2. Hazardous Materials Transportation - LBL Activities

The following types of materials are transported by vendors or commercial carriers to or from LBL: cryogenics, compressed gases, solvents, gasoline and other fuels, and hazardous materials. In addition, LBL has its own transportation and shipping operations which move chemicals, equipment and supplies daily from both the Building 69 on-site receiving facility or LBL's main receiving facility in Emeryville to the LBL hill site, to the biological research facility at 91 Bolivar Drive, to LBL activities at UC Berkeley, to the LBL printing plant in leased space at 91 Bolivar Drive, and to accounting, travel and business offices in leased space at 2070 Allston Way. (Allston Way receives no chemicals but there may be some materials on the truck when a stop is made.)

Approximately five trips of the daily truck traffic to and from the LBL facility may include vehicles containing hazardous materials; this represents a small fraction of total LBL-related traffic. Of the trucks transporting hazardous materials to LBL, less than one trip per day is by bulk delivery vehicles transporting gasoline, diesel fuel, oil/solvents, compressed gases, or other bulk products.[1] Large

volumes of hazardous materials are generally carried by the vendors; however, common carriers transport much smaller quantities of a larger variety of materials.

3. Hazardous Materials Transportation – Management and Compliance Issues

LBL has not been the subject of any transport-related enforcement actions. However, LBL has identified a number of areas where both the process and administration of the transportation of hazardous materials warrant improvement. For example, in the area of packaging and transportation of hazardous materials, LBL does not have a comprehensive internal management program for its hazardous material transportation activities,[2] which results in non-uniform packaging and different transportation protocols utilized by different LBL organizational units.[3]

LBL has committed to develop additional, site-wide procedures to be used by on-site personnel involved in the packaging, distribution, and transportation of hazardous materials to ensure compliance with applicable laws and regulations.[4] LBL also plans to institute more routine self-assessment and other organizational programs to ensure ongoing review of and compliance with applicable packaging and transportation laws and regulations.[5]

Notes for Section IV-E:

1. This estimate was derived from the information given in the LBL memorandum dated November 7, 1991, from David Saucer to Buck Koonce re: Hazardous Materials Traffic at LBL, as follows:

2 trips per day	a)	LBL van from Emeryville
	b)	Priority carrier (e.g., Federal Express) with radioactive materials for biomed laboratories
2 trips per week		Compressed gas delivered by vendors (counted as a "bulk" delivery)
1 trip per week	a)	Compressed gases delivered by LBL Industrial Gases (bulk)
	b)	Liquid nitrogen/oxygen (bulk)
1 trip every 2 wks.	a)	LBL returning chemicals by priority carrier
	b)	Oils/solvents delivered in 55-gallon drums (bulk)
1 trip per month		Gasoline (bulk)
1 trip every 6 weeks		Liquid propane (bulk)
1 trip every 6 months		Diesel fuel (bulk)

Not counted because no frequency was determinable:

a) Liquid helium delivered by LBL truck to locations at LBL and UC.

b) Hazardous chemicals and compressed gases delivered by commercial carriers (e.g. Viking Freight and Yellow Freight) .

Assumptions:

"Daily" trips occurred 20 days per month. The types of deliveries not counted would not significantly affect the calculation.

Total trips per month (divide by 20 days) = 102. Thus, approximately 5 trips per day may carry hazardous materials.

Total bulk trips per month (see above) = 19. Thus, approximately 1 trip per day may carry bulk hazardous materials.

2. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, Concern PT.8-1, p. 4-107; Concern PT.10-1, p. 4-108; Concern PT.12-1 p. 4-110; Concern PT.2-1, p. 4-102; Concern PT.11-1, p. 4-109; Concern PT.4-2, p. 4-104; Concern PT.1-3, p. 4-101;

3. *Ibid.*, Concern PT.6-1, p. 4-106.

4. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 5005, Task 1057, Task 1061, Task 5006, Task 5014, Task 5008, Task 8684, Task 5013, Task 5011.

5. *Ibid.*, Tasks 2058, 9017, 5004.

F. REGULATED BUILDING COMPONENTS

Research facilities such as LBL have tanks, fixtures and other building components which are subject to specific environmental regulatory programs. A few of the programs most relevant to LBL activities are discussed in this section: underground storage tanks, above-ground storage tanks and bulk storage units, asbestos-containing building materials, and electrical equipment containing polychlorinated biphenyls (PCBs).

1. Underground Storage Tanks

a. Underground Storage Tanks – Regulatory Setting

The *Resource Conservation and Recovery Act* (RCRA) (*42 USC § 6901, et seq.*) includes a program for regulating underground storage tanks (USTs) that contain designated hazardous materials. The implementing regulations establish UST construction, standards for monitoring and performance, a registration system, a release reporting system, closure/cleanup requirements, and financial responsibility requirements. This program is directly administered by US/EPA in California. The state UST laws (*H&S Code § 25280, et seq.*) predate the federal UST program, and include regulations which are similar in scope to the federal program. Regulations implementing the state UST laws are developed by Cal/EPA (via the California State Water Quality Control Board, or SWQCB), and local county or fire departments administer the program's permit, inspection and enforcement requirements. County fire or health departments generally administer the UST program by local ordinance. The City of Berkeley is the local agency designated to permit and inspect USTs, and to enforce UST regulations at LBL.

b. Underground Storage Tanks at LBL

The LBL facility has 14 USTs, all of which contain petroleum products (gasoline, diesel and transformer oil). Eight USTs are new double-walled tanks and six USTs are existing single-walled tanks. The Environmental Protection (EP) Department, the Construction and Maintenance Department (C&M), and the Plant Engineering Department share the responsibility for UST oversight. EP is responsible

for obtaining local permits, submitting quarterly reports to the City of Berkeley, and reporting spills should they occur. C&M responsibilities include monitoring of USTs for leaks, preparing the corresponding documentation and overseeing repair work when needed. The Plant Engineering Department plans tank removals/closures and tank replacement/upgrading/repair work.[1]

c. Underground Storage Tanks – Management and Compliance

LBL is improving its emergency response plan for new USTs that contain petroleum products.[2] *[See also Section IV-I, Remediation Activities.]* LBL has committed to update its Underground Storage Tank Response Plan and to improve its operation of the groundwater monitoring well leak detection system. The Plan will also designate LBL personnel responsible for tracking changes in UST regulations that could have impacts on LBL's UST program so that any new requirements can be implemented in a timely fashion.[3] LBL is also in the process of removing several tanks; these closure activities are proceeding in conformance with applicable federal, state and local requirements for closure of underground storage tanks in the context of implementing the Site Restoration and Groundwater Management Program.[4] Two single-walled tanks at the B76 motor pool were recently removed and replaced by double-walled tanks. There are five remaining single-walled tanks which are planned for replacement with double-walled tanks. One of the double-walled tanks has recently been taken out of service and had its waste oil removed, although it remains in the ground. In addition, four other tanks are planned for removal.[5] The remaining tanks, although they are not leaking, will be replaced with double-walled lined tanks and equipped with detectors and monitors to attain comprehensive regulatory compliance by 1998.

2. Aboveground Storage Tanks

a. Aboveground Storage Tanks – Regulatory Setting

There are no specific federal environmental programs regulating above-ground or compressed gas storage tanks. In California, the *Aboveground Petroleum Storage Tank Act* (AST) (*H&S Code § 25270, et seq.*) applies only to tanks containing petroleum or petroleum products, and requires owners to register with the SWQCB, report and cleanup spills, and prepare and implement Spill Prevention Control and Countermeasure (SPCC) plans. There is no specific state law regulating compressed gas

tanks. Several counties and municipalities have adopted a permit program for facilities which use in excess of designated quantities of designated compressed gases. While specific components of this local regulatory program vary, most include registration and fee requirements, inspection and enforcement programs, and facility standards.

b. Aboveground Storage Tanks at LBL

There are 14 ASTs containing diesel fuel serving fixed electrical generation units at LBL buildings.[6] The principal area for bulk chemical storage at LBL is the Drum Storage Area at Building 69. This area contains spill cleanup kits and an area-wide secondary containment/collection system for spilled materials.[7]

c. Aboveground Storage Tanks – Management and Compliance

As a general matter, LBL has identified a need to improve secondary containment measures at AST locations, including the ASTs at Buildings 51, 71, 76, 70, 10, 934, 50A, 10A, and 62B.[8] LBL has committed to provide appropriate secondary containment for its ASTs.[9]

While removing many horizontal drum storage racks from service and conducting the recent general housekeeping upgrade of LBL facilities, drums containing hazardous materials were temporarily placed in areas at LBL that did not conform with best management practices. LBL plans to cease this interim storage upon construction of upgraded storage racks in 1992.[10]

While LBL has had a formal plan for AST spill control for several years, LBL has recently revised its plan to meet all requirements of a Spill Prevention Control and Countermeasure Plan as specified in state law. This Plan includes general information such as facility descriptions, as well as specific information on storage operations, spill prevention features, maintenance, and inspection procedures for all bulk chemical storage areas on the site. The Plan provides for compliance with relevant regulations and is designed to ensure that LBL employees have straightforward guidelines about management of potentially hazardous materials in ASTs at the site.

3. Asbestos-Containing Building Materials

a. Asbestos-Containing Building Materials – Regulatory Setting

Two major federal laws apply to asbestos-containing building materials (ACBM) at LBL. First, OSHA regulations establish asbestos workplace standards that include permissible exposure limits to asbestos, employee warning and training requirements, and work practice standards. Second, under the *Clean Air Act* (*42 U.S.C.* § *7401* et. seq.), asbestos is regulated as a toxic air contaminant (i.e., hazardous air pollutant); facilities are required to notify US/EPA in advance of any demolition or renovation projects involving designated quantities of building materials that include asbestos.

In implementing programs to meet the requirements of the federal Clean Air Act, local air districts such as the BAAQMD have adopted rules which require owners to provide advance notification of demolition or modification projects involving ACBM, establish asbestos control measures for such projects, impose ACBM onsite storage requirements, establish conditions of disposal to ensure that airborne releases do not occur at disposal sites.

b. Asbestos-Containing Building Materials at LBL

ACBM were commonly used in virtually all types of buildings which were constructed through the 1970's. ACBM are present throughout LBL facilities in pipe insulation, floor tile, mastic, and building (transite) siding.[11] While LBL has not completed a comprehensive inventory of asbestos for the site, LBL did conduct an initial asbestos survey in 1989. This survey concentrated on the older buildings at LBL, which were believed most likely to contain asbestos materials; the initial survey covered 38 of 90 site buildings.

Because of the presence of ACBM in LBL facilities, LBL must conduct abatement and removal activities, particularly in conjunction with the remodelling of older buildings. Responsibility for asbestos regulatory compliance matters at LBL is split among two groups: EH&S and Construction and Maintenance (C&M).

C&M is responsible for performing routine in-house asbestos removal operations. These are generally less than 100 linear feet, 100 square feet, or 35 cubic yards of friable material. C&M currently has one employee who is certified with the State of California as an asbestos removal operations supervisor. Two other site personnel are certified with the state to perform removal operations. All certified personnel receive annual recertification. Larger and more extensive removals are performed by properly licensed asbestos removal contractors. Asbestos disposal guidelines are set forth in LBL's *Draft Procedures for the Hazardous Waste Handling Facility*. According to LBL procedures, asbestos waste must be properly packaged and labeled by the generator prior to transportation. Asbestos disposal records are maintained by the Waste Disposal Management Department of EH&S.[12]

c. Asbestos-Containing Building Materials – Management and Compliance

The Tiger Team found that as a general matter the asbestos removal operations at LBL are being conducted in a manner that ensures that workplace and emissions standards are being met; however, LBL was not uniformly meeting all packaging and recordkeeping requirements. The Tiger Team also indicated that LBL should formalize its asbestos management program to ensure a more comprehensive approach toward minimizing asbestos-related risk to LBL employees and to document ongoing compliance with local, state, and federal regulations.[13]

LBL is developing and implementing a formal Asbestos Management Program, including a training program to ensure effective implementation.[14] LBL has retained a contractor and has hired an air quality professional to develop an Air Toxics Program Plan to assure LBL's compliance with BAAQMD regulations concerning identification, characterization, permitting, and inspection of potential or actual air pollution sources. The plan will detail applicable documentation, record keeping maintenance, and reporting requirements of the new program.[15] With regard to the removal of asbestos, the air toxics professional will be responsible for 1) review of applicable occupational and environmental laws and regulations including BAAQMD Reg. 11 and 40 CFR 61 Subpart M; 2) review of existing LBL procedures; 3) revision of existing procedures which will detail the worker certification process and assure compliance with workplace and ambient air emission standards and recordkeeping and notification requirements, including annual removal quantity tracking. The plan will provide provisions for tracking disposed materials, distinguishing between friable and nonfriable waste, and verifying that subcontractors are filing the required notifications.[16]

4. Polychlorinated Biphenyls (PCBs)

a. PCB Items - Regulatory Setting

Polychlorinated biphenyls, or PCBs, are organic oils that were formerly placed in many pieces of electrical equipment, including transformers and capacitors, primarily as electrical insulators. Years after their widespread and commonplace installation, it was discovered that exposure to PCBs may cause various health effects. In 1979, EPA banned the use of PCBs in most new electrical equipment and began a program to phase out certain PCB-containing equipment.[17]

Regulations promulgated pursuant to the Toxic Substances Control Act (TSCA) establish a schedule for phasing out electrical equipment containing PCBs, and include detailed recordkeeping, training and disposal requirements. These requirements are directly administered by US/EPA. PCBs are also hazardous wastes under RCRA. There is no comparable state program, although PCBs are hazardous waste under, and are thus subject to the requirements of, the California Hazardous Waste Control Laws.

b. PCB Items at LBL

Beginning in 1986, LBL initiated a program to retrofit and/or to replace all of the large PCB transformers (generally transformers greater than 12 kVA) at the site. According to the records maintained by Plant Engineering, the last transformer containing PCB concentrations of between 50 and 500 ppb in the oil was removed from service in November 1990. In FY 1991 LBL initiated a program to identify and remove all remaining large PCB capacitors at the site.[18]

The LBL responsibility for managing PCBs in accordance with the requirements of 40 CFR 761 is shared by four different groups. The Construction and Maintenance Department, through the Electrical department, conducts periodic inspections of transformers and maintains unofficial transformer inspection logs. Plant Engineering maintains the official, complete transformer data sheets and test logs, and also contracts for the removal of large PCB equipment of cleanup of PCB spills. The EH&S Environmental Protection Department (EP) prepares the annual PCB report and maintains applicable PCB-related regulations, and is responsible for the cleanup oversight for small PCB spills. The EH&S

Waste Management Department stores PCB waste destined for offsite disposal and maintains the original records of PCB waste shipment manifests and some test results of PCB waste.[19]

c. PCB Items – Management and Compliance

While confirming that there are no violations of legal requirements relating to PCB Items, the Tiger Team suggested that LBL expand its PCB compliance program to provide for a single repository for all PCB-related records at LBL and to formally designate a PCB coordinator within LBL's EH&S unit.[20] Although not required by law to do so, LBL will implement the Tiger Team's recommendation by developing a comprehensive, written program for the management of PCB-contaminated materials that provides for a central authority for all PCB-related activities and for maintaining documentation of all such activities.[21]

Notes for Section IV-F:

1. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-77.

2. *Ibid.*, Finding GW/CF-4, p. 3-66.

3. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 8729.

4. *Ibid.*, Tasks 1016, 8759, 8761, p. 5-87.

5. Lawrence Berkeley Laboratory, Environmental Restoration and Waste Management Site-Specific Plan, FY 1992-1997, July 1991, pp. 3-6 to 3-7.

6. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-120.

7. *Ibid.*, p. 3-120.

8. *Ibid.*, Finding TCM/CF-1, p.3-123.

9. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Tasks 1016, 2028.

10. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-120.

11. *Ibid.*, p. 3-120.

12. *Ibid.*, p. 3-122.

13. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, p. 5-168.

14. *Ibid.*, Task 2032.

15. *Ibid.*, Task 4049.

16. *Ibid.*, Task 4050.

17. *University of California, San Francisco-Laurel Heights Drafts Environmental Impact Report. Volume 1: Report.* Prepared by the Office of the Vice Chancellor, with assistance from Environmental Science Associates, Inc., October 27, 1989, p. 181.

18. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-121.

19. *Ibid.*, Finding TCM/BMPF-1, p. 3-132.

20. *Ibid.*, Finding TCM/BMPF-1, p. 3-132.

21. *Ibid.*, Task 2036.

G. WORKER SAFETY AND HEALTH

LBL employs a diverse array of scientists, administrators, other support staff, and students. In addition, at any one time, LBL may have close to 100 visiting scientists working at the site. Ensuring worker safety and health was among the first programmatic responsibilities of the EH&S Division, and remains a major component of the integrated environmental, health and safety program now administered by EH&S.

1. Worker Safety and Health – Regulatory Setting

Virtually all of the major federal regulatory programs involving hazardous materials, hazardous waste, hazardous materials transportation, and regulated building components include employee hazard disclosure and training requirements, both to ensure the safe handling of the regulated material and to ensure that employees understand and implement the many recordkeeping and other requirements established by these regulatory programs. Accordingly, an adequate training program is a critical cornerstone of an overall worker health and safety program.

In addition to the worker safety components set forth in these other environmental regulatory programs, there are several regulatory programs which address workplace safety issues in detail. These include the federal *Occupational Safety and Health Act* (*29 USC § 651, et seq.*), which requires that employers provide a safe workplace, that the federal Occupational Safety and Health Administration (OSHA) develop workplace safety standards and practices, that employees be informed of workplace hazards (including chemical exposure data), and that employees receive training on safe workplace practices. For DOE facilities, pursuant to an agreement with OSHA, the federal OSHA program is administered by the DOE.

Hazardous Materials Worker Safety Requirements. Federal OSHA requires that employers obtain from product manufacturers brand-specific MSDSs for hazardous materials; that hazardous materials be appropriately labeled at all times in the workplace; that employers provide employees with copies of MSDSs on request; that employees be adequately trained; and that employers maintain and provide employees with access to workplace injury records. Recently, Federal OSHA established a standard

designed specifically to protect workers in laboratories. In addition to several requirements mentioned above, the OSHA Laboratory Standard requires the development and implementation of laboratory specific chemical hygiene plans and standard operating procedures for specific hazards associated with work in a given laboratory setting; this Standard also requires training and communication about potential hazards that might be found in any given laboratory. The standard applies to research and teaching laboratories as well as laboratories associated with industrial settings.

Radiation Safety Requirements. The DOE has Orders that address occupational protection for workers that may be exposed to radioactive materials in the workplace. In general, DOE has a policy that any exposure to a radioactive material must be as low as reasonably achievable (ALARA). Worker protection standards are set by DOE at five rem annually. Generally, radiation protection standards also prescribe training, dosimetry, workplace monitoring and surveillance, and equipment that should be used to reduce exposures.

Corporate Criminal Liability. The *Corporate Criminal Liability Act* subjects a corporation, and individual managers within a corporation or business, to criminal liability if the corporate management or individual manager: (1) has "actual knowledge of a serious concealed danger that is subject to the regulatory authority of an appropriate agency and is associated with" a product or business practice; and (2) "knowingly fails during the period ending 15 days after the actual knowledge is acquired, or if there is imminent risk of great bodily harm or death, immediately, to do both of the following:" (A) submit a written or oral report to Cal/OSHA describing the seriously concealed danger; and (B) provide a written or oral warning of the seriously concealed danger to employees. Exposure to harmful chemicals is included as a category of "concealed danger." These disclosure obligations are not triggered if the danger is corrected immediately, in the case of imminent risk of great bodily harm or death, or within 15 days, in all other cases. A "manager" includes a person with management authority, including "actual authority for the safety of a product or business practice or for the conduct of research or testing in connection with a product or business practice." The Corporate Criminal Liability Act is administered by local District Attorneys (DAs). Perhaps the most relevant element of this law for laboratory facilities such as LBL is the fact that "serious exposure" is defined as either a one-time or repeated exposure to a hazardous material "to a degree or in an amount sufficient to create a substantial probability that death or great bodily harm in the future would result from the exposure." Adequate worker safety practices, in conjunction with an employee training program and an internal audit program to confirm

that appropriate safety protocols are being implemented, is the most prudent proactive defense to this criminal law for facilities which handle hazardous materials.

Local Standards. Federal and state workplace safety standards have generally been held to preempt conflicting or more stringent state and local ordinances; the scope and continued validity of this preemption of local workplace safety standards is currently being retested in the context of local ordinances establishing standards for Video Display Terminals (VDTs).

Other Requirements. National Fire Protection Association Standard 45 (NFPA 45) - Standard on Fire Protection for Laboratories Using Chemicals, 1986, contains specifications for safely conducting laboratory experiments in which hazardous chemicals are handled or stored. These specifications provide basic protection of life and property in laboratory work areas through prevention and control of fires and explosions; these are not requirements, but are generally employed by organizations in order to protect workers. Many of the standards also serve to protect personnel from exposure to non-fire health hazards of chemicals. In addition, limitations on instructional laboratories are defined and laboratory design is discussed.

National Fire Protection Association Standard 99 (NFPA 99) - Laboratory Standards in Health Related Institutions, Chapter 10 establishes fire prevention procedures, emergency procedures, orientation and training, exit detail, and fire protection measures. Emergency procedures must address alarm activation, evacuation, and equipment shut down procedures and provisions for control of emergencies that may occur in the laboratory. Additional topics addressed by this standard include maintenance, inspection and transfer of gases.

2. Worker Safety and Health - LBL Activities

The Laboratory's main site population is 3,055, which includes employees and visiting scientists. In addition to the main site population there are approximately 165 LBL employees and guests working on the UC Berkeley campus and 120 in other offsite facilities. Approximately 30% of LBL's employees are staff and faculty scientists, 50% are technical and administrative staff, and 20% are graduate students, undergraduates, and postdoctoral fellows.[1] The main site population is projected to increase from 3,055 in 1991 to approximately 3,590 in 1997, including an anticipated increase of 200 guest users

of the Advanced Light Source (ALS). The total projected laboratory population will increase from 3,940 in 1991 to approximately 4,390 in 1997. The long-term projected growth at the site, identified in the 1987 LRDP, allows for an average daily main site population of 4,100 and an overall LBL population of 4,750.[2]

EH&S is responsible for coordinating health, safety and compliance training of LBL employees and guest users of LBL facilities; the Division also ensures LBL's ongoing compliance with workplace safety standards.

Within EH&S, the Industrial Hygiene Department performs functions designed for the protection of occupational health and safety and for compliance with applicable laws and regulations. The Department serves as a resource for information about hazardous agents, hazard assessment, and hazard mitigation (e.g., engineering controls, personal protective equipment, etc.). The Industrial Hygiene Department conducts hazard analyses, including air monitoring, noise dosimetry, and medical surveillance referrals. Other responsibilities include: policy development for chemical hygiene, lab safety, and biosafety.

In addition, the Department implements programs (e.g., the respiratory protection program, the asbestos control program, the bio-hazard and medical waste programs, carcinogen control, etc.) to provide personal protection equipment, training, and workplace exposure information to ensure that LBL workers receive professional assistance in the prevention of illness and injuries at the site. The industrial hygiene bio-hazard program includes training for the proper handling of materials used in bio-medical research. Bio-hazards include blood and blood-borne products, cell and tissue cultures and the proper disposal of wastes. LBL's Life Science program includes several LBL divisions and ranges in work from cholesterol research with humans to cell level biological research.

Also within EH&S, the Radiation Protection Department is responsible for compliance with DOE Orders on radiation protection. This involves the ALARA Program audits and compliance with self-assessment within the EH&S Division Instrumentation Programs. Also included in this department are health physics responsibilities. These responsibilities include assessment of radiation risk shielding requirements for radiation producing machines and other sources. Also included is radiation workplace assessment, and the decontamination and decommissioning of facility operations.

The Radiation Protection Department manages the radiation dosimetry program for LBL employees. They determine dosimetry needs by evaluating the extent of radiation exposure potential for employees and which employees require dosimeters. Although radiation fields and accelerators are limited to prompt radiation within the accelerator itself and low levels of induced radiation, LBL requires all accelerator workers to wear radiation dosimeters as a precautionary measure.

The Radiation Protection Department also audits radiation workplaces to ensure compliance with procedures. They survey radioactive materials and assist with sealed source management and inventories. They are involved in the receipt and distribution of radiation materials on site to ensure compliance with Department of Transportation and DOE's regulations.

The Radiation Protection Department also assists with the Laser Safety Program. This assistance includes the development of new safety and training programs and the maintenance of required safety records. As a part of their functional inspections, radiation assessment personnel inspect new laser installations or modifications to laser installations to ensure hazard control measures are adequate.

The EH&S Division also provides occupational safety support and surveillance. Included in the Occupational Safety Department are the reporting requirements for DOE/OSHA requirements. This includes required reports in the DOE Occurrence Reporting system. They provide trending analysis of accidents and other safety statistics. They work with the LBL Risk Management Department in reviewing trends and analyzing injury and illness records. As part of their normal activities, they provide electrical safety and construction safety support as well. Electrical safety includes general site for project-specific electrical compliance inspections. They review LBL's Operational Safety Procedures for electrical compliance and they provide program and support group consultations to improve electrical safety knowledge and practice.

As part of their normal duties, the EH&S Division performs accident investigations and works with the LBL division safety committees and the Lab-wide Safety Review Committee when necessary.

To ensure that construction sites are safe for both non-LBL employees and LBL employees alike, all construction sites are inspected regularly. As further support, construction and maintenance contracts are reviewed by the EH&S Division to ensure that they have the proper safety program requirements

included. Recent increases in staffing have allowed the occupational safety department to improve their routine audits, identification of OSHA-type concerns and provide guidance on correcting these deficiencies and eliminating the potential for future deficiencies of the same type.

LBL requires that new employees and participating guests on-site for more than one month attend a New Employee Safety Orientation within the first month of employment. The Orientation includes an overview of possible hazards, basic hazard communication, radiation safety orientation, resources and emergency response. This orientation forms the basis for future safety training, which includes specific courses matched to job responsibilities and possible hazardous exposures, such as confined space entry, radiation safety for radionuclide users, respirator training, etc.

At LBL, safety training is a joint responsibility of the Environment, Health and Safety Training Department, the Fire Department, and the employee's line manager. Safety training, including emergency response training and hazard communication training, is accomplished using a variety of tools including classes, written guidelines, distribution of pamphlets, and one-on-one communication with supervisors.

Another training and communication resource at LBL is the laboratory-wide Safety Review Committee, which is comprised of individuals with special expertise in appraising difficult safety hazards. This Committee assists in identifying potential hazards and in communicating ways to protect against such hazards at LBL. In addition to the laboratory-wide Safety Review Committee, each division maintains safety committees that are charged with specific work-area responsibilities including hazard identification, evaluation, and mitigation where needed. These Division safety committees provide effective communication links between and among employees about health and safety requirements and procedures as specified in LBL's safety manual (Publication 3000) as well as about individual employee safety responsibilities at particular job sites.

3. Worker Safety and Health – Management and Compliance

The most comprehensive and recent examination of worker safety and health management and compliance issues was undertaken by the Laboratory as part of its self-assessment in late 1990 prior to the Tiger Team arrival. The Tiger Team then began a review that involved 30 buildings representing more than 1.1 million square feet and covering 1,947 employees.[3] The Tiger Team: (1) observed

routine operations, emergency exercises, and the physical condition of the site and facilities; (2) interviewed management, staff, operators, and craft personnel; and (3) reviewed policy statements, records, procedures, and other relevant documents including LBL's self-assessments.

The Safety and Health Subteam drew several conclusions about worker safety and health at LBL. It noted a pervasive new safety attitude among LBL employees and administrators, who were very receptive to new safety initiatives being introduced throughout the Laboratory at all levels. The Tiger Team also noted, however, that institutional mechanisms for maintaining this environmental and safety awareness, enthusiasm and momentum were lacking at the time of the Assessment, and that despite management's full commitment to an improved safety culture, it had not fully demonstrated its ability to implement and manage the changes which would be necessary to fully achieve this goal.[4]

The Tiger Team also determined that resources applied to critical safety and health functions were not sufficient to support the safety needs of the LBL site.[5] Resources, including staffing, facilities and equipment, are inadequate for the prevention, identification, and timely correction of safety deficiencies, including those in industrial hygiene, radiation protection, occupational safety, quality verification, and maintenance.

Although the Tiger Team did not find instances of noncompliance which constituted an imminent danger to workers or members of the public, the Tiger Team did note other instances of noncompliance with applicable DOE Orders, Federal regulations, and other safety and health requirements. Deficiencies were identified in all functional areas examined in the area of worker safety and health, and can be generally categorized as follows: 1) inadequate or incomplete compliance with regulations designed to monitor and limit laboratory worker exposure to radioactivity; 2) inadequate or incomplete compliance with OSHA standards for general industry and construction; 3) inconsistent or irregular maintenance and updating of operations, procedures, and documentation in a controlled manner, as specified by applicable laws and regulations; and 4) deficiencies in the maintenance of equipment. A total of 456 instances of OSHA non-compliance were identified.[6]

LBL's first response to the Tiger Team's findings was to initiate correction of the 456 OSHA violations. All of the OSHA findings identified by the Tiger Team and in LBL's self-assessment (conducted prior to the Tiger Team Assessment) have been or are in the process of being corrected.[7] More importantly,

LBL's overall management response has been to develop a small number of strategic elements that directly address the root causes of the problems identified by the Tiger Team and which will thus successfully address the underlying causes of deficiencies in the area of safety and health. In addition to the individual tasks undertaken to deal with each safety and health finding, this broader strategy is designed to assure that similar problems do not recur in the future.[8]

LBL has improved its radiation protection program in response to deficiencies found in its instrument calibration program. New instrumentation calibration procedures have been completed. They have been reviewed and validated by the Department of Energy, San Francisco Operations Office. These procedures and new documentation are for fixed and portable radiation survey instruments for all of LBL's facilities and for its site perimeter monitoring program. In addition to these new procedures, additional quality assurance measures have been put in place to assure that radiation assessment, instrumentation's and associated data are free from error. This allows LBL to continue to maintain its low radiation environment for its workers and the public.

LBL has also committed to improve its established safety training as applicable to all categories of LBL employees. These programs are designed particularly to address the deficiencies noted above.[9] Plans for expanding the safety training available from EH&S to better meet regulations include more offerings in the following areas: chemical safety, hazardous materials emergency response, radiation safety retraining, laser safety, and electrical safety.

Appropriate measures are being implemented to control the hazards and use of hazardous chemicals in research laboratories: use and testing of fume hoods, glove boxes for OSHA regulated carcinogens, personal protective equipment and clothing, monitoring, employee orientation and hazard communication, safety showers/eyewash, labeling, collection and proper disposal of wastes, and proper storage facilities. LBL also is implementing improvements in its comprehensive program of monitoring laboratory worker exposure to radioactivity.[10]

LBL is now using a computerized database to track and report noncompliances and associated corrective actions. Also, with the establishment of a central training office, LBL will implement a new data base training tracking system to better ensure that its health and safety training requirements are met. In

addition, continuous self-assessment by LBL will provide for identification and correction of new OSHA findings.[11]

LBL has increased its resources and staffing for ES&H functions *[see Table IV-G-1, below]*.[12] Implementation of the Corrective Action Plan will require the addition of up to 38 new staff members to LBL's EH&S staff. Facilities available to house these additional people are currently inadequate; accordingly, LBL has proposed to develop an Environmental Monitoring and Industrial Hygiene Building, which would provide the necessary laboratory and office space required to support these expanded environmental and industrial hygiene functions.[13] The conceptual design report for this new ES&H facility is currently underway; if approved, funding for more detailed planning, environmental review, and actual construction can become available as early as 1994. The preliminary proposal is for a facility of 28,800 square feet to be sited on previously-developed land in the vicinity of Building 75.

Although not required by applicable law, LBL will also implement the following best management practices: develop a document control system that will ensure that (1) policies and procedures are disseminated to the people needing the information and that they are complete, accurate, and current; (2) that revisions to these policies and procedures are received and old versions are removed from use[14]; and (3) that LBL's internal system for distribution and implementation of DOE requirements under the direction of the UC Office of the President is improved.[15]

LBL will develop and implement a "Notebook" system[16] to demonstrate its program for complying with DOE orders covering Quality Assurance and Conduct of Operations. The purpose of the Notebook system is to describe the requirements for the operation of facilities and to document that those requirements have been fulfilled. It consists of guidance and instructions for sections to be filled out by the applicable LBL staff. These sections include (1) a description of the unit in terms of function and hazards, (2) approved written procedures for normal operation, hazardous waste control, and abnormal conditions, (3) what training consists of, and (4) documentation of training and assessments. This system provides increased assurance that all operations, even in low hazard areas, are conducted with sufficient formality and discipline to achieve compliance with ES&H requirements.

Table IV-G-1
LBL EH&S DIVISION FULL-TIME EQUIVALENTS (FTEs)

Department	Actual FY 91 (Staff FTE)	Proposed FY 92 (Staff FTE)
Fire Department	26	28
Medical	16	17
Other EH&S[a]	42	77
Division Office	3	11
Total	**87**	**133**

Notes:

a = Includes Industrial Hygiene, Operations, Training, Occupational Safety, Environmental Restoration, Radiation Assessment, Site Restoration and Waste Management.

Source: Lawrence Berkeley Laboratory.

In addition to the other occupational health and safety program enhancements described above, a Site Management Plan (SMP) defining all aspects of DOE oversight activities is now being prepared and implemented. The SMP and associated Memorandum of Understanding (MOUs) will define performance indicators and establish the bases for the frequency and level of physical oversight of LBL by DOE-SF.[17] Development and implementation of these programs and of LBL's Corrective Action Plan should provide reasonable assurance that LBL will achieve substantial compliance with applicable worker health and safety laws in the future.

Notes for Section IV-G:

1. *Lawrence Berkeley Laboratory, Draft FY 1992 Site Development Plan (PUB-5304)*, March, 1991, p. 1.

2. *Ibid.*, p. 5.

3. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 4-3.

4. *Ibid.*, pp. 4-4 to 4-5.

5. *Ibid.,* pp. 4-13.

6. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, pp. 6-i to 6-viii.

7. *Ibid.*, pp. 6-i to 6-viii.

8. *Ibid.*, pp. 6-i to 6-viii.

9. *Ibid.*, Chapter 6.

10. *Ibid.*, Tasks 1062, 4036, 9098, 3023, 9195, 2057, 2058, 9167, 1068, 1079, 1080, 1081, 1069, 4074, 4075, 1096, 1097, 1104, 4027, 9077, 4025, 5018, 8684, 1085, 1083, 9117, 1084, 4026, 1086, 1090, 9079, 1094, 9081, 2056, 5019, 5020, 5021, 5022, 9091, 5023, 9152, 1110, 9162, 4028, 5024, 1101, 2021, 1100, 4030, 4029, 4031, 4033, 9195, 4035, 9096, 9099, 2045, 4040.

11. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, pp. 6-1 to 6-viii.

12. *Ibid.*, Task 9195, 9177.

13. *Ibid.*, Task 9177.

14. *Ibid.*, Task 2047.

15. *Ibid.*, Task 3026.

16. *Ibid.*, Tasks 2022, 2023, 2024.

17. *Ibid.*, Tasks 1124, 4056, 4057, 4058, 4060, 4059.

H. EMERGENCY PREPAREDNESS AND RESPONSE

For LBL, a major emergency may include, but not necessarily be limited to the following: a potential significant loss to a building or facility; an emergency that involves more than one building or facility; a situation where a choice must be made in the assignment of relative levels of authority among responding units; a potential hazard to the surrounding community; threats to LBL; civil disturbances; civil alerts; natural disasters such as earthquakes, floods, and landslides; and power and other utility failures.[1]

The underlying philosophy of the LBL plans for response to an emergency is the recognition that each employee has a vital role in the area of safety and emergency action. The emergency plan for an individual building or facility sets forth the response to be taken by individuals in the event of an emergency. The responsibility for action will normally proceed upward through normal departmental lines of authority to the Building Manager and to the LBL emergency groups. Involvement of individuals at a higher level of responsibility will depend on the particular situation.

1. Emergency Preparedness and Response – Regulatory Setting

Many environmental laws include requirements relating to emergency planning and response.

Emergency Planning and Community Right-To-Know. Federal laws, such as the Emergency Planning and Community-Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act, SARA Title III, or EPCRA) require detailed planning to ensure that hazardous materials are properly handled, used, stored and disposed of and to prevent or mitigate injury to health or the environment in the event such materials are accidentally released.

Business Plan Law. Pursuant to the *Hazardous Materials Release Response Plans and Inventory Law of 1985* (the Business Plan Law), local agencies are required to develop "area plans" for response to releases of hazardous materials and wastes. These emergency response plans depend to a large extent on the business plans submitted by persons who handle hazardous materials. An area plan must include preemergency planning and procedures for emergency response, notification and coordination of affected

governmental agencies and responsible parties, training and follow-up.[2] In 1988, the Business Plan Act was amended to include public agencies within the definition of a business. State agencies, including the University of California and LBL, were required to submit to the local administering agency a business plan consistent with state regulations by January 1, 1990. For LBL, the agency designated to receive business plans is the City of Berkeley Environmental Health Division. According to the provisions of the Business Plan Act, local jurisdictions may adopt more stringent requirements or ordinances than those specified in the Law; the City of Berkeley has done this. As of January 1, 1992, state agencies, including facilities administered by the University of California, must comply with these local regulations implementing the Business Plan Act.[3]

Emergency Services Act. Pursuant to the *Emergency Services Act*, the State has developed an Emergency Response Plan to coordinate emergency services provided by federal, state and local governmental agencies and private persons. Response to hazardous materials incidents is one part of this Plan. The Plan is administered by the state Office of Emergency Services (OES); OES coordinates the responses of other agencies including EPA, the California Highway Patrol, the Department of Fish and Game, the Regional Water Quality Control Board, and the Bay Area Air Quality Management District, and the City of Berkeley Public Health and Fire Departments. (See California Government Code, Section 8550.)

National Fire Protection Association Standards. *National Fire Protection Association Standard 99 (NFPA 99) - Laboratory Standards in Health Related Institutions, Chapter 10* establishes fire prevention procedures, emergency procedures, orientation and training, exit detail, and fire protection measures. Emergency procedures must address alarm activation, evacuation, and equipment shut down procedures and provisions for control of emergencies that may occur in the laboratory. Additional topics of discussion include maintenance and inspection and transfer of gases. State Fire Code regulations require emergency prefire plans to include training programs in the use of first aid fire equipment and methods of evacuation.[4]

DOE Orders. DOE Order 5500.3A, Planning and Preparedness for Operational Emergencies, requires DOE facilities to provide training to all workers who may have to take protective actions (e.g., assembly, evacuation) in the event of an emergency. A formal training program must be implemented for the instruction and qualification of all personnel (primary and alternate) comprising the facility emergency response organization to include initial training and annual retraining. A coordinated program of drills

and exercises must be an integral part of the emergency management program. Drills and exercises must be conducted annually to develop and maintain personnel skills, expertise, response capability and to demonstrate an integrated emergency response capability. Although DOE has classified LBL as a nonnuclear facility, the radiological hazards on the site warrant conformance with the performance objective as a best management practice."

Hazardous Material Worker Safety Requirements (Fed/OSHA). The Federal Occupational Safety and Health Administration (Fed/OSHA) is the agency generally responsible for establishing standards for worker safety in the handling and use of chemicals in the workplace. At DOE facilities, pursuant to an agreement with federal OSHA, enforcement of OSHA requirements occurs through DOE. Under the authority of the Occupational Safety and Health Act of 1970, Fed/OSHA has adopted numerous regulations pertaining to worker safety (contained in the *Code of Federal Regulations Title 29 [29 CFR] - Labor*). These regulations set standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries. Some OSHA regulations contain standards relating to hazardous materials handling, including first aid and fire protection.

Federal laws include special provisions for emergency response through hazard communications to employees in research laboratories, including training in chemical work practices. The training must include methods of safe handling of hazardous materials, an explanation of Material Safety Data Sheets (MSDSs), use of emergency response equipment and supplies, and an explanation of the building emergency response plan and procedures. Chemical safety information must also be available. Specific, more detailed training and monitoring is required for the use of carcinogens, ethylene oxide, lead, asbestos, and certain other chemicals listed in 29 CFR. Emergency equipment and supplies, such as fire extinguishers, safety showers and eye washes, must also be kept in accessible places. These regulations also require preparation of emergency action plans (escape and evacuation procedures, rescue and medical duties, alarm systems, and training in emergency evacuation). Conformance with these regulations reduces the risk of accidents, worker health effects, and emissions.[5]

2. Emergency Preparedness and Response - LBL Activities

LBL's potential emergency risks are characteristic of those found in accelerator operations, shops, and a diversity of laboratories for chemical, biological, materials science, and technology development, as

well as other facility support operations. Hazards arise from both radiological and nonradiological activities. Radiation protection for workers and the public is required for accelerators, x-ray units, sealed sources, and radioisotope use. The nonradiological hazards include electrical systems, sources of ignition and combustible materials, rotating and reciprocating machinery, hoisting and rigging operations, lasers, chemicals, moving vehicles, construction activities, and natural phenomena such as storms and earthquakes.

LBL Professional Emergency Response Groups. The LBL emergency response framework consists of (1) facility-wide emergency coordination, (2) an LBL professional emergency response group, (3) LBL volunteer emergency response teams, (4) outside support groups, and (5) the LBL Emergency Response Plan. At LBL, support for emergency response efforts is provided by the Fire Department, Industrial Hygiene Department (IH), Waste Management Department (WM), Environmental Protection Department (EP), Radiation Assessment Department (RA), Medical Services Department, and the Protective Services Group.

The primary purpose of the LBL Fire Department is to protect personnel and property at LBL from harm resulting from fires, explosions, and other hazardous conditions; through preventive efforts and through expeditious control of such events when they do occur. The LBL Fire Department provides first-response rescue and transportation services for medical emergencies. The IH, WM, EP and RA Departments are assigned the responsibility of providing technical guidance and support in the field of health and safety including emergency response support as required by the LBL's management. To carry out its responsibilities, these Departments maintain staffs of specialists qualified in their respective disciplines.

The Medical Services Department provides medical emergency as well as occupational health services for LBL. Nurses and physicians are on duty from 7:30 a.m. until 5:00 p.m.; first aid is available from the Fire Department at night. All fire fighters are also certified Emergency Medical Technicians (EMTs). In addition, the LBL IH Department has on-line access to the various computer databases which provide immediate capability for searches for characteristics of and safety requirements regarding chemicals and other hazardous materials; databases include Chemline, TDB, Toxline and RETCS.[6] The Protective Services Group provides around-the-clock surveillance of laboratory facilities and equipment and emergency support for hazardous materials spills. This group is responsible for the

protection of property and personnel at LBL. This group enforces both the laws of the State of California and the regulations of the University of California, and conducts preliminary investigations to determine violations of the laws of the State of California. This group patrols and responds to alarms in all areas at LBL including six offsite locations.

The LBL Volunteer Emergency Response Team consists of the following elements: Amateur Radio Operators, Ambulance Team, Building Emergency Teams, Building Inspection Teams, Command Center Team, Firefighting Team, First Aid Team, and Traffic Control Team (ATOMS).

Response to Hazardous Materials Incidents. LBL has an open contract with I.T. Corporation to respond to chemical spills. According to this contract, I.T. is on call 24 hours a day, 7 days a week, with a two-hour response time. They are responsible for cleaning up the spill and taking the materials to a DOE/EPA approved treatment or disposal site.[7] Outside emergency response agencies may also be contacted in case of a hazardous materials incident, including the Berkeley Fire Department, Berkeley Division of Environmental Health, Poison Control Center, and ambulance service.[8] Other agencies may also be notified depending on the type and impact level of the incident, including the Department of Energy, San Francisco Office; California Office of Emergency Services; California Department of Health Services; Cal EPA's Department of Toxic Substances Control; California Regional Water Quality Control Board; U.S. Environmental Protection Agency; East Bay Municipal Utility District; U.S. Coast Guard; California Highway Patrol (Oakland); Bay Area Air Quality Management District; Caltrans; National Response Center.[9] Major spills or releases of toxic or flammable materials will be reported to the Department of Energy and City of Berkeley Division of Environmental Health by LBL senior management in accordance with reporting requirements; other agencies are contacted as required.

Facility-Wide Emergency Coordination. The Lawrence Berkeley Laboratory Emergency Plan delineates the line of authority and responsibility for emergency response.

The Director's Office has the responsibility for LBL response during an emergency and at a given level of severity may become directly involved. In this event, the primary function of this organization is to assure that priorities are established, that resources are available and appropriately assigned, that the type and level of response is appropriate and adequate, and that these measures are implemented. The Incident Commander is the person in charge of specialized personnel involved in handling an emergency.

An orderly transition of responsibility is made from the local building or facility organization to the responding support group.

It is conceivable that an emergency may arise which involves multiple locations and/or which requires major involvement from more than one emergency response support group. If this happens and it is not obvious who is to act in the role of Incident Commander, then the Director's Office is called and assumes command as soon as he/she arrives on the scene.[10]

Emergency Preparedness Documentation. LBL emergency preparedness documentation includes the following: LBL Master and Building Emergency Plans, Health & Safety Manual (Publication 3000), RCRA Hazardous Waste Contingency Plans, LBL Fire Department Emergency Pre-Plans, Alameda County Fire Mutual Aid Plan, and Memorandum of Understanding Plan.

Emergency Response Plan. LBL's Emergency Response Plan is comprised of four sections, 1) the Building Emergency Plan, 2) the Fire Department Emergency Pre-Plan, 3) the Memorandum of Understanding, and 4) the Alameda County Fire Mutual Aid Plan. For major emergencies, local, state, and federal support groups are also available. The Emergency Response Plan enables LBL to ensure the most efficient use of all resources (material and human) for the maximum benefit and protection of individuals at or near the facility and for the expedient execution of facility emergency response.

Building Emergency Plan. A specific emergency plan has been prepared for each LBL building or building complex. These plans were prepared under the direction of the Building Manager and the EH&S Division. The objectives of this plan are to prepare building personnel for proper and immediate response to emergency situations, to designate and train a building emergency organization to act during emergencies, and to define the responsibilities of the Building Emergency Staff.

The plan includes instructions and procedures to follow during the following emergencies: illness or injury, fire, smoke or leaking gas, landslide or water damage, electric power failure, mechanical failure, loss of flow or pressure of gas or water, bomb threat, earthquake, road obstruction, civil disturbance, civil alert, release or leak of toxic materials, or release of radiological materials. A copy of this plan is given to the building personnel and it is used as the main source of information in case of an emergency.

The back cover lists phone numbers and agencies to contact for various emergencies, phone numbers of the Building Manager and the Deputy Building Manager, and evacuation procedures.

If an emergency occurs, the appropriate alarm system would be activated and announcements would be made over the LBL PA system to notify personnel of the potential danger. Normally, specific instructions would be given defining the actions to be taken. Announcements would also be made in the event of a radioactive spill or during a toxic or flammable chemical release.

Each Building Emergency plan covers the responsibilities of the personnel prior to, during and after the emergency; a list of the personnel access codes, work and home phone numbers; and a set of floor plans. The floor plans depict the utility shutdown location, the evacuation routes, the assembly area, and the emergency equipment locations.

Fire Department Emergency Pre-Plan. The LBL Fire Department has compiled pertinent fire safety information about all buildings on the LBL site and about four buildings in the proximity of LBL but not within the jurisdiction of LBL. These four buildings are the Lawrence Hall of Science, Space Science Lab, Math Science Research Building, and Animal Behavior Field Station, all under the jurisdiction of the University of California, Berkeley (UCB). Since the closest fire department to these buildings is LBL's, UCB and LBL have agreed that LBL's fire department would respond to an emergency on these four buildings. The list of emergency information on these buildings enables the Fire Department to respond effectively and efficiently.

Fire Protection. The LBL Fire Department, along with the City of Berkeley Fire Department, responds to fire alarms from the Donner Laboratory, Melvin Calvin Laboratory, the Electron Microscope area of the Hearst Mining Building, and Giauque Hall on the UCB campus. The Alameda County Fire Mutual Aid Plan has been established to provide assistance to a fire jurisdiction or group of fire jurisdictions involved in containing a major emergency. The county has been divided into three Mutual Aid Zones: North, South and East; initial requests for mutual aid are to be handled within each county Mutual Aid Zone. LBL belongs in the North Zone. Thus, when LBL resources need assistance to combat an emergency or to provide reasonable protection, North Zone Mutual Aid units could directly assist in combating the emergency or in providing "cover-in" to areas involved in combating a major emergency.

Building Manager Program. The Director's Office has designated a Building Manager for every building under the administrative jurisdiction of LBL. The Building Manager is a senior member of the LBL staff to whom the authority necessary for the position has been delegated. While the Building Managers' functions are largely administrative, they also include specific duties for the promotion of health and safety, namely: 1) preparing, updating, and implementing the emergency plan for their area, 2) taking charge of all emergency actions, 3) acting as point of contact for other departments and individuals with respect to any proposed activities that might affect the safe operation of the building, and 4) providing training programs as needed.

Building Managers are also responsible for ensuring that building facilities are property maintained and that they provide a healthful and safe work environment. To this end, they must survey facilities to identify hazardous conditions, initiate action to correct hazardous conditions, participate in health and safety inspections, prevent or stop unsafe operations whenever they occur, and engage the full cooperation of program managers and supervisors who have the primary responsibility for the safety and operations of the people under their jurisdiction.

In implementing the emergency plan, Building Managers appoint a deputy to assist them and to act as manager in their absence. Also, in large multi-floor or multi-wing buildings, an Assistant Manager has been appointed for each floor, wing, small adjacent building, or group of office trailers.[11]

3. Emergency Preparedness and Response – Management and Compliance

An effective, comprehensive program for emergency preparedness and response has historically been a cornerstone of LBL's safety program. In response to its own ongoing program review efforts and Tiger Team findings and recommendations, LBL has identified a need for: revising the existing Master Emergency Plan (MEP) and Emergency Preparedness Implementing Procedures (EPIPs) to be in accordance with DOE Orders; developing a more comprehensive Emergency Preparedness Training Program for all members of LBL Emergency Response Organization, support teams, and field response teams; developing a more effective emergency response training program for Building Managers and support staff assigned emergency responsibilities; expediting completion of necessary or appropriate facility improvements; conducting quarterly drills and exercises to ensure that LBL has the ability to respond, mitigate, and effect appropriate recovery operations; and conducting an in-depth review of

DOE Orders to determine that LBL is in compliance with these policy and management practice directives. Improvement to achieve an acceptable emergency preparedness program will require allocation of additional resources, manpower, and management support.[12]

Fire and Emergency Response Personnel. The most recent, comprehensive analysis of LBL's Fire and Emergency Response Personnel was undertaken by the Tiger Team. The Tiger Team noted that LBL already has many of the assets necessary to achieve an adequate program, but requires additional staffing to fully implement subtier programs. The Tiger Team also noted that:

- LBL has dedicated, well-qualified people in fire protection positions; in particular, the recently hired Fire Marshal and Fire Protection Engineer have excellent qualifications.

- LBL has taken contractual action to hire a third party to perform in-depth fire protection surveys of all the facilities onsite.

- The recently vacated Fire Protection Engineer position in the Fire Department is in the process of being filled. It is expected that this engineer will be qualified to do in-depth fire protection facility surveys, maintenance evaluations, design reviews, trend analysis, and root cause problem solving.

- The system maintenance activities previously performed by the Fire Department have been transferred to the Construction and Maintenance Department; the two positions that performed these duties have been reclassified and will remain in the Fire Department.

- An inspection program for fire prevention and fire risk reduction, including delegation of the necessary authority and responsibility to make this program successful has recently begun.

As part of its response to self-assessment and Tiger Team findings, LBL will make the following improvements:

- Adopt measurable performance objectives and review the operation of the Fire Department in light of these formal objectives.

- Adopt more detailed operating procedures for each operation required to be performed by the Fire Department.

- Adopt a formal, certified training program designed to keep personnel up-to-date.

- Increase Fire Department staffing levels.

- Evaluate opportunities to improve the fire protection program with more aggressive, results-oriented fire protection environment.[13]

Facilities. Some older LBL facilities or emergency response equipment may not be in proper repair or may not meet applicable laws, regulations, DOE orders or code specifications.

As a general matter, LBL has established an ongoing process of conducting inspections to identify and implement fire protection mitigation requirements.[14] Once identified, the need for further improvements are prioritized and corrected based on the hazard level of the deficiency.[15]

In response to these types of specific concerns, LBL has undertaken the needed improvements or developed an alternate, effective means of achieving the same goal. For example, LBL developed an alternative emergency instruction method using the Fire Alarm system, and will no longer rely on the public announcing system as an "emergency" system.

Safety and health improvements, many of which are ongoing or began as early as FY 1988, include hazardous materials compliance efforts generally, as well as fire protection and seismic upgrades and improvements to safety and medical services. Further seismic stabilization of steep slopes, which is an ongoing process at LBL, is scheduled for FY 1991. Road improvements include widening, replacement of base materials, and elimination of acute curves and blind spots. The modernization program calls for several phases of road rehabilitation, including FY 1994, and 1995.

Major facility health and safety improvements which are currently underway and/or funded include Slope and Seismic Stabilization (required in the Bevalac and Shops Areas), the Original Labsite

Substation Project, the Instrument Support Laboratory Rehabilitation, and the Building 90-Seismic Rehabilitation.

A Safety and Support Services Facility and road safety improvements will enhance safe and efficient operations and movement of staff and materials throughout the site. The proposed Environmental Monitoring and Industrial Hygiene Building would accommodate increased ES&H staff in modernized facilities. Together, these infrastructure improvements will allow LBL to meet accepted standards for its environment, health and safety programs, including providing adequate emergency command and response facilities. In addition, other safety projects are needed for fire safety and emergency egress.[16]

LBL also addresses safety issues in the design and construction phase of new or renovated facilities. For example, use of ordinary lumber for new construction is now controlled by the Construction and Maintenance Department with a document system. Identification and removal of non-treated wood where prohibited, as well as non-compliant electrical cables, is accomplished as part of the comprehensive Fire Protection Engineering Survey and LBL's ongoing self-conducted fire protection inspections.[17] The Advanced Materials Laboratory will be upgraded to provide additional safeguards.[18]

Equipment and Resources. In addition to general review of the Master Emergency Plan, LBL will review and improve space and utilization for the Emergency Operations Center and LBL Fire Department.[19] In addition to the Fire department's comprehensive review and revision of its operating procedures, baseline fire protection survey, and regular self-conducted fire loss surveys and inspections, annual trend and root cause analysis of fire inspection reports will be initiated.[20] LBL has increased the frequency of its fire protection system tests and inspections to meet NFPA standards. The laboratory public address system has been determined not to be an emergency system. However, it is maintained as one of LBL's regular communications systems.[21]

Emergency Preparedness Procedures – Hazardous Materials Incidents. Emergency preparedness documents and procedures require ongoing review and revision under applicable laws.

With respect to SARA requirements, LBL has prepared annual reports on the storage of hazardous chemicals which identify locations and quantities of specific chemicals in storage, as required by SARA

Sections 311 and 312. The reporting requirements of SARA Sections 311 and 312 are currently met by preparing, submitting and updating the Business Plan to the City of Berkeley as specified by California law. The Business Plan has two components. The first component is on annual inventory. The second is a Hazardous Materials Management Plan which is submitted every two years and is commonly referred to as the Business Plan. LBL persons responsible for chemical storage or usage at the site have prepared individual chemical inventories for 1989, 1990, 1991 and 1992, which are used for business plan submission.[22] LBL has submitted a Business Plan dated January 2, 1992 to the City of Berkeley.[23] The most recent chemical inventory was also submitted on January 2, 1992.[24]

The Tiger Team reviewed the existing LBL Master Emergency Plan and Emergency Plan Implementing Procedures (EPIPs) and noted that it should be revised to conform to more recent DOE policy directives.[25] In response to the Tiger Team's findings, LBL has agreed to update and implement enhanced emergency preparedness documents and procedures in accordance with applicable, laws, regulations, and DOE guidance. Programs will be devised and implemented to ensure that all such documents and procedures are updated on a regular and appropriate basis.

LBL is also implementing the emergency response activities and procedures referenced in the LBL Business Plan and identified in their numerous emergency response documents, including LBL's Master and Building Emergency Plans, Health & Safety Manual (PUB-3000), RCRA Hazardous Waste Contingency Plan, LBL Fire Department emergency Pre-Plans, Alameda County Fire and Mutual Aid Plan, and Memorandum of Understanding with University of California, Berkeley. Implementation includes training for local emergency response agencies as well as LBL personnel.

The Master Emergency Plan will be revised to comply with applicable guidelines and regulations, and a full set of EPIPs to implement the Master Emergency Plan will be developed.[26] Using the requirements of the revised MEP, an emergency preparedness drill/exercise program will be prepared, and Laboratory-wide exercises will be developed.[27]

A formal Fire department QA plan consistent with the Laboratory Institutional QA Plan will be developed and implemented, as well as the Function Notebook system.[28] The Fire Department will make comprehensive and continuing reviews of its existing operating procedures, revising and expanding

them where necessary.[29] The training program for LBL fire fighters will be improved.[30] A formal mechanism to keep pre-fire plans current will be established and maintained.[31]

Emergency Preparedness Training Program. The Emergency Preparedness Training Program consists of first aid, cardiopulmonary resuscitation, fire extinguisher use, and Building Manager Orientations. LBL had not provided required formal emergency response training to incident commanders, fire fighting and other environment, health and safety division staff, and emergency response teams in accordance with DOE 5500.3. The need to provide the emergency management organization with an in-depth training program was made evident during the Technical Safety Appraisal (TSA) Emergency Response Exercise.

The Tiger Team found that existing programs of training and preparation might not be sufficient to provide LBL personnel with effective emergency response skills.[32] In response to this concern, LBL has committed to develop and implement a comprehensive program to train emergency response personnel, both on-and off-site, who could potentially respond to emergency incidents which occur at LBL. Using the requirements of the revised MEP, an emergency preparedness drill/exercise program will be prepared, and Laboratory-wide exercises will be developed. A formal method of independent appraisal will be established, including feedback from appraisals, drills, and exercises to make improvements in the MEP, EPIPs, and Emergency Management and Response Organization.[33] Ongoing programs will be developed to educate LBL employees on fire safety, including special training for Building Managers and awareness programs for safe storage and use of flammable liquids.[34]

Notes for Section IV-H:

1. Lawrence Berkeley Laboratory, *Business Plan*, December 1989, p. 23.

2. *University of California, San Francisco - Laurel Heights Draft Environmental Impact Report. Volume 1: Report.* Prepared by the Office of the Vice Chancellor, with assistance from Environmental Science Associates, Inc., October 27, 1989, pp. 180-182.

3. *Ibid.*, pp. 172-73.

4. *Ibid.*, p. 177.

5. *Draft. University of California, San Francisco - Laurel Heights Environmental Impact Report. Volume 1: Report.* Prepared by the Office of the Vice Chancellor, with assistance from Environmental Science Associates, Inc., October 27, 1989, p. 176.

6. *Lawrence Berkeley Laboratory, Site Development Plan Draft Environmental Impact Report,* December 1986, p. 187.

7. Lawrence Berkeley Laboratory, *Business Plan,* December 1989, p. 28.

8. *Ibid.*, p. 28.

9. *Ibid.*, p. 32.

10. *Ibid.*, pp. 23-24.

11. *Ibid.*, p. 24.

12. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 4-70 to 4-71.

13. *Ibid.*, pp. 4-177 to 4-178.

14. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 2173-4.

15. *Ibid.*, Task 8654.

16. *Lawrence Berkeley Laboratory, Institutional Plan FY 1992-97 (PUB-5306),* November 1991, Pg. 9-4)

17. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Tasks 9184, 9179.

18. *Ibid.*, Task 2164.

19. *Ibid.*, Tasks 4084, 4137, 4139, 9172.

20. *Ibid.*, Tasks 4108, 2169, 4102, 4103.

21. *Ibid.*, Task 3006.

22. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-167.

23. Lawrence Berkeley Laboratory, letter to City of Berkeley, December 22, 1989.

24. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-167.

25. *Ibid.*, Concern EP.2-2, p. 4-77; Concern EP.2-4, p. 4-78; Concern EP.6-2, p. 4-90; Concern EP.6-1, p. 4-89.

26. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Tasks 4084, 4081.

27. *Ibid.*, Task 4089.

28. *Ibid.*, Tasks 1900, 2024.

29. *Ibid.*, Tasks 2169, 4103.

30. *Ibid.*, Task 8647.

31. *Ibid.*, Task 4106.

32. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory*, February 1991, Concern EP.4-2, p. 4-82; Concern EP.4-3, p. 4-86; *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, p. 6-222.

33. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 4089.

34. *Ibid.*, Task 8718.

I. REMEDIATION ACTIVITIES

Like many older facilities that have handled hazardous materials, LBL has had leaks and spills which have resulted in contaminated soil and groundwater. In addition to the many environmental compliance responsibilities applicable to ongoing operations, LBL is also subject to a variety of regulatory programs which require that the contamination be cleaned up. The regulatory requirements and status of these cleanup or remediation activities are described below.

1. Remediation Activities – Regulatory Setting

As a general matter, DOE facilities such as LBL are responsible for conducting environmental characterization, restoration and monitoring activities in compliance with all applicable DOE Orders and applicable federal, state, and local regulations. DOE/SF itself is responsible for ensuring that actions undertaken at facilities for which it is responsible are in full compliance with all applicable regulations and requirements.[1] DOE is also required to respond to releases and potentially imminent releases of hazardous substances from sources under DOE custody or control in accordance with the provisions of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Contingency Plan (NCP), and Executive Order 12580, regardless of whether the facility is formally listed as a Superfund site.[2] As a lead agency, DOE is required to notify and coordinate with other cognizant state and Federal Natural Resource Trustees when DOE discovers a release or a threat of release of a hazardous substance, pollutant or contaminant from a DOE facility.[3]

Site Investigation and Characterization

The following federal laws, including detailed implementation regulations and guidance documentation, are applicable to site investigation and characterization activities at LBL: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C. §§ 9601 et seq.; Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA); and certain provisions of the Occupational Safety and Health Act (OSHA). State laws establish similar remediation requirements.

In addition, the following DOE orders are applicable to site investigation and characterization at LBL: General Environmental Protection Program (DOE Order 5400.1); CERCLA Requirements (DOE Order 5044.4); Environmental Protection, Safety, and Health Protection Information Reporting Requirements (DOE Order 5484.1); Emergency Notification, Reporting and Response Levels (DOE Order 5500.2A); and Radioactive Waste Management (DOE Order 5820.2, superseded by DOE Order 5820.2A).

Preliminary Assessments. 40 CFR 300.410 and 300.420 require that lead agencies conduct Preliminary Assessments (PAs) to inventory sites where releases of hazardous substances may have occurred, identify sources of contamination, including a history of waste handling, and evaluate site conditions. PAs include a documented collection or review of data such as site management practices, information from generators, analysis of historical photographs, literature reviews, and interviews. Current EPA guidance for conducting PAs is published in the Office of Solid Waste and Emergency Response (OSWER) Directive 9345.1-01.[4]

The lead agency must prepare field sampling plans, quality assurance project plans, and health and safety plans prior to conducting field activities associated with remedial site inspections and remedial investigations.[5] It is a best management practice to develop sampling plans, quality assurance project plans and project management plans prior to conducting field studies; these plans are similar in scope to Site Inspections (SIs) and Remedial Investigations (RIs) (i.e., investigations of hazardous substance releases).[6]

Radiation Contamination. It is DOE's objective to protect the environment from radioactive contamination to the extent practical.[7] Pursuant to these requirements, contaminated soil should be characterized and documented.[8]

DOE Headquarters must be immediately notified of any discovery of significant radioactive or nonradioactive contamination in the onsite or offsite environment attributable to current or past DOE operations.[9] Operational records (e.g., facility design drawings and modifications, characterization data on contamination levels, prior decontamination activities, and incident reports required by DOE Orders) for all contaminated facilities must be maintained by the cognizant DOE field organization for use in preparing decommissioning plans.[10]

Reports written in response to follow-up investigations or occurrences such as discovery of onsite or offsite contamination must be submitted.[11] A final report must be prepared and forwarded to DOE Headquarters. The report must include a facility description and final radiation survey.[12] After completion of decommissioning, a final radiological and chemical survey report and project final report must be prepared and kept in the facility's permanent record.[13]

Institutional Guidance. DOE field organizations, such as DOE/SF, are required to ensure that the facilities under their responsibility comply with applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Contingency Plan (NCP), and applicable DOE policies, guidelines, requirements, and procedures.[14]

Site Restoration and Environmental Monitoring

It is the policy of DOE to respond to releases of hazardous substances from its facilities in accordance with the requirements of CERCLA, RCRA, Executive Order 12580, and other applicable laws.[15] DOE's responses may include both removal and/or remedial actions, as appropriate, regardless of whether the facility has been placed on the National Priorities List (i.e., has bene named as a Federal Superfund Site).[16] Removal actions include shorter-term, less complex cleanups which are often limited to soil contamination. Remedial actions include longer-term, more complex cleanups which generally include cleanup of both soil and groundwater contamination.

Groundwater Management Program. DOE Order 5400.1, "General Environmental Protection Program," Chapter III, Section 4a requires that a Groundwater Protection Management Program Plan (GPMPP) be completed by May 1990. Elements of the GPMPP include documentation of the groundwater regime with respect to quantity and quality, design and implementation of a monitoring program, a management program for groundwater protection and remediation, a summary of areas that may be contaminated, strategies for controlling sources of these contaminants, a remedial action program that is part of the site CERCLA or RCRA compliance program, and decontamination and decommissioning and other remedial programs contained in DOE directives.

Standards for Boreholes and Monitoring Wells. California Department of Water Resources (CDWR) Bulletin 74-90, "California Well Standards," requires that wells be constructed, maintained, and abandoned in a manner that protects groundwater quality. The bulletin provides minimum guidance

in these areas and requires that the owner assume ultimate responsibility for ensuring that a well does not constitute a significant pathway for the movement of pollutants, contaminants, or poor quality water.

Monitoring wells must be inventoried, marked, maintained, and inspected to ensure the integrity of the monitoring system. Wells that are not protected can be damaged by vehicles and equipment. Cracked casing seals not only allow the casings to loosen, but may also allow surface infiltration along the casing. Wells that are not labeled make field identification more difficult and increase the possibility of collecting a misleading sample. Wells that are not locked can be tampered with and can also increase the possibility of collecting a nonrepresentative sample.[17]

A well is considered permanently inactive if it has not been used for one year unless the owner demonstrates intention to use the well again. The well owner must properly maintain an inactive well, as evidence of intention of continued use, in such a way that:

- the well has no defects that will allow degradation of the quality of water in strata penetrated by the well;
- the top of the well casing is provided with a watertight cover which cannot be removed except with the equipment or tools. Covers must eliminate physical hazard to humans and animals. Any subsurface vault used to house the top of a well casing shall be maintained in a sound condition and shall be watertight;
- the well is marked so that it can be clearly seen and identified; and
- the area surrounding the well is kept clear of brush and debris.[18]

Closure of Underground Storage Tanks. Article 7 of the California State Water Resources Control Board (SWQCB) regulations requires facilities with underground storage tanks (USTs) to install and maintain groundwater monitoring wells, establish and adhere to appropriate sampling schedules, and report the findings of their sampling activities as appropriate.[19] A Groundwater Monitoring Plan (GMP) will be developed as a specific element of the groundwater protection management program by November 1991. The GMP must address regulations and requirements applicable to groundwater

protection and monitoring sampling strategies, sampling and analysis plans, and data management.[20] Both CERCLA and RCRA implementation guidelines require that groundwater regimes should be adequately characterized to understand flow path, source verification of contaminants, and other hydrogeologic features.[21]

Also, DOE Order 5400.1, "General Environmental Protection Program," requires groundwater monitoring as specified in the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (OSWER Directive 9950.1) and the RCRA Comprehensive Groundwater Monitoring Evaluation Document (OSWER Directive 9950.2); it also requires documentation of groundwater quality and quantity.[22]

2. Remediation Activities – LBL Activities

Overall responsibility for management of the Site Restoration Program rests with the Director of the EH&S Division. Technical, administrative, and functional support is provided to the Program Manager by LBL personnel from the Earth Science and Plant Engineering Division. Finally, policy support for program decisions is provided through monthly status meetings, attended by individuals from the Office of Assessment and Assurance, Plant Engineering, Earth Sciences and EH&S Divisions, as well as the Program Director. The DOE/SF Environmental Restoration Program Manager also attends the monthly status report meeting. Discussions at status meetings and minutes of those meetings, prepared by Site Restoration Program staff, have provided the primary vehicles of communication between LBL and DOE/SF regarding the Site Characterization Project. A weekly status report is prepared and sent to DOE/SF, as well as other attendees. A Program Management Plan has been developed that more precisely defines roles and responsibilities for the Site Restoration Program Management staff.[23]

Site Investigation and Characterization

LBL has carried out several surveys to determine the condition of the site with respect to contamination from past activities. Environmental studies, monitoring, and assessments conducted by LBL and SAN indicate that the groundwater, soil, sediment, and biota at LBL have been contaminated with low levels of organic and radioactive substances due to past spills, leaks, accidents or waste handling practices at LBL.[24]

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Summary of Site Investigations at LBL. In 1986, nine on-site and three off-site locations were sampled in order to investigate for possible radioactive and toxic pollutants at LBL. Soil, groundwater (from hydraugers), and vegetation (eucalyptus leaves) samples were collected by LBL Environmental Protection Department staff. The soil samples were analyzed for gamma-emitters, fission products, radiohalogens, transuranics, and EPA priority pollutants. Vegetation samples were analyzed for tritium, and gamma-emitters. Groundwater samples were analyzed for tritium, gamma-emitters, and EPA priority pollutants.[25]

A DOE Environmental Survey Team visited LBL during February 22-29, 1988. In their report, they referred to the 1986 findings of solvents in groundwater and indicated that the polluted groundwater discharging through the hydraugers enters the storm water system, which eventually flows into the San Francisco Bay. They also pointed out the need to follow up on the 1986 study. However, in their conclusions, the DOE survey team reported that "The Survey found no environmental problems at the LBL facility that represent an immediate threat to human life." They recognized, however, that full understanding of some of the identified environmental problems are beyond the scope of that Survey.[26]

Following the outcome of the DOE Environmental Survey, in September 1988 LBL hired Harding Lawson Associates (HLA) to perform a fast track sampling effort at the LBL site. HLA collected water samples from three slope indicators. One of these, situated on the hill east of Building 46, has no LBL facility upstream from it. Chemical analysis of the sample from this slope indicator did not show any contamination. The other two slope indicators were located north and south of Building 53. The water sample from the slope indicator north of Building 53 showed a very low level of chloroform, TCE and PCE, all of them below their respective Safe Drinking Water Act (SDWA) maximum contaminant levels (MCL). The sample collected from the slope indicator south of Building 53, however, showed a relatively high concentration of TCE and PCE, above the MCL.[27]

LBL developed a Site Restoration Program (SRP) in 1989 as the basis for a comprehensive evaluation of past releases at the site. While waiting for project-specific funds to be secured for implementation of the SRP, LBL undertook two additional site characterization efforts using available overhead funds. In addition to the Fast Track Study, the LBL Earth Sciences Division conducted a survey more extensive in scope and involving sampling hydrauger outflows throughout the site, using existing inclinometers and

boreholes to collect groundwater samples and installing and sampling groundwater monitoring wells. Both of these interim studies have provided supporting analytical data to previously available information and confirm the presence of contamination as a result of past releases.[28]

Starting in FY 1991, LBL has conducted detailed investigations to identify environmental impacts of past activities. Hundreds of soil gas samples have been collected from suspected areas and tested for volatile organic compounds (VOC's). A large number of shallow and deep (up to 95 feet) soil samples have been collected and analyzed for VOC's and California Code of Regulations - 17 metals. To date, 11 peripheral monitoring wells have been installed at strategic locations close to the property boundary to monitor the quality of groundwater leaving LBL. Water samples from four monitoring wells located downgradient from previously removed underground storage tanks are analyzed every three months.

In addition, fifteen new site characterization wells have been installed in areas where groundwater contamination was suspected. Water samples from these wells have been analyzed for VOCs and metals. Construction of more site characterization wells is continuing.

LBL is now in the process of a RCRA Facility Assessment (RFA). An RCRA Facility Assessment is the first part of a potentially four-part Corrective Action process undertaken as part of the regulation of an RCRA-permitted facility; in this case, issuance of the RCRA permit for the new Hazardous Waste Handling Facility. The major objectives of a RCRA Facility Assessment are to identify areas from which hazardous wastes or constituents may migrate (these areas are known as "Solid Waste Management Units" or "SWMUs"), collect existing information on contaminant releases, and identify releases or suspected releases needing further investigation. The RFA begins with a preliminary but comprehensive review of pertinent existing information on the facility, and includes a visual site inspection and sampling.

LBL has responded to Cal/EPA's requests for information with regard to the RFA. These responses have indicated that there may be areas of potential contaminations which may have to be further investigated. However, it is not possible at this time to predict what the nature and extent of any corrective action which may be required as part of the permitting process for the HWHF. In response to this requirement, a Corrective Action program has been designed. It includes regulatory oversight for any remediation resulting from releases of hazardous substances.

Building 75D has been identified as a SWMU by the Department of Toxic Substance Control (DTSC) as a part of the RFA. In late 1987 and early 1988, UCB, "with agreement from LBL," retrofitted Building 75D to serve as a temporary chemical waste packaging facility.[29] Further investigation of Building 75D is ongoing as of this time.

Building 75D was also the subject of a DOE inspection on November 9, 1990, and an LBL inspection on November 16, 1990.[30] The inspections identified fire safety issues.[31] Operations at Building 75D were immediately suspended, and corrective action in the form of revised operating procedures, including a limitation on the kinds and quantities of waste which would be handled, was taken.[32]

Depending on the results on the RFA, LBL may be required to undergo the further steps of a RCRA Facility Investigation (RFI), Corrective Measures Study (CMS), and/or Corrective Measures Implementation (CMI) with respect to some areas of suspected hazardous substances contamination. An RFI would require LBL to investigate and characterize specific areas or releases requiring further study. If the potential need for corrective measures is identified during the RFI process, then LBL would be responsible for identifying, recommending, and implementing specific measures designed to cleanup the release or releases.

Previous sampling efforts have revealed contamination of soil and groundwater with VOCs, metals, and tritium. The lateral and vertical extent of the soil and groundwater contamination at LBL is unknown at present. However, analysis of the Hazard Ranking considerations (the factors considered in determining whether a site should be placed under the supervision of CERCLA, or the Federal Superfund program) resulted in an EPA recommendation that no further remedial action be planned under CERCLA. The significant factors of the Hazard Ranking Systems pertaining to LBL, given its population level and functions, were found to be the following: although a release to groundwater appears to have occurred, groundwater within four miles of the site is not used as drinking water; no fisheries or sensitive surface water environments or species are encountered until San Francisco Bay is reached, a distance of three miles from the site; and although observed contamination of soils has occurred in some areas of the site, access to the public is restricted.[33]

There are currently no Interagency Agreements, Compliance Agreements, Consent Orders, or Compliance Decrees from Federal, state, or local authorities involving any actual or potential inactive

waste sites on LBL.[34] Based on information gained since the Tiger Team Assessment, the EPA has recommended that no further action be taken at the LBL site under CERCLA.[35] The planned characterizations and possible remediation of potential inactive waste sites at LBL will probably proceed under the auspices of a RCRA 3004(u) Corrective Action Order (or in a manner consistent with the protocols, methods, and intent of the RCRA Corrective Action Program), as a result of LBL's RCRA Part B application to close the existing Hazardous Waste Handling Facility.[36] Environmental restoration activities associated with the closure of this existing waste handling facility at Buildings 75/75A and 69 include decommissioning and decontaminating Buildings 75/75A and 69 and performing a geotechnical investigation of the existing site.[37] All facility closure activities are scheduled to be complete in FY 1994.[38]

Soil Contamination.

Facility Soil Survey. Soil samples collected in 1986 by LBL indicated the presence of radiological and heavy metals contamination near several buildings. These samples indicated contamination 2 times above background of alpha emitters around Building 4, the site of a previous radioactive waste storage and staging area; tritium activity 100 times above background around Building 75, the location of the National Tritium Labeling Facility; arsenic 1.5 times above background around Building 71; chromium 1.5 to 4 times above background around Buildings 4, 51, 70/70A, 71, 75, and East Canyon; copper 2 times above background around Building 4; lead 2 times above background around Building 74; and nickel 2 to 2.5 times above background around Buildings 51 and 75. Vegetation samples collected at the same time indicated tritium contamination above background around Building 75. This 1986 study was limited in scope and did not characterize the full extent or nature of contaminants in the soil, sediment, and biota at the site.[39]

Building 5. In 1985, LBL identified radioactive contamination in the subsurface soils under a former outdoor waste storage area adjacent to Building 5. Historical records revealed that this area had been used in the past as an accumulation area for radioactive waste materials generated at LBL. Field measurements indicated that radioactive contamination existed not only in the concrete pavement, but also in soils under the concrete. There was also an indication that some migration of radioactive contamination had taken place in the subsurface soils. It should also be noted that historical information which detailed the former use of the contaminated area also suggest that the contamination

released to the environment may have included chemical as well as radiological constituents. However, the decontamination and decommissioning (D&D) project did not consider the potential for chemical contamination.[40] The D&D activities associated with Building 5 characterized (and removed) contaminated materials and soils based on radioactive contamination.[41] LBL has undertaken some remedial actions in the form of decontamination and decommissioning (D&D) at Building 5. The only written record of the D&D activities at Building 5 are the field logbook notes of the environmental health and safety staff member who directed the investigation. LBL has undertaken decontamination and decommissioning (D&D) of the Building 5 area. All radioactive-contaminated concrete and soils were removed for disposal in appropriate offsite disposal facilities.[42]

Cyclotron Decommissioning. The decommissioning of the 184-inch Cyclotron began in October 1987 and was completed in September 1988. An area of uranium contamination was discovered through environmental monitoring performed during the decommissioning project; this contamination was traced to a sump which drained to an underground pipe. LBL has not characterized known uranium contamination remaining underground from decontamination and decommissioning (D&D) activities associated with the 184-inch Cyclotron.

PCB Contamination. There is evidence of PCB contamination in connection with the Bevatron sump near/in Building 51.[43] Environmental Health and Safety Division staff are currently overseeing a study on potential PCB contamination resulting from a number of PCB oil spills which have occurred over the years in the basement and sump areas of the Building 51 Bevatron.[44]

Sewer Line Assessment and Repair. A sitewide assessment of the integrity of existing sanitary sewer lines is currently underway for the purpose of identifying where disruptions in these lines may have created possible soil contamination problems and the need for remediation activities.[45] Preliminary assessment activities appear to link existing sewer lines to soil contamination found during on-going sitewide characterization efforts. Sampling activities are continuing to further identify potential soil and/or water contaminations from existing sewer lines. Assessment activities were completed at the end of FY 1991. The results of these assessment activities will be used to support a request for funds for the replacement of deteriorated sewer lines, and remediation of potentially contaminated soil, as part of the *LBL Sitewide Assessment and Characterization Project* (see below). This project is scheduled to be completed by the end of FY 1997.[46]

3. Remediation Activities – Management and Compliance

LBL has not yet completed a comprehensive characterization of the site for contamination resulting from past activities.[47] However, in the past LBL did some site characterization screening using existing hydraugers, boreholes, and wells, none of which had been installed with adequate quality control and documentation for use in a full-scale site characterization study. Thus, LBL has used the results from the hydrauger sampling as screening tools only and not as the basis for conclusions regarding sources, migration pathways, or levels of contaminants.[48]

A Federal Facility Preliminary Assessment/Site Investigation was recently completed at LBL to determine whether the site is sufficiently contaminated, or presents a sufficient risk to public health and safety or the environment, to warrant listing as a federal Superfund site. US/EPA reviewed the results of the investigation and has concluded that listing is not warranted and that no further action be taken at LBL under CERCLA (the federal Superfund program).[49] Current remediation efforts will proceed in conformance with other applicable legal requirements.

LBL is carrying out the Site Restoration Program (SRP). This program is designed to assess and characterize the extent of siteside soil and water contamination which may have resulted from past laboratory activities. The program was initiated after elevated levels of hazardous substances were found in groundwater outflow from two onsite hydrauger locations, and after a 1988 DOE Environmental survey identified the need for the LBL site to be characterized for soil and groundwater contaminations. In 1992, program activities will consist of a continuation of sitewide assessment activities implemented in FY 1991. Groundwater monitoring wells will be installed, geophysical and soil gas surveys will be conducted and data logging and analysis will be performed. Site characterization activities will be concluded with the scheduled completion of a risk assessment and feasibility study.[50] In addition, LBL has taken steps to ensure performance objectives are defined for the SRP.[51]

This project is an initial element of a substantial five-year Environmental Restoration and Waste Management (ERWM) plan prepared by LBL and DOE to address site contamination resulting from past activities.

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DOE's five-year ERWM Plan reflects its discrete goals of (1) preventing near-term adverse impacts to workers, the public, or the environment; (2) meeting the terms of agreements in place or in negotiation between DOE and local, State, and Federal agencies; (3) reducing out year risks and costs, complying with internal DOE Orders, complying with external environmental laws and regulations not addressed under item 2, and preventing the disruption of Departmental missions; and (4) accelerating overall compliance. A rigorous, risk-based prioritization methodology is under development.[52]

Site-Specific Plans implement DOE's ERWM plan on the facility level. The Site-Specific Plans provide the vehicle for participation by affected parties at the regional and local levels. Also, they will be used by the Operations Offices (e.g., DOE/SF) and DOE Headquarters to measure progress in meeting DOE's goal for environmental cleanup, waste operations, and technology development activities. Each Site-Specific plan will summarize the Corrective Activities, Environmental Restoration, Waste Operations and Technology Development activities being conducted.[53] Both the DOE and LBL ERWM Five-year plans are to updated annually.[54]

LBL Five-Year ERWM Plan. LBL's major objectives for corrective activities, environmental restoration, and waste management are to:

1. Conduct assessment of potential soil and groundwater contamination and perform any needed remediation activities;

2. Plan and execute projects to bring all existing and proposed LBL operations into compliance with all applicable Federal, State, and local environmental regulations; and

3. Continue to manage ongoing and future waste handling operations in an environmentally sound and cost-effective manner.[55]

Projects described in the LBL Five-Year Environmental Restoration and Waste Management Plan (ERWM) are grouped into the following categories: Corrective Activities, Environmental Restoration, and Waste Management. Corrective Activities are defined as projects and activities required to bring active and standby facilities into compliance with external air, surface water and solid waste regulatory requirements and internal DOE requirements.[56] The ERWM Waste Management program consists

of those activities connected with minimization, treatment, storage, and disposal of all radioactive, hazardous, and mixed wastes generated as a result of ongoing operations at active DOE facilities. The projects included in this category describe the work needed to continue to manage ongoing and future waste handling operations in an environmentally sound and cost-effective manner.[57] Environmental Restoration activities are defined as activities concerned with the assessment and cleanup of facilities and sites that have become contaminated from past operations, including activities planned to assess and clean up potentially contaminated sites at LBL, decontamination and decommissioning activities, closure of the existing Hazardous Waste Handling Facility.[58]

The administration of LBL's ERWM program is primarily the responsibility of the Director of the Environment, Health and Safety Division. Preparation of the DOE Environmental Restoration and Waste Management Five-Year Plan by EH&S is coordinated with the Office of Planning and Development. Information input for plan formulation is provided by the following LBL departments and offices: EH&S, Plant Engineering, Budget and Resource Planning, and the Office of Assessment and Assurance. Representatives from these groups form the ERWM Working Group, which is directly responsible for developing the FYP. The principal function of the ERWM Working Group is to develop and update the FYP for review by LBL management and subsequent approval by the LBL Director.[59]

The LBL Environmental Restoration Program activities include a site-wide characterization study to be followed by remediation activities to satisfy requirements of Federal, state and local regulatory agencies. In addition, an assessment of existing sewer lines will be conducted to identify possible soil contamination problems. The existing Hazardous Waste Handling Facility will be closed, and potential contamination cleaned up, in conformance with provisions of a pending RCRA Part B application.[60]

LBL will also develop and prepare a Long Range Environmental Protection Plan to be submitted to DOE/SF.[61] LBL will develop a Site Restoration and Groundwater Management Program (SRGMP) Plan that includes a Groundwater Protection Management Plan, as well as all other required plans related to site characterization and groundwater management.[62] The SRGMP will encompass all LBL programs relating to site restoration and groundwater management, and will include environmental monitoring, site restoration, health and safety, and quality assurance components, as well as elements such as a Spill-Prevention Control and Countermeasures Plan and a Well-Management Plan. A geotechnical firm that specializes in site characterization and related regulatory requirements has been

selected to develop the SRGMP under the direction of the LBL EH&S Division, with technical support from the Earth Sciences Division and the Plant Engineering Department. The development, approval and implementation of the SRGMP, and the subsequent preparation of an RCRA Facility Investigation Report, will fully address all Tiger Team findings, which pertain to Site Contamination Issues; however, the SRGMP will continue beyond the point at which the Tiger Team Findings are closed and will require considerable additional resources.[63]

LBL environmental management site projects and operating activities are essential to correct and restore environmental conditions and to improve the management of waste handling operations in support of DOE's national environmental objectives. In addition to addressing issues arising from current operations, the ERWM Plan achieves and maintains required exposure and risk levels to chemicals in soils and groundwater, in discharges to sewers, and in laboratory buildings. The ERWM Plan for facilities includes the assessment and characterization of chemical contamination and the closure of the existing hazardous waste handling facility. The waste management program plan includes support for the construction of a new Hazardous Waste Handling Facility and enables the assessment of sewer systems integrity and other projects. These ERWM project plans provide for compliance with DOE and other Federal regulations and for meeting requirements established by State and local agencies.[64]

Throughout the term of the project, work with all regulatory agencies with jurisdiction over LBL site contamination issues will continue. Remedial alternatives will be developed, analyzed, and screened to assess cleanup effectiveness, implementability, and cost effectiveness.[65] Remedial activities are scheduled to continue through FY 2002 when all site cleanup work is scheduled to be completed.

LBL will also prepare an Environmental Monitoring Plan outlining all required environmental surveillance and monitoring requirements. The plan will include implementation procedures, surveillance siting criteria, extent and frequency of all monitoring activities, sampling and analysis methodologies, and reporting requirements. The plan will also provide a program that will ensure compliance with all applicable environmental laws and regulations.[66] LBL will then update the existing environmental monitoring procedures and prepare additional procedures to detail a documented monitoring program that will satisfy applicable guidelines.

Notes for Section IV-I:

1. DOE Order 5400.1, "General Environmental Management Program," cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-173.

2. DOE Order 5400.4, "Comprehensive Environmental Response, Compensation, and Liability Act Requirements", cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-178.

3. CERCLA Section 104(b)(2) and NCP Section 300.135(j), cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-178.11.1.

4. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-169.

5. 40 CFR 300.420(c) and 300.430(b) of the NCP, cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-184.

6. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-184.

7. DOE Order 5400.5(6)(b) cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-185.

8. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-220.

9. DOE Order 5484.1, *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-159.

10. DOE Order 5820.2A, *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-159.

11. DOE Order 5484.1, *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-171.

12. DOE Order 5820.2, *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-171.

13. DOE Order 5820.2A, cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-171.

14. DOE Order 5400.1, "General Environmental Protection Program," cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-176.

15. DOE Order 5400.4, CERCLA Requirements, cited in *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-169.

16. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-169.

17. *Ibid.*, pp. 3-68 to 69.

18. *Ibid.*, p. 3-68.

19. *Ibid.*, p. 3-66.

20. *Ibid.*, p. 3-60.

21. *Ibid.*, p. 3-62.

22. *Ibid.*, p. 3-62.

23. *Ibid.*, p. 3-166.

24. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-178.

25. Lawrence Berkeley Laboratory, "Environmental Monitoring at LBL, East Canyon Preoperational Survey," 1986, cited in Ecology and Environmental, Inc., *Federal Facility Preliminary Assessment/Site Inspection Review*, July 1, 1991/September 6, 1991, p. 3.

26. United States Department of Energy, "Environmental Survey for the Lawrence Berkeley Laboratory," February 1988, cited in *Preliminary Environmental Investigations at the Lawrence Berkeley Laboratory.* Prepared for the U.S Department of Energy, November 1990, p. 1.

27. Harding Lawson Associates, "Fast Track Sampling Effort, Lawrence Berkeley Laboratory, Berkeley, California," February 15, 1989, cited in *Preliminary Environmental Investigations at the Lawrence Berkeley Laboratory.* Prepared for the U.S Department of Energy, November 1990, p. 1.

28. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 3-166 to 3-167.

29. Office of Environmental Health and Safety, University of California, Berkeley, Operating Procedures for LBL Building 75D: Temporary Chemical Waste Packaging Location for the University of California at Berkeley, November 23, 1990, p. 1.

30. Office of Environmental Health and Safety, University of California, Berkeley, Operating Procedures for LBL Building 75D: Temporary Chemical Waste Packaging Location for the University of California at Berkeley, November 23, 1990, p. 1.

31. U.S. Department of Energy, Berkeley Site Office, *Letter to Director of Environment, Health and Safety, University of California, Berkeley and Associate Director for Scientific and Technical Resources, Lawrence Berkeley Laboratory, re: Corrective Action Plan for Building 75D-UC Chemical Waste Management Facility,* November 15, 1990, p. 1.

32. University of California, Operating Procedures for LBL Building 75D: Temporary Chemical Waste Packaging Location for the University of California at Berkeley, November 23, 1990, p. 1.

33. Ecology and Environment, Inc., Federal Facility Preliminary Assessment/Site Inspection Review, July 1, 1991/September 6, 1991, pp. 3-19.

34. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 3-163 to 3-164.

35. Ecological Environment, Inc., Federal Facility Preliminary Assessment/Site Inspection Review, July 1, 1991/September 6, 1991, p. 19.

36. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, pp. 3-163 to 3-164.

37. *Lawrence Berkeley Laboratory, Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-13.

38. *Ibid.*, p. 3-13.

39. *Ibid.*, p. 3-220.

40. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-171.

41. *Ibid.*, p. 3-171.

42. *Ibid.*, p. 3-171.

43. *Ibid.*, p. 3-176.

44. *Ibid.*, p. 3-122.

45. *Lawrence Berkeley Laboratory, Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-10.

46. *Ibid.*, p. 3-10.

47. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-220.

48. *Ibid.*, p. 3-166 to 3-167.

49. Ecology and Environment, Inc., Federal Facility Preliminary Assessment/Site Inspection Review, July 1, 1991, p. 19.

50. *Lawrence Berkeley Laboratory Environmental Restoration and Waste Management Site-Specific Plan FY 1992-1997.* Lawrence Berkeley Laboratory, July 1991, p. 3-11.

51. *U.S. Department of Energy. Office of Environment, Safety & Health. Tiger Team Assessment of the Lawrence Berkeley Laboratory.* February 1991, p. 3-174.

52. U.S. Department of Energy, Environmental Restoration & Waste Management 5-Year Plan/Fiscal Years 1992-96, June 1990, p. xiv.

53. DOE Five-Year Environmental Restoration and Waste Management Plan, FY 1992-1996, June 1990, p. 46.

54. DOE Five-Year Environmental Restoration and Waste Management Plan, FY 1992-1996, June 1990, p. 46.

55. Lawrence Berkeley Laboratory Five-Year Environmental Restoration and Waste Management Plan, FY 1992-97, July 1991, p. 1-2.

56. *Ibid.*, p. 3-1.

57. *Ibid.*, p. 3-14.

58. *Ibid.*, p. 3-9.

59. *Ibid.*, p. 2-1.

60. *Ibid.*, p. 3-9.

61. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 1041.

62. *Ibid.*, Task 8761.

63. *Ibid.*, Tasks 2072, 8603, 8751, 8756, 2073, 2084, 2085, 2086, 2083, 8755, 8759, 8761, 8763, 1016, and 9012; SAN ID Nos. 2012A and B, 2004A and B.

64. *Lawrence Berkeley Laboratory FY 1991 Site Development Plan.* Prepared by the Lawrence Berkeley Laboratory for the U.S. Department of Energy, March 1991, p. 9.

65. Lawrence Berkeley Laboratory Five-Year Environmental Restoration and Waste Management Plan, FY 1992-97, July 1991, p. 3-11.

66. *Lawrence Berkeley Laboratory, Tiger Team Assessment, Corrective Action Plan.* November 8, 1991, Task 8742.

J. ENVIRONMENTAL MONITORING

Lawrence Berkeley Laboratory has a monitoring program of surface water, sanitary sewers, and air for radionuclides, heavy metals and volatile organic compounds. The results of this monitoring program are reported annually in the *Annual Site Environmental Report of the Lawrence Berkeley Laboratory.* For purposes of this SEIR, monitoring information for surface water and sanitary sewers is presented in this subsection; air monitoring results are discussed in Section III-J, Air Quality of this SEIR.

Two sanitary sewer systems serve LBL: the Strawberry Sanitary Sewer and the Hearst Sanitary Sewer. Effluent from each sewer is monitored at the LBL boundary. Periodic daily sampling is performed to ensure compliance with the site discharge limits mandated by EBMUD Ordinance No. 311. At both monitoring stations, representative composite and grab samples are collected according to a schedule prescribed by the permit. Composite samples are analyzed for metals; grab samples are analyzed for volatile organic compounds, oil/grease, and cyanide; the sampling stations are also equipped with radiation detection devices.

Tables IV-J-1 through IV-J-3 present the results of monitoring for radioactive materials. Tables IV-J-4 and IV-J-5 provide monitoring trend data for toxic compounds from 1981 through 1990.

1. Radionuclides

LBL monitors for alpha and beta radionuclide emitters generally, and also conducts specific monitoring for tritium in surface water. Table IV-J-1 presents sampling results for 1990 for these categories of radioactive materials and also indicates applicable regulatory standards for each. As shown in Table IV-J-1, there were no exceedances of the applicable standards for even the samples with the maximum amounts of radioactivity detected. The average amount detected for alpha emitters was between two and four percent of the standard; beta emitters range between 23 and 29 percent of the standard. Tritium, as measured in surface samples, averaged approximately 0.5 percent of the standard. With regard to tap water, alpha emitters were less than one percent of the standard, beta emitters were approximately ten percent of the standards and tritium was 0.5 percent of the applicable standard.

Table IV-J-1
SUMMARY OF SURFACE- AND DRINKING-WATER SAMPLES, 1990

	No. of Samples	Concentration (10^{-9} μCi/ml) Alpha Avg.	Alpha Min.	Alpha Max.	Beta Avg.	Beta Min.	Beta Max.
On-site streams							
Blackberry	51	≤0.2	≤0.7	2.2±2	2.2±0.1	0.6±0.5	7±0.7
Lower Strawberry	51	≤0.12	≤0.4	≤1.4	2.1±0.1	≤0.4	8±0.8
Upper Strawberry	51	≤0.3		≤1.3	2.1±0.1	≤0.9	4±1
Average		≤0.2			2.1±0.1		
Off-site streams							
Claremont	50	≤0.3	≤0.7	≤4	1.8±0.1	≤0.6	7.2±1.1
Wildcat	50	≤0.2	≤0.7	≤3	1.5±0.1	≤0.5	5.2±1
Tap water	--	≤0.04	≤0.2	≤0.5	0.8±0.1	≤0.5	1.4±0.6
Standard of Comparison[a]		5			8		

	No. of Samples	Concentration (10^3 pCi/l) Tritium as HTO Avg.	Min.	Max.	Average as % of Standard Alpha	Beta	Tritium
On-site streams							
Blackberry	51	≤0.1	≤0.7	1.1±0.4	4%	28%	0.5%
Lower Strawberry	51	≤0.1	≤0.7	2.6±1	2%	26%	0.5%
Upper Strawberry	51	≤0.1	≤0.7	2.2±1	6%	26%	0.5%
Average		≤0.1			4%	26%	0.5%
Off-site streams							
Claremont	50	≤0.1	≤0.7	1.8±0.6	6%	23%	0.5%
Wildcat	50	≤0.1	≤0.7	1.9±1	4%	29%	0.5%
Tap water	--	≤0.1	≤0.7	1.1±0.7	0.8%	10%	0.5%
Standard of Comparison[a]		20					

Notes:

[a] Source: 40 CFR 141

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 45.

Table IV-J-2 presents the summary of sewage sampling data for the year 1990. Again, for all categories of radioactive materials sampled, there were no exceedances of applicable standards. As a percentage of these standards, alpha emitters at the Hearst Sampling Station, at the Strawberry Sampling Station, and overall for the Laboratory were approximately 0.4; the average for beta emitters ranged from 3.2 percent at the Hearst Sampling Station to two percent at Strawberry Sampling Station with an overall average for the Laboratory of 2.5 percent of the standard. Tritium was measured at 0.01 percent of the applicable standard at the Hearst Station and 0.15 percent at the Strawberry Sampling Station with an overall average of 0.6 percent of the applicable standard for the Laboratory.

Table IV-J-3 displays the trends in sanitary sewer discharge for alpha and beta emitters for the period 1981 through 1990. As these tables indicate, at the Hearst Sampling Station the alpha emitters have ranged from the low average of 0.02 to a high of 0.2 μCi/ml. At the Strawberry Sampling Station alpha emitters have ranged from a low of 0.02 to a high of 0.5 μCi/ml. For beta emitters the sampling mechanism was changed in 1986 and more sensitive detection devices were installed. As shown in Table IV-J-3, for beta emitters the range has been from 9±3 μCi/ml to 32±6 μCi/ml at the Hearst Station and from 20±4 μCi/ml to 400±10 μCi/ml at the Strawberry Station. It is useful to note that at the Strawberry Station the measured amount of beta emitters has declined twentyfold in the past five years.

Table IV-J-2
SUMMARY OF SEWAGE SAMPLING DATA, 1990

	No. of Samples	Concentration (10^{-9} μCi/ml) Alpha[a,b] Avg.	Min.	Max.	Beta[c] Avg.	Min.	Max.
Hearst	96	≤0.2	≤0.7	≤1.5	32±6	6±3	500±100[d]
Strawberry	98	≤0.2	≤0.8	≤1.5	20±4	≤2	120±50
Overall	194	≤0.2			25±6		
Standard for Comparison[e]		50			1000		

	No. of Samples	Concentration (10^3 pCi/l) Tritium Avg.	Min.	Max.	Average as % of standard Alpha[b] %	Beta[c] %	Tritium %
Hearst	51	≤0.2	≤0.7	1±0.9	0.4	3.2	0.01
Strawberry	51	3.0±0.7	≤0.7	35±7	0.4	2	0.15
Overall	102	1.2±0.7			0.4	2.5	0.6
Standard for Comparison[e]		2000					

Notes:

The standards cited here are for ingestion of specific radionuclides and are provided for comparison purposes only.

a = The alpha values are based on 48 Hearst and 49 Strawberry samples, respectively.
b = Conservatively assumed to be ^{232}Th.
c = Conservatively assumed to be ^{90}Sr.
d = The nuclide responsible for the maximum Beta discharge was ^{35}S.
e = Source: Ref. 3.

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 47.

Table IV-J-3
SANITARY-SEWER DISCHARGE TRENDS, 1981-1990

			Concentration (10^{-9} μCi/ml)			
			Hearst			
		Total	Gross Alpha		Gross Beta	
Year	No. of Samples	Flow (10^6l)	Avg.	Max.	Avg.	Max.
1981	49	280	<0.2	1	21	150
1982	42	300	0.05	1.1	20	460±20
1983	49	190	0.05	<5	9	80±7
1984	51	170	0.02	<5	80	1100±50
1985	50	160	<0.2	<3	15	90±10
1986	47	200	<0.1	1±0.3	10±1	50±10
1987	44	140	≤0.1	≤1.4	11±2	80±20
1988	41	160	≤0.1	≤1.1	9±3	25±5
1989	40	80	≤0.2	3±2	13±4	28±10
1990	48	160	≤0.2	≤1.5	32±6	500±100

			Concentration (10^{-9} μCi/ml)			
			Strawberry			
		Total	Gross Alpha		Gross Beta	
Year	No. of Samples	Flow (10^6l)	Avg.	Max.	Avg.	Max.
1981	43	89	0.5	14	240	2500
1982	29	180	0.5	17±12	60	640±40
1983	38	140	<0.4	<20	60	640±401
1984	39	74	0.02	<2	70	250±10
1985	49	120	<0.2	<2	140	1600±30
1986	47	110	<0.1	1.1±0.3	400±10	4200±700
1987	48	120	≤0.1	1.2±1.1	180±40	2200±500
1988	46	120	≤0.1	≤4	43±20	1100±300
1989	43	160	≤0.2	≤2	26±10	190±60
1990	49	100	≤0.2	≤1.5	20±4	120±50

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 48.

2. Toxic Compounds

The tables on the following pages describe the compounds and schedule for sampling of heavy metals and volatile organic compounds at LBL (see Tables IV-J-4 and IV-J-5).

During 1990, there were three wastewater discharge violations at the Hearst Monitoring Station for total chlorinated hydrocarbons. The major contaminants detected were methylene chloride and chloroform. Purchase records were reviewed for these two materials. As a result, the discharge was eventually determined to be the result of a research activity. This activity was suspended until an alternative method of handling the wastewater was installed.

At the Strawberry Monitoring Station, four wastewater discharge violations were found for levels of total chlorinated hydrocarbons. The primary contaminants were 1,1,1-trichloroethane and methylene chloride. A survey was performed of the major branches to the Strawberry Sanitary Sewer System, and the source was identified and corrected.

Table IV-J-4
SUMMARY OF HEARST MONITORING STATION, 1990 SAMPLING DATA

Analyte	No. of Samples	Concentration (mg/l) Min.	Max.	Avg.	Avg. % of Limit	2 x Std. Dev. (mg/l)	No. over Limit	Limit (mg/l)
Arsenic	1	0.01	0.01	0.01	0.70	NA	0	1
Cadmium	11	0.00	0.01	0.00	0.33	0.00	0	1
Chromium	13	0.01	0.37	0.06	2.98	0.20	0	2
Copper	13	0.04	2.40	0.28	5.56	1.28	0	5
Iron	3	1.60	4.69	2.63	2.63	3.41	0	100
Lead	13	0.01	0.11	0.04	1.81	0.07	0	2
Mercury	8	0.00	0.00	0.00	1.35	0.00	0	0.05
Nickel	13	0.01	0.02	0.01	0.22	0.01	0	5
Silver	12	0.01	0.38	0.09	8.93	0.20	0	1
Zinc	13	0.08	3.20	0.40	8.01	1.69	0	5
Chlor HCS*	7	0.01	2.11	0.61	121.57	1.63	3	0.5
Oil & Grease	7	1.00	43.00	19.43	19.43	30.70	0	100
Cyanide	2	0.02	0.02	0.02	0.40	0.00	0	5

* = Chlorinated Hydrocarbons

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 67.

Table IV-J-5
SUMMARY OF STRAWBERRY MONITORING STATION, 1990 SAMPLING DATA

Analyte	No. of Samples	Concentration (mg/l) Min.	Max.	Avg.	Avg. % of Limit	2 x Std. Dev. (mg/l)	No. over Limit	Limit (mg/l)
Arsenic	1	0.01	0.01	0.01	0.50	NA	0	2
Cadmium	12	0.00	0.10	0.02	0.51	0.05	0	1
Chromium	14	0.01	0.17	0.06	3.01	0.09	0	2
Copper	14	0.06	0.98	0.23	4.57	0.48	0	5
Iron	2	1.50	2.70	2.10	2.10	1.70	0	100
Lead	14	0.01	0.04	0.03	1.25	0.02	0	2
Mercury	8	0.00	0.00	0.00	2.05	0.00	0	0.05
Nickel	14	0.01	0.37	0.09	1.77	0.20	0	5
Silver	13	0.01	0.26	0.03	3.42	0.14	0	1
Zinc	14	0.08	1.40	0.26	5.20	0.67	0	5
Chlor HCS*	10	0.01	3.46	0.80	161.00	2.20	4	0.5
Oil & Grease	5	7.00	32.00	17.00	17.00	18.81	0	100
Cyanide	2	0.02	0.02	0.02	0.40	0.00	0	5

* = Chlorinated Hydrocarbons

Source: *Annual Site Environmental Report of the Lawrence Berkeley Laboratory, 1990.* May 1991, p. 68.

K. IMPACTS AND MITIGATION MEASURES

In general, the kinds and quantities of hazardous materials to be used in the future at a research facility such as LBL cannot be known with certainty. It can be expected, however, that the types and quantities of future hazardous materials use will be similar to what is presently used at LBL. Accordingly, this SEIR presumes that the types of chemicals and materials currently used at LBL are generally representative of those that will be used in the future.

Because it is not possible to accurately predict future chemical usage in a research facility some conservative assumptions were used throughout this SEIR to ensure that impact analyses results overstate actual risks that might result from implementation of the proposed project. For example, for purposes of this SEIR, quantities of hazardous materials used and wastes generated were assumed to increase in proportion to the increase in square footage of research space associated with the proposed project. Because of various regulatory requirements associated with the use of hazardous materials, materials usage and waste generation could not practically increase in this fashion. Therefore this analysis is designed to overstate impacts that would result from the proposed action and present a worst case scenario of hazardous materials use and disposal.

The following method was used to project potential impacts. Projected increases in research space (FY 1992 Institutional Plan) during the project period were compared with existing research space to obtain the percentage increase in hazardous materials and wastes for the proposed project. This approach yielded a projected increase in hazardous materials and wastes of 8.5 percent associated with the project.

Thus, for purposes of this SEIR, the projected amount of hazardous materials associated with the proposed project is expected to increase by 13,800 pounds of solid material, 14,650 gallons of liquid material, and 371,250 cubic feet of contained gaseous material. The amount of hazardous waste for the proposed project is projected to increase by 9,100 pounds of solid hazardous waste and 1,100 gallons of liquid hazardous waste. Using the same method of projection, the increase in radioactive materials associated with the proposed project is estimated to increase by 1,650 Curies of radioactive sealed sources and 850 Curies of radioactive materials. The increase in radioactive waste is projected to increase by 3,000 Curies of radioactive waste contained in 17 cubic feet. Again, this method of

projection likely overstates the actual amounts of materials and wastes that would result from implementation of the proposed action; this method is used, for purposes of this SEIR, to ensure that impacts are analyzed with a worst case scenario in mind.

Table IV-K-1
COMPARISON OF INVENTORY AND WASTE MATERIALS

Type	1990-1991	Projected Increase
Hazardous Materials Inventory	Solid: 162,200 pounds Liquid: 172,400 gallons Gas: 4,367,500 cu. ft.	Solid: 13,800 pounds Liquid: 14,650 gallons Gas: 371,250 cu. ft.
Radioactive Materials Inventory	Sealed Sources: 19,600 Curies Other: 10,025 Curies (99.9% Tritium)	Sealed Sources: 1,650 Curies Other: 850 Curies
Hazardous Waste	Solid: 106,900 pounds Liquid: 13,400 gallons	Solid: 9,100 pounds Liquid: 1,100 gallons
Radioactive Waste	3,538,200 Curies, 200 cu. ft.	3,000 Curies, 17 cu. ft.

Source: Lawrence Berkeley Laboratory.

This SEIR also assumes that the scope of environmental regulatory requirements will continue to expand over time, with more detailed regulations applying to an increasing number of LBL's activities. The proposed project will be developed in conformance with such applicable laws and regulations.

1. Standards of Significance

Impacts would be significant if extension of the contract and continued operation of LBL by UC, including development pursuant to the 1987 LRDP, would:

- Create a potential public health hazard or involve the use, production, or disposal of materials that pose a hazard to people or to animal or plant populations;

- Interfere with emergency response plans or emergency evacuation plans;
- Result in unsafe conditions for employees or surrounding neighborhoods;
- Expose building occupants to work situations that exceed health standards or present an undue potential risk of health-related accidents; or
- Conflict with any federal, state or local regulations or DOE Order for the handling, packaging, storage, transport, or disposal of hazardous and radioactive materials and/or wastes.

The impacts identified below are considered potentially significant. Unless otherwise indicated by an asterisk ("*"), compliance with applicable regulatory requirements (assumed as part of the proposed project) and implementation of the recommended mitigation measures will reduce these potentially significant impacts to a less than significant level.

2. Project Impacts and Mitigation Measures

Impact 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.**

Discussion: An important mitigation measure for hazardous materials handling activities, as well as for other activities described in this section of the SEIR, is for LBL to continue to ensure implementation of environmental compliance programs. LBL is required to comply with comprehensive environmental regulations, and various federal, state and local agencies have the jurisdiction to enforce these regulations. LBL compliance is considered part of the "project" for CEQA purposes. In addition to these laws and regulations, the DOE requires its facilities to prepare annual reports that include results of environmental monitoring activities for the facility. As part of this proposed project LBL will continue to prepare and make available to the public upon request the *Annual Site Environmental Report of the Lawrence Berkeley Laboratory* which describes LBL environmental compliance. The

following mitigation measure is included to further facilitate LBL's continuing compliance with laws and regulations applicable to hazardous materials handling:

Mitigation 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 where 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.

Impact 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.**

Discussion: Because LBL is already required to comply with the comprehensive environmental regulations set forth in Section IV-C (*Disposal of Hazardous Materials*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. In particular, LBL must comply with provisions of the following Federal laws applicable to the management and disposal of hazardous materials: the *Resource Conservation and Recovery Act, Pollution Prevention Act of 1990; Clean Water Act; Atomic Energy Act; Low-Level Radioactive Waste Policy Act*; and applicable DOE Orders. LBL must also comply with provisions of the following State and local laws applicable to the management and disposal of hazardous materials: the *Hazardous Waste Control Law; Hazardous Waste Source Reduction and Management Review Act; Medical Waste Management Act; Porter-Cologne Water Quality Control Law*; and East Bay Municipal Utility District wastewater pretreatment programs. To further reduce the potential for adverse impacts associated with the disposal of hazardous wastes, the following mitigation measures are also included. The purpose of these mitigation measures is to minimize the likelihood that LBL will inadvertently send hazardous waste to an unauthorized facility, as well as to reduce the potential for adverse impacts relating to hazardous waste handling.

Mitigation 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.

Mitigation 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.

Impact 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.**

Discussion: Because LBL is already required to comply with the comprehensive environmental regulations set forth in Section IV-C (*Disposal of Hazardous Materials*) and Section IV-E (*Hazardous Materials Transportation*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. In particular, LBL will comply with laws and regulations of the U.S. Department of Transportation, U.S. Postal Service, and the California Vehicle Code which are applicable to the packaging and transportation of hazardous materials and wastes. To assist in ensuring that LBL vendors comply with applicable hazardous materials transportation requirements, LBL routinely includes and updates as needed, provisions in contract specifications requiring its vendors to comply with pertinent regulatory requirements; this will continue as part of the proposed project. In addition, to help reduce the potential for accidents and other problems associated with offsite transportation of hazardous materials and hazardous waste, the following mitigation measure is included:

Mitigation 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.

Impact 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.**

Discussion: Because LBL is already required to comply with the comprehensive environmental regulations set forth in Section IV-F (*Regulated Building Components*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. In particular, LBL will comply with applicable provisions of Federal and state laws which regulate the following types of building fixtures and components: underground storage tanks (*Federal Resource Conservation and Recovery Act*, California Underground Storage Tank laws, and City of Berkeley implementation requirements for California Underground Storage Tank laws); aboveground storage tanks (*California Aboveground Petroleum Storage Tank Act*); asbestos-containing building materials (*Federal Clean Air Act*, OSHA Regulations, *Toxic Substances Control Act*, and *California Asbestos Notification Act*), and electrical equipment containing polychlorinated biphenyls, or "PCBs" (*Federal Toxic Substances Control Act and California Hazardous Waste Control Law*). It should be noted that the upgrading and removal activities planned as part of the project will reduce the likelihood of harm resulting from underground storage tanks, aboveground storage tanks, asbestos-containing building materials, and electrical equipment containing polychlorinated biphenyls.

Mitigation: 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 biphenyls.

Impact IV-K-5: **Continued UC operation of LBL, including proposed increases in laboratory and facility space, will result in increased numbers of employees and thus increase the potential for exposures to hazardous or radioactive materials.**

Discussion: Because LBL is already required to comply with the comprehensive environmental regulations set forth in Section IV-G (*Worker Safety and Health*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. In particular, LBL must comply with provisions of the *Federal*

Occupational Safety and Health Act and its associated regulations applicable to the safety and health of workers in laboratory and other workplace settings. In addition, in enforcing these regulations for DOE facilities, the DOE has established Orders and various other types of directives to further ensure substantial compliance with occupational regulations. Moreover, separate worker protection standards exist for employees that may be exposed to radioactive materials. These are established and enforced by various regulatory agencies, including the DOE. LBL must and will comply with these standards as well. The following mitigation measures are included to ensure LBL's compliance with applicable laws and regulations.

Mitigation 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.

Impact 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.

Discussion: Because LBL is already required to comply with the comprehensive environmental regulations set forth in Section IV-H (*Emergency Preparedness and Response*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. For example, LBL must comply with pertinent requirements of the *Federal Emergency Planning and Community-Right-to-Know Act (EPCRA); Federal Occupational Safety and Health Act; California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act); California Emergency Services Act*; National Fire Protection Standards; and applicable DOE Orders. In addition, although not required by applicable law, the following mitigation measure is included to ensure LBL's compliance with applicable laws and regulations. The purpose of this mitigation measure is to require more frequent, sitewide update of the LBL emergency plan than is currently required by law. Implementation of this mitigation measure will also decrease the likelihood of unauthorized releases of hazardous materials and thus also reduce the potential for emergency conditions involving dangerous chemical exposures or spills to the environment.

Mitigation 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.

Impact IV-K-7: **Continued UC operation of LBL, including proposed increases 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.**

Discussion: Because LBL is already required to comply with the comprehensive remediation requirements set forth in Section IV-I (*Remediation Activities*), and because various federal, state and local agencies already have jurisdiction to enforce these regulations, LBL compliance is considered part of the "project" for CEQA purposes. In particular, LBL must comply with pertinent requirements of the following Federal laws and regulations: *Comprehensive Environmental Response, Compensation, and*

Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA); Federal Occupational Health and Safety Act; and applicable DOE Orders; as well as State of California laws which mandate similar or more stringent requirements. The purpose of the following mitigation measure is to supplement regulatory requirements for reporting spills, leaks, upset conditions, or other unauthorized releases of hazardous materials into the environment by continuing to provide members of the staff and the public with monitoring program documentation.

Mitigation 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.

3. Cumulative Impacts and Mitigation Measures

The project would result in the increased handling of hazardous materials generally in the Berkeley area. However, 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.

In addition, the project would increase the quantity of various types of hazardous wastes which are being generated in California as a whole. California itself lacks adequate disposal capacity to handle current or projected quantities of hazardous wastes generated within the state, and has embarked on a hazardous waste facility siting and development process to provide the needed disposal capacity. Until these facilities have been developed, however, LBL and other California generators continue to rely on licensed hazardous waste treatment and disposal facilities located outside of California. While California's current lack of adequate hazardous waste treatment and disposal capacity is not desirable, it is not considered a significant adverse impact based on CEQA standards.

In order to properly evaluate the cumulative impacts of increased waste generation on treatment and disposal, potential impacts must be evaluated on a national scale. Currently different treatment and

disposal options exist for various waste streams. For example, some local DOE facilities currently send scintillation fluids to a permitted facility in Florida for treatment and disposal. Similarly, other DOE facilities around the country ship radioactive waste to the Nevada Test Site for disposal.

DOE is evaluating national capacity and the relative cumulative impacts of waste generation on treatment and disposal facilities as part of the Programmatic EIS for Environmental Restoration and Waste Management. Due to the lack of information currently available from the DOE, the cumulative impacts associated with increased waste generation from DOE facilities nationwide are considered by DOE to be significant and unavoidable at this time.

As described in previous subsections of this SEIR, as part of the proposed project, LBL will continue to comply with applicable laws and is implementing a number of programs to ensure reduced acquisition of hazardous materials and minimization of waste generation; this will occur throughout the timeframe for implementation of the project and will serve partially to mitigate potential cumulative impacts associated with increased hazardous materials and wastes.

CEQA CONSIDERATIONS

Growth Inducing Impacts

Summary of Cumulative Impacts

Significant Irreversible Changes in Relationships Between Short-Term Uses and Long-Term Productivity

V. CEQA CONSIDERATIONS

CEQA requires an EIR include statements regarding the project's: (1) growth-inducing impacts; (2) cumulative impacts; and (3) significant irreversible changes in the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. Special attention is to be given to impacts which narrow the range of beneficial uses of the environment and potential long-term risks to health or safety.

A. GROWTH INDUCING IMPACTS

CEQA requires the EIR to discuss the ways in which a proposed project can foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.

Under CEQA, a project is generally considered to be growth inducing if it results in any one of the following criteria:

Extension of urban services or infrastructure into a previously unserved area;

Extension of a transportation corridor into an area that may be subsequently developed; and,

Removal of a major obstacle development and growth (e.g., if to accommodate the project, new infrastructure components need to be developed capable of servicing additional growth in the community).

This section summarizes both the direct and related secondary growth impacts of the LBL 1987 LRDP, as potentially extended by the proposed renewal of the operating contract for the Lawrence Berkeley Laboratory between the United States Department of Energy and the University of California.

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

In 1986, the LBL population of staff and guests, both full-time and part-time, was 3,595 persons. Had the 1987 LRDP been fully implemented, the 1992 LBL population was projected in the 1987 LRDP EIR to reach 4,200; however, by 1991, the total staff and guest population level had only reached 3,940. The 1992 population is not expected to reach the level projected in the 1987 LRDP EIR. During the term of this project, i.e. from 1992 to 1997, LBL total staff and guest population levels are projected to grow to approximately 4,390. This is still below the ultimate site capacity of 4,750 projected in the 1987 LRDP EIR for the year 20xx.[1]

Projections in the 1987 LRDP EIR showed that of the projected increase to 1992 of 176 part-time staff, 377 full-time staff, and 52 guests, 91 of the additional part-time staff would live in the city of Berkeley, 88 of the additional full-time staff would live in the city of Berkeley, and 26 of the additional guests would live in the city of Berkeley. As shown earlier in SEIR Table III-H-1, the number of full-time staff living in the city of Berkeley rather than increasing from 470 to 558 between 1986 and 1992, has actually declined to 356 by 1991. Similar declines occurred among the city of residence of LBL full-time staff in the cities of Albany, El Cerrito/Kensington, Oakland, as well as in cities of San Leandro and south, and Orinda and east of Orinda. Growth of LBL full-time staff did occur among those who lived in the City of Richmond, the City of San Pablo and north, Marin County, San Francisco, and other unidentified areas.

For purposes of this SEIR, it is assumed that future LBL population growth will be distributed throughout the Bay Area similar to its distribution in 1980, 1986, and 1991, the years for which data is available. Using residence patterns of LBL full-time staff as a proxy, then approximately 20 to 25 percent of those persons who will constitute LBL growth will choose to live in the city of Berkeley, a similar percentage in the cities of Orinda and east of Orinda, approximately 17 percent in the city of Oakland, and eight to ten percent in the cities of El Cerrito/Kensington and the cities of San Pablo and north of San Pablo. Over the five year term of the project, remaining population would be distributed through other communities, primarily in the East Bay. The distribution of the approximately 450 person increase in LBL population across the Bay Area cities is not considered to have a significant impact on any one city.

Growth at LBL to the year 1997 would be accompanied by a net increase of approximately 230,000 square feet devoted to facilities and an additional net of approximately 150,000 square feet to the year

20xx, as some of the new facilities would be replacing existing, outdated facilities. This is not considered a significant adverse impact.

As a result of the growth in facilities at LBL, and the need to replace aging utility infrastructure, some utility distribution lines for water, power, sanitary sewer, and communications would have to be upgraded and extended; however, with the exception of the LBL East Canyon Area, none of these infrastructure improvements would serve previously unserved or underserved areas, nor would such improvements remove major obstacles to growth. As a result, these improvements are not considered significant adverse impacts.

B. SUMMARY OF CUMULATIVE IMPACTS

CEQA also requires an analysis of the impacts of the proposed project considered in conjunction with impacts caused by other foreseeable future projects which are located in the vicinity of the proposed project. The purpose of this analysis is to determine whether the "cumulative impacts" of the proposed project, in conjunction with these other projects, would create a significant environmental impact or compound or increase other environmental impacts. Cumulative impacts for each environmental issue are discussed in detail at the end of each subsection of SEIR Sections III and IV, and are repeated in this section.

Information about foreseeable future projects and development which could produce cumulative impacts when considered in conjunction with the potential impacts of this project was derived from the 1987 LRDP and from information regarding foreseeable future projects in the Berkeley area, including information from environmental impact reports for recent projects approved in the City of Berkeley.

Table V-1 on the following page summarizes the amount and type of proposed development as identified in these reports. The gross square footage for each of the categories shown in Table V-1 represents the estimates regarding future development available as of the date of this SEIR. These estimates indicate that through the year 2005/06, up to 5,787,500 gsf of new UC Berkeley campus, LBL, downtown Berkeley, private development and other public (non-UC) space could be developed. Up to 4,417 dwelling units (student beds and multifamily units) could also be developed in that time.

Table V-1
CUMULATIVE DEVELOPMENT THROUGH 2005/06

Project Category	**Gross Square Footage (GSF) Dwelling Units (d.u.)**
Lawrence Berkeley Laboratory (LBL)	404,800 GSF
Recent Development in Downtown Berkeley (Existing Buildings Not Fully Occupied)	239,000 GSF
Proposed Private Sector Projects	355,764 GSF 440 d.u.
Potential Future Private Development	1,426,969 GSF 392 d.u.
Proposed (Non-UC) Public Sector Projects	266,000 GSF
UC Berkeley Approved Development	820,000 GSF 917 d.u.
UC Berkeley 1990 LRDP Category 2 (Proposed Development)	2,239,000 GSF 3,585 d.u.
Total Cumulative Development	**5,787,533 GSF 4,417 d.u.**

Note: The data for the cumulative projects list was coordinated with the city of Berkeley, the Downtown Plan EIR, LBL, and traffic consultants. The gross square footage for each category represents the largest estimates from these sources. These estimates indicate that through the year 2005/06, up to 5,787,533 gross square feet of new campus, LBL, city of Berkeley office and retail space, private development and other public (non-UC) space could be developed. Up to 4,417 dwelling units (student beds and multifamily) are projected to be developed in the city of Berkeley by the year 2005. The 1990 estimate of 404,800 gsf for LBL is now estimated at 378,900 square feet.

Source: *Revised Draft Environmental Impact Report, Computer Science/College of Engineering Building, University of California at Berkeley.* Campus Planning Office, University of California, Berkeley, June 1990.

In addition, major projects in the West Berkeley area, as shown in Table V-2 would add 1,392,500 square feet of development to the City. Smaller projects in the West Berkeley area would provide

another 274,000 square feet of development, as shown in Table V-3. The information for this cumulative development is taken from the *Miles Inc./Cutter Biological Long Range Plan, Final Environmental Impact Report* (October 1991).

Table V-2
CUMULATIVE DEVELOPMENT FROM MAJOR PROJECTS PROPOSED IN THE WEST BERKELEY AREA

Location	Square Feet	Description	Status
Canned Foods 2000 Fifth Street	40,000	20,000 sq. ft. change from auto sales to retail sales and 20,000 sq. ft. new office space	Approved
1045 Ashby	40,000	Change from warehouse to retail	Approved
Bay Export 209-255 Potter	200,000	R & D/office	Proposed
Colgate Seventh Street and Carleton	587,250	R & D/office and warehouse	Proposed
Yerba Buena and San Pablo[a]	525,000	Mixed use retail and residential	Proposed
Total Area (Sq. ft.)	**1,392,250**		

Note:
a = Emeryville

Source: *Miles Inc./Cutter Biological Long Range Plan, Final Environmental Impact Report Response to Comments on the Draft Environmental Impact Report*, Volume 1, October 1991, p. 4.4-2.

Table V-3
CUMULATIVE DEVELOPMENT FROM SMALL PROJECTS PROPOSED IN THE WEST BERKELEY AREA BY LAND USE

Type of Land Use	Total Square Feet
Retail	100,000
Office	96,000
Warehouse	25,000
Other[a]	53,000
Total Area (Sq. ft.)	**274,000**

Note:
a = 20,000 square feet of small business, 21,000 square feet of nursery and retail space, 7,000 square feet of bank space and 5,000 square feet of school space.

Source: *Miles Inc./Cutter Biological Long Range Plan, Draft Environmental Impact Report,* Volume 1, June 1991, p. 5B-13.

While cumulative impacts are discussed in each resource section of the EIR, for the convenience of the reader this information is repeated below:

Geology, Soils and Seismicity

Cumulative development at and in the vicinity of LBL is not expected to result in significant adverse impacts upon people or property as a result of geologic hazards.

Occupancy of proposed structures and proposed cumulative development would expose additional people to hazards related to groundshaking and risks associated with structural damage from seismic events. Development of these new structures must be undertaken in conformance with the provisions of all applicable laws, including current requirements in applicable building codes to ensure seismic safety. In fact, since these new structures must be constructed with more stringent seismic safety designs, they will be more safe than older, existing structures, to the extent that new development replaces older, existing structures. Moreover, the cumulative impact of the replacement facilities will result in a cumulative beneficial impact.

Hydrology and Water Quality

Cumulative development at and in the vicinity of LBL is not expected to have significant adverse hydrologic impacts within the Strawberry Creek watershed. Water quality, potential for erosion and sedimentation of drainage facilities, and the quality of Strawberry Creek are all potentially impacted by cumulative development and cumulative increases in impermeable surface. However, implementation of all hydrology mitigation measures relevant to cumulative development, and compliance with all applicable laws, will result in less than significant impacts on hydrology.

Cumulative development in the City of Berkeley may adversely impact water quality, potential for erosion, and sedimentation of drainage facilities. These potential adverse impacts can be reduced if the agencies responsible for reviewing and approving these new development projects adopt feasible mitigation measures to control surface water runoff, prevent erosion, and maintain adequate drainage facilities.

Biological Resources

As described above, threatened or endangered plant or wildlife species and appropriate habitat for such species have not been identified at LBL. Thus, while cumulative development of the hillside area surrounding the LBL site, 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 project itself will not cause or contribute to any of these impacts. Accordingly, no further analysis is required for potential cumulative impacts for purposes of this SEIR.

Historical and Archaeological Resources

Impacts of cumulative development upon archaeological or historical resources at and in the vicinity of LBL are not expected to be significant.

Study and preservation of LBL's own historic and archaeological resources will occur to the extent outlined in the above mitigation measures; mitigation of significant archaeological or historical impacts which result from LBL development will be mitigated under the LRDP EIR. Impacts upon historic or archaeological resources resulting from private development will be regulated by the appropriate lead agency under applicable federal, state, and local requirements.

Visual Quality

Cumulative development in the LBL/UCB hillside area is not expected to have a significant impact upon visual quality.

Cumulative development in the hillside area has the potential to degrade the existing visual character of the hills. However, the LBL LRDP proposes only minimal development of the hill area. Implementation of the proposed mitigation measures will safeguard the aesthetic character of the hillside under LBL management. No significant adverse effect on visual quality is expected.

Land Use

No adverse impacts upon land uses at and in the vicinity of LBL are expected as a result of cumulative development.

Mitigation measures described above will minimize land use conflicts between LBL and its neighbors; hillside development proposed under the UC Berkeley LRDP is also not expected to conflict with local land uses. Any private development proposed in the vicinity would be subject to local land use controls.

Population, Employment and Housing

No significant impacts upon employment or housing are projected as a result of cumulative development at and in the vicinity of LBL.

Population increases as a result of cumulative development are not expected to be significant. The LBL LRDP projects a modest increase in population; other proposed developments in the vicinity, like UC Berkeley, are not expected to significantly impact population trends, the availability of housing, or local employment statistics.

Traffic, Circulation and Parking

The 1990 UC Berkeley LRDP EIR included a comprehensive update on traffic and circulation in the areas affected by the campus, including the streets and intersections near LBL. The information developed in 1989 and 1990 indicated that cumulative population growth and facility development in the vicinity had resulted in a deterioration of the levels of service at intersections on the feeder routes into

the UC Berkeley campus and LBL area.[2] The effect of this cumulative development on the intersections and roadways near LBL is summarized in Tables III-I-2 and III-I-4 shown earlier.

The 1990 UC Berkeley LRDP EIR study revealed that the levels of service ("LOS") in intersections and roadway segments have deteriorated to below acceptable levels along the northern access routes to the UC Berkeley campus. The level of traffic service has declined most along the Piedmont/Gayley corridor.[3] LBL, along with the City of Berkeley and UC Berkeley, has undertaken steps to alleviate the traffic congestion in the area, and restore acceptable levels of traffic service. LBL's commitments are included as a mitigation measure for this project.

New data provided by the 1990 UC Berkeley LRDP EIR led to the conclusions that the cumulative increases in traffic and parking demand were significant impacts. However, because of the mitigation commitments set forth in the UC Berkeley LRDP EIR, the UC Berkeley/City Mitigation Monitoring Agreement, and the mitigation commitments of LBL as summarized in this SEIR, these cumulative impacts will be reduced to a less than significant level. In fact, the cumulative measures undertaken by the City of Berkeley, UC Berkeley and LBL should result in a net improvement in the traffic and parking conditions in the immediate vicinity of LBL and UC Berkeley.

Air Quality

Regional growth and development will continue to impact the current exceedances of air quality standards. Projects developed in the San Francisco Bay Area are expected to result in increased vehicle trips and increased emissions of pollutants from stationary and mobile sources that contribute to the Bay Area's non-attainment status. LBL will comply with applicable transportation management and emission control measures imposed by the BAAQMD pursuant to the 1991 Clean Air Plan and the California Clean Air Act. As discussed above, the BAAQMD is expected to adopt emission control measures, on a phased-in basis to implement the plan and to attain ambient air quality standards in the San Francisco Bay Area basin. Since these regional measures are not within the jurisdiction of The Regents to implement, the cumulative air quality impacts of regional growth are considered to be significant and unavoidable for purposes of this SEIR.

The project would contribute to cumulative toxic air emissions in the LBL vicinity. Again, it should be noted that a precise methodology for estimating cumulative TAC risks does not exist; the discussion and

conclusion of significance above represents a prudent way to consider project-related impacts for purposes of this SEIR. However, at this time because of the lack of established guidelines and principles, the same methodology cannot be readily applied to the region as a whole. Some could conclude in accordance with CEQA that the real cumulative impacts associated with TAC and radionuclides over the planning horizon of this project are too speculative to determine at this time.

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 are not within the jurisdiction of LBL's management to implement. Therefore, the cumulative air quality impacts of toxic air contaminant emission increases due to regional growth and development remain significant for purposes of this SEIR.

Noise

Noise impacts resulting from cumulative development at and in the vicinity of LBL are not expected to be significant.

Mitigation measures described above will minimize noise conflicts between LBL and its neighbors; mitigation measures proposed under the 1987 LRDP are also projected sufficiently to mitigate potential impacts of development. Any private development proposed in the vicinity would be subject to local noise ordinances and standards.

Public Services

No significant impact upon public services is projected as a result of cumulative development at or in the vicinity of LBL.

Mitigation measures presented above and in the 1987 LRDP EIR sufficiently mitigate impacts of development to less than significant levels; private development proposed in the vicinity would be subject to local approvals and controls. Cumulative population growth is not projected to have significant impacts upon community services.

Utilities

Cumulative development at and in the vicinity of LBL is not expected to result in adverse impacts to utilities and waste services.

Cumulative increases in water consumption and distribution needs, wastewater treatment capacity, or solid waste landfill capacity are expected to be accommodated within existing systems. Sanitary sewer cumulative impacts will be accommodated within the 20-year sewer rehabilitation program undertaken by the City of Berkeley. Without these programmed improvements, cumulative development in the vicinity of LBL could potentially overburden the aging sanitary sewer system.

Currently solid waste generated by LBL is taken to a private recycling service in Oakland. About 90 percent of the materials are reused, and only ten percent (by volume) are baled and sent to a landfill. Construction and grounds waste are also sent to landfills. Despite the implementation of aggressive solid waste recycling and reduction programs by many facilities (including LBL) and municipalities, there is a shortage in solid waste capacity for the Bay Area and many other regions in California. California has enacted recent legislation aimed at reducing solid waste levels by 50 percent over the next several years, coupled with a planning process designed to ensure adequate new solid waste disposal capacity. If the (primary local) agencies charged with implementing the requirements of this solid waste planning system fail to do so, it is probable that shortfalls in solid waste capacity will become acute within the foreseeable future.

Energy

Cumulative development at and in the vicinity of LBL is not expected to result in significant adverse impacts upon energy resources. Increases in energy demands would be met through existing regional energy sources; new development would be constructed in accordance with Title 24 energy conservation standards. While beyond the scope of a CEQA document, the consumption of fossil fuels and other materials has caused a global increase in the quantities of certain gases in the earth's atmosphere.

Hazardous Materials

The project would result in the increased handling of hazardous materials generally in the Berkeley area. However, 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.

In addition, the project would increase the quantity of various types of hazardous wastes which are being generated in California as a whole. California itself lacks adequate disposal capacity to handle current or projected quantities of hazardous wastes generated within the state, and has embarked on a hazardous waste facility siting and development process to provide the needed disposal capacity. Until these facilities have been developed, however, LBL and other California generators continue to rely on licensed hazardous waste treatment and disposal facilities located outside of California. While California's current lack of adequate hazardous waste treatment and disposal capacity is not desirable, it is not considered a significant adverse impact based on CEQA standards.

In order to properly evaluate the cumulative impacts of increased waste generation on treatment and disposal, potential impacts must be evaluated on a national scale. Currently different treatment and disposal options exist for various waste streams. For example, some local DOE facilities currently send scintillation cocktails to a permitted facility in Florida for treatment and disposal. Similarly, other DOE facilities around the country ship radioactive waste to the Nevada Test Site for disposal.

DOE is evaluating national capacity and the relative cumulative impacts of waste generation on treatment and disposal facilities as part of the Programmatic EIS for Environmental Restoration and Waste Management. Due to the lack of information currently available from the DOE, the cumulative impacts associated with increased waste generation from DOE facilities nationwide are considered by DOE to be significant and unavoidable at this time.

As described in previous subsections of this SEIR, as part of the proposed project, LBL will continue to comply with applicable laws and is implementing a number of programs to ensure reduced acquisition of hazardous materials and minimization of waste generation; this will occur throughout the timeframe for implementation of the project and will serve partially to mitigate potential cumulative impacts associated with increased hazardous materials and wastes.

C. SIGNIFICANT IRREVERSIBLE CHANGES IN RELATIONSHIPS BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The California Environmental Quality Act states that environmental impacts associated with a proposed project may be considered significant and irreversible for the following reasons:

> Uses of non-renewable resources to construct the project may be irreversible because a large commitment of resources makes removal or non-use thereafter unlikely.
>
> Primary, and particularly secondary impacts (such as a highway improvement that provides access to previously inaccessible area), generally commit future generations to similar uses.

CEQA also states that irretrievable commitments and resources should be evaluated to ensure that current consumption is justified.

The irreversible and irretrievable environmental changes that would occur if the 1987 LRDP were fully implemented involve consumption of materials, energy, and land resources.

The 1987 LRDP would involve consumption of material resources utilized for construction of capital projects, for initial equipment of the facilities, and for long-term maintenance and operation of the facilities.

Implementation of the 1987 LRDP would require energy resources to be consumed during the construction of the proposed projects (in the form of gasoline, diesel fuel and electricity), as well as for operation and maintenance of the projects (including the use of electricity and natural gas). Indirect consumption of energy would result from increased transportation demanded by the growing LBL population. Implementation of the 1987 LRDP requires use of energy resources. (Section III-N more fully describes energy use and setting at LBL.)

Although most of the proposed construction on the LBL site will involve the replacement of existing facilities, continued implementation of the 1987 LRDP would result in the consumption of land resources in terms of site preparation for construction programs, grading and excavation, landscaping,

and permanent sites for facilities and parking. An undeveloped four acre portion of the site, known as the East Canyon area will begin development in 1992.

Development of the LBL properties constitutes an irreversible conversion of open space to built space. It is unlikely that after conversion such space would revert to open space in the future. The visual impact of this change would also be irreversible.

Notes for Section V:

1. *Lawrence Berkeley Laboratory, Site Development Plan, Draft Environmental Impact Report.* Prepared by the Director's Office, Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., December 1986, Tables III-5, III-6 and III-7, pp. 70-72.

2. *Draft Environmental Impact Report. Long Range Development Plan. University of California at Berkeley.* Prepared for Campus Planning Office, University of California at Berkeley, January 1990, p. 4.5-9.

3. *Ibid.*, p. 4.5-9, Figure 4.5-3.

ALTERNATIVES

Introduction

No Project (Discontinuation of UC Management)

No Project (Shutdown and Decommissioning)

Modification of Operations (Less Development)

No New Development

Off-Site Development

VI. ALTERNATIVES

A. INTRODUCTION

The alternatives environmental analysis addresses the environmental impacts associated with alternative site locations for elements of Lawrence Berkeley Laboratory's (LBL) long-term program plans, such as offices and research space, open space, roads, parking and landscape, as well as management and operational alternatives.

LBL is projected to experience continued modest growth in overall size during its 1987 LRDP planning period, consistent with program directions, national needs, and effective supporting infrastructure. This growth will occur in the energy sciences, the general sciences and the life sciences. Activities that strengthen LBL's historically significant educational and training role will continue to develop. Technology transfer and educational activities are projected to result in increases in guests and visitors to LBL.

Some programs will grow substantially, such as materials science and structural biology research associated with the ALS, chemical sciences research at the Chemical Dynamics Research laboratory, Human Genome Center research, and Heavy Ion Fusion Accelerator Research program. After FY 1993, operating levels of other existing programs are projected between 1.0 and 1.5 percent annual growth until FY 1997. NASA support for the Space Exploration initiative is expected to grow during this time. After FY 1997, some growth (1 percent/yr) in the Energy Sciences programs is anticipated, whereas most other programs will remain stable.

1. Alternatives

This SEIR also includes a comprehensive examination of alternatives to the contract renewal project, including two "no project" alternatives (discontinuation of the University's management of LBL and the shutdown and decommissioning of LBL), and three different physical development alternatives (no new development at LBL, less development at LBL, and the same level of development at an offsite

location). The purpose of this alternatives analysis is to determine whether there are any alternatives which are capable of satisfying most or all of the project objectives in a manner which eliminates or substantially reduces a significant adverse environmental impact. While one of the no project alternatives (shutdown and decommissioning of LBL) and one of the development alternatives (less development) would cause fewer impacts than the proposed project, neither would result in the elimination of the one unavoidable significant adverse project impact (air quality) since both would result in some level of air emissions that would contribute to the region's failure to attain applicable ozone standards. Accordingly, while these alternatives are technically environmentally superior to the proposed project, neither can eliminate or substantially reduce the sole significant adverse impact caused by the project. In addition, neither of these alternatives is capable of achieving all or most of the project objectives.

A brief description of these alternatives follows.

a. No Project (Discontinuation of UC Management)

The principal alternative to UC's continuing management and operation of LBL is the alternative under which the UC Regents or the DOE would decide to discontinue UC's management and operation of LBL. If this were to happen, it is assumed that DOE would select another contractor to manage and operate LBL. It is assumed for purposes of this SEIR analysis that a new LBL contractor would continue to manage LBL at the same operational level described in the proposed action, or at the level of operations selected by DOE as an alternative through its environmental and project review process.

b. No Project (Shutdown and Decommissioning)

The other "no project" alternative is the alternative of not renewing the operating contract for LBL between UC and DOE and phasing out of all research and development operations at LBL with the ultimate shutdown and decommissioning of all facilities. For the purposes of discussion of this alternative, "no project" will be synonymous with shutdown and decommissioning. (This no project alternative will also affect the 250 UC faculty members, 500 graduate and 150 undergraduate students, as well as guests to LBL.)

c. Modification of Operations (Less Development)

The modification of operations (less development) alternative would modify LBL operations, including near term (within five to ten years) proposed projects, to reduce potentially adverse environmental impacts. Modification of operations is broadly defined as the scale down of operations and/or the application of alternative technologies and management strategies.

d. No New Development

The no new development alternative is the continued operation, including development of LBL projects already authorized and budgeted through FY 1992. Programs and projects would continue at their present (FY 1992) level, but no additional proposed projects (as listed earlier in Table III–4) would be added.

e. Off-Site Alternatives

Several off-site locations were identified as potential sites for the development of future LBL programs. The following discussion notes the location of potential sites and the reasons for rejecting them. Some of the sites have previously been identified in the *Draft Environmental Impact Report: Long Range Development Plan, University of California at Berkeley*[1]. These are described in more detail in Section VI-F.

1. Overview of Screening Analysis

The following criteria were used to establish planning requirements for off-site development during the contract renewal term. They are repeated in Section VI–F where the off-site alternatives are discussed in detail.

a) The site must be at least 30 acres in size in order to allow for proper placement of new (additional and replacement) facilities. The acreage would also provide for open space and parking needs, and a building floor area ratio of 1:3.

b) The site must be within 45 minutes driving time of LBL in order to create the minimally acceptable operation relationship between the two sites.

c) Adequate access must be available to existing and future highways and public transportation systems.

d) Infrastructure and services must be in place or have expansion potential to serve proposed building development. Infrastructure and services include: water, sewer, power, police, fire, voice and data communications, and recreational amenities.

e) Land must be easily assembled, preferably in single ownership.

f) The site must have no major environmental or land-use constraints, such as endangered species, rare plants or animals, etc.

g) The site must meet DOE terms and conditions for leased space.

Table VI-1 provides a summary comparison of the alternatives to the proposed project, in the form of an alternatives matrix. For each alternative, a comparison is made as to whether the alternative has a significant (S) or less than significant impact (LS) in relation to the proposed project, and whether the impact is of greater impact (+) than the proposed project, or less impact (-) than the proposed project.

Table VI-1
ALTERNATIVES MATRIX

Impact by Environmental Issue Area	Alternative 1	2	3	4	5	6
B. Geology, Soils and Seismicity						
Impact to People and Property During a Seismic Event	S	S	LS-	S	S-	S-
Soil Erosion, Sedimentation and Landsliding Caused by Construction	S	S	LS-	S-	LS	S-
Cumulative Exposure to Seismic Hazards	LS	LS	LS-	LS	LS	LS
C. Hydrology and Water Quality						
Increased Surface and Storm Runoff	S	S	S-	S-	S-	S+
Cumulative Degradation in Water Quality	LS	LS	LS-	LS	LS-	LS
D. Biological Resources						
Loss of Some Vegetation	S	S	LS-	S	LS	LS
Cumulative Reduction in Habitat	S	S	LS	S	S-	S+
E. Historical and Archeological Resources						
Removal of Substandard Buildings	LS	LS	LS	LS	LS-	LS-

Alternatives:
1 = Proposed Project (Without Mitigation)
2 = No Project (Discontinuation of UC Management)
3 = No Project (Shutdown and Decommissioning)
4 = Modification of Alternatives (Less Development)
5 = No New Development
6 = Off-Site Development

S = Significant
LS = Less than Significant
+ = Greater Impact than Proposed Project
- = Less Impact than Proposed Project

Table VI-1 (Continued)
ALTERNATIVES MATRIX

Impact by Environmental Issue Area	Alternative 1	2	3	4	5	6
F. Visual Quality						
Change in the Visual Quality	S	S	LS	S-	LS	S+
Removal of Trees Screening Buildings	LS	LS	LS-	LS	LS-	LS
Cumulative Appearance Changes	LS	LS	LS	LS	LS	S+
G. Land Use						
Convert Open Space into Developed Areas	S	S	LS-	S	LS	S+
H. Population Employment and Housing						
Increase in Housing Demand	LS	LS	LS-	LS	LS-	LS+
I. Traffic/Circulation and Parking						
Increase in Traffic	LS	S	LS-	LS-	LS-	LS+
Ratio of Parking Spaces per Employee will Decrease	S	S	LS-	LS	LS	LS

Alternatives:
1 = Proposed Project (Without Mitigation)
2 = No Project (Discontinuation of UC Management)
3 = No Project (Shutdown and Decommissioning)
4 = Modification of Alternatives (Less Development)
5 = No New Development
6 = Off-Site Development

S = Significant
LS = Less than Significant
+ = Greater Impact than Proposed Project
- = Less Impact than Proposed Project

Table VI-1 (Continued)
ALTERNATIVES MATRIX

Impact by Environmental Issue Area	Alternative 1	2	3	4	5	6
J. Air Quality						
Construction Emissions	S	S	S+	S	S-	S
Generate Criteria Air Pollutants	S	S	S+	S	S-	S
Increase in Toxic Air Contaminants	LS	LS	LS-	LS-	LS	LS
Increase in Emissions of Radionuclides	LS	LS	LS-	LS-	LS	LS
Increase Cancer Risk	LS	LS	LS-	LS-	LS	LS
Cumulative Emissions of Pollutants	S	S	S+	S	S	S
Cumulative Toxic Air Emissions	LS	LS	LS-	LS-	LS	LS
K. Noise						
Facility Operation Noise	LS	LS	LS-	LS	LS	LS
Construction Noise	S	S	S+	S-	S-	S
Cumulative Traffic Noise	LS	LS	LS	LS	LS	LS
L. Public Services						
Cumulative Public Services Increase	LS	LS	LS	LS	LS	LS+
M. Utilities						
Increase in Wastewater Generated	LS	S	LS-	S-	S-	S
Require Rerouting of 120 kV Service	LS	LS-	LS-	LS	LS-	S
Cumulative Utilities Demand	S	S	LS-	S-	S	S

Alternatives:
1 = Proposed Project (Without Mitigation)
2 = No Project (Discontinuation of UC Management)
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S = Significant
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+ = Greater Impact than Proposed Project
- = Less Impact than Proposed Project

Table VI-1 (Continued)
ALTERNATIVES MATRIX

Impact by Environmental Issue Area	Alternative 1	2	3	4	5	6
N. Energy						
Increase Energy Demand	LS	LS	LS-	LS	LS	LS
Cumulative Energy consumption	LS	LS	LS	LS	LS	LS
IV. Hazardous Materials						
Increased Use of Hazardous Materials	S	S	LS-	S-	S-	S
Increase in Hazardous Materials Disposal	S	S	LS-	S-	S-	S
Increase in Hazardous Materials Transportation	LS	LS	LS-	LS	LS	LS
Increase in Upgrading or Removal of Regulated Building Components	LS	LS	S+	LS	LS-	LS-
Increased Employee Exposure to Hazardous Materials	S	S	LS-	S-	S	S
Continued Emergency Preparedness	LS	LS	S	LS	LS	LS
Continued Site Characterization and Remediation	LS	LS	S	LS	LS	LS
Cumulative Increase in Hazardous Materials Handling	S	S	LS	S-	S	S
Cumulative Increase in Hazardous Materials Waste	S	S	S+	S-	S	S

Alternatives:
1 = Proposed Project (Without Mitigation)
2 = No Project (Discontinuation of UC Management)
3 = No Project (Shutdown and Decommissioning)
4 = Modification of Alternatives (Less Development)
5 = No New Development
6 = Off-Site Development

S = Significant
LS = Less than Significant
+ = Greater Impact than Proposed Project
- = Less Impact than Proposed Project

B. NO PROJECT (DISCONTINUATION OF UC MANAGEMENT)

Under this alternative, DOE would replace UC with an alternative contractor. For purposes of this SEIR, it is assumed that DOE would select another contractor to manage and operate LBL at the same operational level described in the proposed project.

1. Impact Analysis

a. Summary Impact Analysis

Impacts of the discontinue university management alternative cannot be ascertained at this time because impacts depend on the level of operations chosen by DOE for implementing the project.

b. Geology, Soils and Seismicity

No portion of the LBL site is within the Alquist-Priolo Special Studies Zone, however, the LBL site is within an active fault zone. Consequently, there could be significant adverse impacts on people or property due to surface rupture or liquefaction produced by an earthquake. Groundshaking, landslides, lurching and differential compaction may also injure persons and property during a seismic event.[2] Implementation of the 1987 LRDP would increase the present potential for injury to persons and property due to seismicity because implementation is expected to increase the number of persons and facilities on the LBL complex. Similar effects would be expected from the "no project" alternative if operations would be at the same level as required by the 1987 LRDP. Variations in effects would be expected for different levels of operation. Therefore, impacts would depend on the level of operations.

Presently, no portion of the site is within a Mineral Resource Zone or Important Farmland. Therefore, implementation of the 1987 LRDP would not have an adverse impact on those types of areas. Impacts of the "no project" alternative would depend on the level of operations.

Implementation of the 1987 LRDP may promote soil erosion, sedimentation and landsliding, which would adversely affect the stability of buildings placed on the site.[3] Impacts of the "no project" alternative would depend on the level of operations.

c. Hydrology and Water Quality

Continued construction on the LBL site is not expected to increase off-site flood hazard, erosion or sedimentation. Moreover, development under the 1987 LRDP is not expected to substantially deplete the groundwater resource, interfere with groundwater recharge, or substantially degrade surface or groundwater quality.[4] LBL itself is not in a flood plain.

Though the anticipated effects of implementation of the 1987 LRDP on groundwater are not substantial, the increase in population and facilities would cause an increased demand on groundwater supply. In addition an increase in the number of buildings could negatively impact the recharge and quality of groundwater by changing the pattern of stormwater run-off. Impacts anticipated under the "no project" alternative would depend on the level of operations.

Implementation of the 1987 LRDP would not produce uncontrolled run-off and would not adversely affect the quality of water run-off.[5] Impacts anticipated under the "no project" alternative would depend on the level of operations.

d. Biological Resources

No rare, endangered or threatened plant or animal species has been located or is expected to appear on the LBL site. Accordingly, 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 to cause any fish or wildlife populations to drop below self-sustaining levels.[6] Impacts of the "no project" alternative would depend on the levels of operations.

Additional facility development under the 1987 LRDP would cause a loss of open space, portions of which may be vegetated and provide habitat for some non-critical species.[7] Impacts of the "no project" alternative would depend on the level of operations.

e. Historical and Archaeological Resources

Implementation of the 1987 LRDP is not expect to adversely impact any significant prehistoric, archaeological or paleontological site, or any property of historic or cultural significance, other than the Laboratory itself.[8] Impacts of the "no project" alternative would depend on the level of operations.

f. Visual Quality

Implementation of the 1987 LRDP could impact the visual quality of LBL and the surrounding environs; for instance, development would minimally disturb existing landscaping, possibly requiring re-vegetation and grading, and the additional grading, retaining walls and buildings would necessitate measures that would make them as visually compatible as possible with their surroundings.[9] Impacts of the "no project" alternative would depend on the level of operations.

g. Land Use

The 1987 LRDP proposes development on the original LBL site and development on the east site area. Development on the original site is contained in the center of the LBL site and would not affect any land use adjacent to, and outside of, LBL property.[10] However, development of the east site would utilize approximately four acres of open space, which would be converted to urban- to suburban-scale uses.[11] Therefore, implementation of the 1987 LRDP may conflict with provisions of UC Berkeley or local land use or general plans, local ordinances, or locally adopted environmental plans and goals. Impacts of the "no project" alternative would depend on the level of operations.

h. Population, Employment and Housing

Implementation of the 1987 LRDP is expected to increase the LBL population by 605 persons by the year 1992, 400 of which would seek to live in communities other than Berkeley. The increased population is expected to increase the demand for housing, but will not significantly affect the availability of owned and rented housing.[12] Impacts of the "no project" alternative would depend on the level of operations.

The general effects of the LBL population growth on surrounding communities due to implementation of the 1987 LRDP is not expected to be significant. Population changes in the LBL environs communities would be the result of population factors which affect the San Francisco Bay region as a whole, and not LBL or the city of Berkeley in particular.[13] Impacts of the "no project" alternative would depend on the level of operations.

i. Traffic, Circulation and Parking

Daily traffic to and from LBL has not increased significantly. However, as the 1987 LRDP continues to be implemented, additional incremental increases in traffic are expected due to projected increases in the number of employees and visitors at LBL.[14] Implementation of the 1987 LRDP would cause peak hour traffic volume increases at the Blackberry Canyon and Grizzly Peak gates, with minimal impacts on the overall volume of traffic away from LBL. Furthermore, implementation of the 1987 LRDP would slightly increase potential conflicts between motor vehicles and pedestrians and/or bicycles due to increased traffic and emphasis on use of alternate transportation.[15] Impacts of the "no project" alternative would depend on the level of operations.

Parking availability would decline during implementation of the 1987 LRDP.[16] Impacts of the "no project" alternative would depend on the level of operations.

Implementation of the 1987 LRDP would create a slight increase in the difficulty of bicycle and pedestrian circulation around the LBL complex.[17] Impacts of the "no project" alternative would depend on the level of operations.

j. Air Quality

Implementation of the 1987 LRDP would adversely impact short-term air quality by increasing emission of particulates and air contaminants during, and after construction. Impacts of the "no project" alternative would depend on the level of operations.

k. Noise

Implementation of the 1987 LRDP could generate construction noise which could have significant adverse impacts on noise levels.[18] Activities made possible by implementation would not generate noise at levels in conflict with applicable noise ordinances and standards.[19] Impacts of the "no project" alternative would depend on the level of operations.

l. Public Services

Neither implementation of the 1987 LRDP nor implementation of the "no project" alternative would negatively impact public services because LBL would continue to operate its own police, fire and security units during either alternative.[20]

m. Utilities

Project development according to the 1987 LRDP would not create demands in excess of existing and planned water supply, natural gas supply, electricity supply, or waste-water and sanitary waste capacity.[21] Nonetheless, expansion of the LBL complex would increase demand for water, natural gas, electricity, waste-water and sanitary waste disposal and treatment. Impacts of the "no project" alternative would depend on the level of operations.

Project development is not expected to have a significant adverse impact on LBL's ability to dispose of non-hazardous solid waste.[22] However, expansion of LBL would increase the generation of non-hazardous waste. Impact of the "no project" alternative would depend on the level of operations.

n. Energy

Increased energy demand from new facilities and increased employee-related transportation impacts would occur in conjunction with implementation of the 1987 LRDP.[23] Impacts of the "no project" alternative would depend on the level of operations.

o. Hazardous Substances

Implementation of the 1987 LRDP would increase the amounts of hazardous materials produced by LBL. Impacts of the "no project" alternative would depend on the level of operations.

2. Capacity to Achieve Project Objective

Discontinuation of UC's management of LBL would adversely impact the Laboratory's ability to fulfill its mission. The substitution of another contractor would jeopardize the close relationship between LBL and the Berkeley Campus which provides the basis for LBL's unique capability to conduct research in an environment that combines academic quality renewal with national laboratory research and development management experience and facilities. The increased hardship of coordinating activities between UC and LBL would make it difficult for faculty, students and staff to attain the cohesiveness needed to foster LBL's purpose of providing national scientific leadership and supporting technological innovation. Even though alternative management might promote continued cooperation between LBL and UC, coordination of activities between the two institutions would become increasingly difficult as each alters its strategies and expectations.

At best, students at the complex would be outsiders dependent on the generosity of a contractor for unique opportunities for education and training; at worst, alternative management of LBL would exclude students from LBL's facilities. Students would no longer be ensured that the stimulating intellectual environment created by UC management would continue. Moreover, UC's diminished involvement with LBL would make it more difficult to integrate core facilities located on the LBL site into the regular activities on the Berkeley Campus.

Five hundred graduate students pursue research at the Laboratory with about 100 students receiving advanced degrees every year.[24] Lack of coordination between UC and LBL's alternative management could limit the availability of LBL's advance research and development facilities to students, thereby undermining LBL's ability to educate and train future generations of scientists and engineers.

Under alternative management, increasingly difficult coordination between UC's scientists, engineers and professors and LBL would reduce the quality of research and development produce at the Laboratory.

Deterioration of the quality of research and development would, in turn, diminish LBL's ability to foster productive relationships between LBL's research programs and industry. In short, industry would no longer consider it beneficial to continue the exchange of ideas and information with LBL. Furthermore, LBL's reduced success in education and training would reduce the flow of Berkeley graduates to industry, thus eliminating one form of technology transfer that allows LBL to maintain close and supportive relationships with industry.

C. NO PROJECT (SHUTDOWN AND DECOMMISSIONING)

The second "no project" alternative is the alternative of no renewal of the operating contract for LBL between the University of California and the Department of Energy leading, in effect, to the phaseout of all research and development operations at LBL with the ultimate shutdown and decommissioning of all facilities. For the purposes of this alternative, "no project" will be synonymous with shutdown and decommissioning. (The no project alternative will also affect the 250 UC faculty members, 500 graduate and 150 undergraduate students, as well as guests to LBL.)

While the LBL site is owned by UC and leased to DOE, the buildings themselves are owned by the DOE. This section does not distinguish between ownership of buildings (DOE) and ownership of property (UC).

Shutdown means an orderly phaseout of programmatic research and development efforts. The time period for phased shutdown is an estimated five years. This estimate is based on time periods for planning, environmental documentation of the impact of closing facilities, and phaseout of programs and shutdown of facilities. LBL would require a caretaker staff during and after shutdown to maintain the decommissioning, environmental restoration and compliance infrastructure. The caretaker staff would continue operation and maintenance of LBL support functions, including security; utilities; shipping and receiving; environmental, safety and health protection; and other services.

Decommissioning means the restoration or destruction and disposal of contaminated facilities. Decommissioning and environmental compliance activities would continue after shutdown for an estimated five to 20 years. Radioactive and other hazardous sources would be removed and transported to other DOE or commercial facilities as appropriate. During this time, individual facilities would be cleaned up as they are vacated. LBL would be restored in such a way that facilities could be conveyed to new unrestricted ownership in accordance with applicable regulatory limits. The subsequent fate of the various programs is not considered in this EIR because it is beyond the scope of this EIR.

The projects to be eliminated and the facilities to be shutdown are those in existence in FY 1992. Those projects and facilities required to comply with statutes and regulations (e.g., remediation of inactive sites) would not be shut down.

1. Impact Analysis

a. Summary Impact Analysis

The impact analysis focuses on the effects of the shutdown and decommissioning alternative during its 10 to 25 year period because impacts thereafter cannot be determined until the identity and plans of the new owners of the decommissioned facilities are known. During the 10 to 25 year period, the alternative would have an overall lesser adverse impact on the environment than would implementation of the 1987 LRDP. Lesser impacts are expected regarding seismicity; erosion, sedimentation and landsliding; biological resources; land use; air quality; noise; utilities; energy; housing; traffic, circulation and parking; air quality; and hazardous substances. The alternative could have a greater adverse impact on employment conditions in the San Francisco Bay region.

b. Geology, Soils and Seismicity

No portion of the LBL site is within the Alquist-Priolo Special Studies Zone, however, the LBL site is within an active fault zone.[25] Consequently, there could be significant adverse impacts on people or property due to surface rupture or liquefaction produced by an earthquake. Groundshaking, landslides, lurching and differential compaction may also injure persons and property during a seismic event. Shutdown would reduce the number of persons on the LBL complex by causing the dismissal of LBL employees who supported the research and development efforts that have been phased out. Therefore, it would diminish the potential for injury to persons due to surface rupture or liquefaction produced by earthquakes.

Similarly, shutdown would decrease the potential for bodily injury as a result of groundshaking, landslides, and lurching. Decommissioning may potentially reduce damages to buildings and property which can be caused by surface rupture, liquefaction, groundshaking, landslides, lurching and differential compaction. In contrast to shutdown and decommissioning, implementation of the 1987 LRDP would increase the present potential for injury to persons and property due to seismicity because implementation of the 1987 LRDP is expected to increase the number of persons and facilities on the LBL complex.

Presently, no portion of the site is within a Mineral Resource Zone or Important Farmland. Therefore, neither the shutdown and decommissioning alternative nor the 1987 LRDP would affect those types of areas.

Implementation of the 1987 LRDP could promote soil erosion, sedimentation and landsliding, which would adversely affect the stability of buildings placed on the site.[26] Shutdown and decommissioning would not include excavation, grading or clearing of vegetation, therefore, it would not facilitate erosion, sedimentation and landsliding. Consequently, shutdown and decommissioning is expected to have no adverse impact on building stability due to erosion, sedimentation and landsliding.

c. Hydrology and Water Quality

Continued construction on the LBL site is not expected to increase off-site flood hazard, erosion or sedimentation. Moreover, development under the 1987 LRDP is not expected to substantially deplete the groundwater resource, interfere with groundwater recharge, or substantially degrade surface or groundwater quality.[27]

Though the anticipated effects of implementation of the 1987 LRDP on groundwater are not substantial, the increase in population and facilities would cause an increased demand on groundwater supply. In addition, an increase in the number of buildings could negatively impact the recharge and quality of groundwater and surface water by changing the pattern of stormwater run-off.

In contrast, shutdown and decommissioning would reduce the demand on the groundwater supply by reducing the number of active programs and facilities at LBL. Therefore, shutdown and decommissioning would decelerate groundwater depletion, whereas implementation of the 1987 LRDP would accelerate depletion. The possible destruction of buildings during decommissioning could also adversely impact groundwater recharge and quality by altering the pattern of stormwater run-off. Furthermore, the potential destruction of buildings during decommissioning could adversely impact the quality of groundwater and surface water by contaminating run-off with particulates produce during the demolition of buildings or facilities. Construction during implementation of the 1987 LRDP could have the same effect. Consequently, the shutdown and decommissioning alternative could have a similar or lesser impact on groundwater recharge than would be expected due to implementation of the 1987

LRDP. Moreover, shutdown and decommissioning is expected to have an impact on the quality of groundwater that is similar to, or less than, that expected to be caused by implementation of the 1987 LRDP.

Implementation of the 1987 LRDP would not produce increased uncontrolled run-off and would not adversely affect the quality of water run-off.[28] Shutdown and decommission could alter the pattern of run-off following the removal of buildings. Shutdown and decommissioning is expected to have an impact on the volume of uncontrolled run-off that is similar to the impact expected of implementation of the 1987 LRDP, because the built-up area is already an impervious surface. Because decommissioning may result in the contamination of run-off with particulates generated during demolition of buildings or facilities, decommissioning may adversely impact the quality of run-off. However, construction during implementation of the 1987 LRDP could similarly contaminate run-off. Therefore, shutdown and decommissioning is expected to have an impact on the quality of run-off that is similar to that expected from implementation of the 1987 LRDP.

d. Biological Resources

No rare, endangered or threatened plant or animal species has been located or is expected to appear on the LBL site. Accordingly, 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 to cause any fish or wildlife populations to drop below self-sustaining levels.[29] Shutdown and decommissioning would not expand the LBL complex, therefore it would not adversely affect the range or population of any plant or animal species. Accordingly, shutdown and decommissioning is expected to have less of an impact on the range and population of species than that expected from implementation of the 1987 LRDP.

Additional facility development under the 1987 LRDP would cause a loss of open space, portions of which may be vegetated and provide habitat for some non-critical species.[30] On the other hand, shutdown and decommissioning would affect only programs, buildings and facilities on the existing LBL site, therefore it would not reduce open space, but may actually produce open spaces which may be used as a habitat by wildlife, if buildings were removed and the site planted with new vegetation.

Consequently, shutdown and decommissioning is expected to have a lesser impact on vegetation and noncritical species than would implementation of the 1987 LRDP.

e. Historical and Archaeological Resources

Implementation of the 1987 LRDP 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.[31] Because shutdown and decommissioning would affect solely existing facilities, it would not affect any prehistoric, archaeological or paleontological sites, or property of historic or cultural significance, other than the Laboratory itself. Consequently, shutdown and decommissioning and implementation of the 1987 LRDP are expected to have similar impacts on historical and archaeological resources.

f. Visual Quality

Implementation of the 1987 LRDP could impact the visual quality of LBL and the surrounding environs; for instance, development would minimally disturb existing landscaping, possibly requiring revegetation and grading, and the additional grading, retaining walls and buildings would necessitate measures that would make them as visually compatible as possible with their surroundings.[32] Shutdown and decommission would neither add structures to the LBL complex nor disturb the topography by grading or excavation, though shutdown and decommissioning may remove structures; thereby requiring re-vegetation to minimize the visual impact. Furthermore, the removal of existing structures might also necessitate grading to restore the natural appearance of the topography. Consequently, shutdown and decommissioning may have less of an impact on visual quality than that expected from the 1987 LRDP.

g. Land Use

The 1987 LRDP proposes development on the original LBL site and development on the east site area. Development on the original site is contained in the center of the LBL site and would not affect any land use adjacent to, and outside of, LBL property.[33] However, development of the east site would utilize approximately four acres of open space, which would be converted to urban- to suburban-scale uses.[34] In contrast, shutdown and decommissioning would neither add new structures to the site nor

introduce new activities onto the LBL site, thereby avoiding any conflict with applicable land use or environmental plans, ordinances or goals.

h. Population, Employment and Housing

Implementation of the 1987 LRDP is expected to increase employment in the San Francisco Bay region. For instance, it is anticipated that the 1987 LRDP would increase the LBL population by 605 persons, by the year 1992, 400 of whom would seek to live in communities other than Berkeley. The increased population is expected to increase the demand for housing, but will not significantly affect the availability of owned and rented housing.[35]

The shutdown and decommissioning alternative would reduce the LBL population because of the inevitable departure of employees who serviced phased out programs and decommissioned facilities. Consequently, the alternative could increase unemployment in communities surrounding LBL. If dismissed LBL employees emigrate from the area, then the alternative project would contribute to a population decline which could increase the availability of housing. However, the effects on unemployment and housing are expected to be small because LBL employees would be dismissed over the course of five to ten years.

The general effects of the LBL population growth on surrounding communities due to implementation is not expected to be significant. Shutdown and decommissioning could cause a decrease in population by causing the dismissal of LBL employees. However it is expected that, as with the 1987 LRDP, population changes in the LBL surroundings would be the result of population factors which affect the San Francisco Bay region as a whole, and not LBL or the city of Berkeley in particular.[36]

i. Traffic, Circulation and Parking

Daily traffic to and from LBL has not increased significantly. However, as the 1987 LRDP continues to be implemented, additional incremental increases in traffic are expected due to projected increases in the number of employees and visitors at LBL.[37] Implementation of the 1987 LRDP would cause peak hour traffic volume increases at the Blackberry Canyon and Grizzly Peak gates, with minimal impacts on the overall volume of traffic away from LBL. Furthermore, implementation of the 1987

LRDP would slightly increase potential conflicts between motor vehicles and pedestrians and/or bicycles due to increased traffic and emphasis on use of alternate transportation.[38]

During shutdown and decommissioning, dismissal of LBL employees would cause a decrease in the LBL population, which would lead to a reduction in the population traveling to and from the LBL site, when building and accelerators are removed from the site. Therefore, the alternative project would reduce commuting traffic around LBL, due to truck shipments of shielding and building scrap to appropriate disposal sites.

Increased traffic to LBL would cause a decline in parking availability during implementation of the 1987 LRDP.[39] However, the shutdown and decommissioning alternative would gradually reduce the LBL population by phasing out programs. Therefore, the alternative would improve parking availability during the shutdown and decommissioning period.

Implementation of the 1987 LRDP would increase the difficulty of bicycle and pedestrian circulation around the LBL site and Berkeley Campus.[40] The shutdown and decommissioning alternative would reduce the population traveling to the LBL site. Therefore it would improve bicycle and pedestrian circulation around LBL.

j. Air Quality

Implementation of the 1987 LRDP would adversely impact air quality by increasing emission of particulates and air contaminants during construction. Although shutdown and decommissioning could release particulates into the air during the demolition of facilities, the release of particulates would cease at the end of decommissioning. Therefore, shutdown and decommissioning would have a lesser impact on air quality than would implementation of the 1987 LRDP.

k. Noise

Implementation of the 1987 LRDP could generate construction noise which could have significant adverse impacts on noise levels.[41] Activities made possible by implementation would not generate noise at levels in conflict with applicable noise ordinances and standards.[42] In contrast, even though

shutdown and decommissioning would generate noise at levels which could conflict with applicable noise ordinances and standards during the removal of facilities, it would eliminate existing programs that contribute to ambient noise. Therefore, the shutdown and decommissioning would have a lesser impact on noise levels than would implementation of the 1987 LRDP.

l. Public Services

Implementation of the 1987 LRDP would not negatively impact public services because LBL would continue to operate its own police, fire and security units.[43] During decommissioning, LBL would employ a caretaker staff which would continue operation and maintenance of LBL support functions; therefore, unlike implementation of the 1987 LRDP, shutdown and decommissioning would reduce fire suppression and police protection services in the area.

m. Utilities

Project development under the 1987 LRDP would not create demands in excess of existing and planned water supply, natural gas supply, electricity supply, or waste-water and sanitary waste capacity.[44] Nonetheless, expansion of the LBL complex would increase demand for water, natural gas, electricity, waste-water and sanitary waste disposal and treatment. In contrast, shutdown and decommissioning would reduce demand for water, gas, electricity, and waste-water and sanitary waste capacity by eliminating programs and facilities. Therefore, by reducing present demands, shutdown and decommissioning would have a lesser adverse impact on utilities than would be expected from implementation of the 1987 LRDP.

Project development is not expected to have a significant adverse impact on LBL's ability to dispose of non-hazardous solid waste.[45] However, expansion of LBL would increase the generation of non-hazardous waste. The shutdown and decommissioning alternative would decrease landfill capacity consumption from its present rate.

n. Energy

Increased energy demand from new facilities and increased employee-related transportation impacts would occur in conjunction with implementation of the 1987 LRDP.[46] However, shutdown and decommissioning would decrease energy demand by eliminating programs and facilities. Therefore, shutdown and decommissioning would have a lesser adverse impact on the energy supply than would implementation of the 1987 LRDP.

o. Hazardous Substances

Implementation of the 1987 LRDP would increase the amounts of hazardous materials produced by LBL. Shutdown and decommissioning would reduce the amount of hazardous substances produced by eliminating programs and facilities. Consequently, shutdown and decommissioning would have a lesser impact on the environment due to hazardous substances than would implementation of the 1987 LRDP, except for removal of regulated building materials which may increase during building removal.

2. Capacity to Achieve Project Objective

Shutdown would phase out all LBL research and development operations, and decommissioning would prepare vacated buildings for transfer to new, unrestricted ownership. Consequently, shutdown and decommissioning would terminate LBL, thus eliminating all potential for LBL to complete its mandated mission.

Five hundred graduate students pursue research at the Laboratory with about 100 students receiving advanced degrees every year. Shutdown and decommissioning would eliminate the availability of LBL's advance research and development facilities to students, thereby undermining LBL's ability to educate and train future generations of scientists and engineers. Shutdown would eliminate LBL's ability to foster productive relationships between LBL's research programs and industry. In short, industry would no longer be able to continue the exchange of ideas and information with LBL. Furthermore, without LBL, a flow of Berkeley graduates to industry would cease, thus eliminating one form of technology transfer that allows LBL to maintain close and supportive relationships with industry.

D. MODIFICATION OF OPERATIONS (LESS DEVELOPMENT)

The modification of operations (less development) alternative would modify LBL operations, including near term (within five to ten years) proposed projects, to reduce potentially adverse environmental impacts. Modification of operations is broadly defined as the scale down of operations and/or the application of alternative technologies and management strategies.

For the purpose of analyzing the impacts of this alternative, operations at LBL were examined to determine which operations could be selected for consideration in this alternative. The criteria for selection were:

- Operations with the greatest potential for emission of toxic air contaminants.
- Operations historically generating the greatest quantities of hazardous waste.

The facilities selected as containing the above-described operations with the potential for environmental impacts according to these criteria were:

- Degreasing operations in LBL shops.
- Gasoline dispensing operations.
- Painting operations.
- Chemical, material and life science research laboratories.

1. Impact Analysis

a. Summary Impact Analysis

During the analysis of the modification of operations (less development) alternative, it is assumed that the alternative would not lead to the implementation of management strategies or the adoption of technologies which would cause an increase in the LBL population or an increase in the number of buildings on the LBL site. The assumption follows from the alternative's goal of reducing adverse environmental impacts, as well as the possible scaling down of operations under the alternative.

Generally, the alternative would have a lesser adverse impact on the environment than would implementation of the 1987 LRDP. Lesser adverse impacts are expected regarding seismicity; sedimentation, erosion and landsliding; hydrology; visual quality; land use; traffic, circulation and parking; air quality; noise; utilities; energy; and hazardous substances. The alternative is expected to have a greater adverse impact on unemployment conditions in the San Francisco Bay region than would be caused by implementation of the 1987 LRDP.

b. Geology, Soils and Seismicity

No portion of the LBL site is within the Alquist-Priolo Special Studies Zone, however, the LBL site is within an active fault zone. Consequently, there could be significant adverse impacts on people or property due to surface rupture or liquefaction produced by an earthquake. Groundshaking, landslides, lurching and differential compaction may also injure persons and property during a seismic event.[47] Implementation of the 1987 LRDP would increase the present potential for injury to persons and property due to seismicity because implementation is expected to increase the number of persons and facilities on the LBL complex.

Because the modification of operations (less development) alternative could scale down operations to reduce adverse environmental impacts, it may cause a reduction in the LBL population. Therefore it is anticipated that it could reduce the potential for harm to persons due to seismic and related events. At worst, it would maintain the present potential for human injury. Similarly, because the alternative may scale down operations, it is expected that it could decrease equipment and buildings on the LBL

site. Therefore it is likely to have a lesser adverse impact on LBL facilities due to seismic and related events than is expected from implementation of the 1987 LRDP, with the exception of those buildings proposed for seismic safety upgrades.

No portion of the site is within a Mineral Resource Zone or Important Farmland. Therefore, neither the modification of operations (less development) alternative or the 1987 LRDP would affect those types of areas.

Because modification of operations emphasizes the scaling down of operations, it is not expected to cause an increase in structures on LBL. Therefore, the alternative would avoid most excavation, grading or clearing of vegetation which could initiate erosion, sedimentation and landsliding. Therefore, in contrast to implementation of the 1987 LRDP, the alternative is expected to have no adverse impact on building stability due to erosion, sedimentation and landsliding. Implementation of the 1987 LRDP may promote soil erosion, sedimentation and landsliding, which would adversely affect the stability of buildings placed on the site.[48]

c. Hydrology and Water Quality

Continued construction on the LBL site is not expected to increase off-site flood hazard, erosion or sedimentation. Moreover, development under the 1987 LRDP is not expected to deplete the groundwater resource substantially, interfere with groundwater recharge, or substantially degrade surface or groundwater quality.[49] Though the anticipated effects of implementation of the 1987 LRDP on groundwater are not substantial, the increase in population and facilities would cause an increased demand on groundwater supply. An increase in the number of buildings could negatively impact the recharge and quality of groundwater by changing the pattern of stormwater run-off.

Like the 1987 LRDP, the modification of operations (less development) alternative is not expected to increase off-site flood hazards, erosion or sedimentation because the alternative is not expected to cause excavation, grading or clearing of vegetation. In contrast to the 1987 LRDP, the modification of operations (less development) alternative would be designed to reduce adverse effects to the environment. Therefore, if successfully implemented, the alternative would not accelerate depletion of groundwater, or adversely affect groundwater recharge or the quality of surface or groundwater.

Accordingly, the alternative is expected to have a lesser adverse impact on groundwater supplies and the quality of surface water than is expected from implementation of the 1987 LRDP.

Implementation of the 1987 LRDP, would not produce uncontrolled run-off and would not affect the quality of water run-off.[50] The modification of operations (less development) alternative would be implemented to reduce adverse effects of run-off. Therefore, the alternative is expected to have a lesser adverse impact on the volume of uncontrolled run-off and the quality of run-off than is expected from implementation of the 1987 LRDP.

d. Biological Resources

No rare, endangered or threatened plant or animal species has been located or is expected to appear on the LBL site. Accordingly, 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 to cause any fish or wildlife populations to drop below self-sustaining levels.[51] The modification of operations (less development) alternative would not expand the LBL site, therefore it would not adversely affect the range or population of any plant or animal species. Therefore, the alternative is expected to have an impact on the range and population of species that is similar to that expected from implementation of the 1987 LRDP.

Additional facility development under the 1987 LRDP would cause a loss of open space, portions of which may be vegetated and provide habitat for some non-critical species.[52] However, the modification of operations (less development) alternative includes the scaling down of operations, therefore it is not likely to consume open space for additional construction. Furthermore, the alternative would be designed to reduce adverse impacts on the environment; therefore, if properly implemented, it would not reduce open space, but may actually increase open spaces that might be used as habitat by noncritical species. Consequently, the alternative is expected to have a lesser impact on vegetation and noncritical species than would implementation of the 1987 LRDP.

e. Historical and Archaeological Resources

Implementation of the 1987 LRDP is not expect to adversely impact any significant prehistoric, archaeological or paleontological site, or any property of historic or cultural significance, other than the Laboratory itself.[53] The alternative would maintain or decrease the number of buildings as it scales down operations and reduces adverse impacts on the environment. Accordingly, it is expected that the alternative would not affect any prehistoric, archaeological or paleontological sites, or property of historic or cultural significance, other than LBL itself. Consequently, the modification of operations (less development) alternative and implementation of the 1987 LRDP are expected to have similar impacts on historical and archaeological resources.

f. Visual Quality

Implementation of the 1987 LRDP could impact the visual quality of LBL and the surrounding environs; for instance, development would minimally disturb existing landscaping, possibly requiring re-vegetation and grading, and the additional grading, retaining walls and buildings would necessitate measures that would make them as visually compatible as possible with their surroundings.[54] The modification of operations (less development) alternative is not expected to cause additional development of the LBL complex because the alternative would scale down operations to reduce adverse impacts to the environment. Moreover, if scaling down causes the removal of structures, in accordance with its environmental purpose, the alternative would provide for landscaping and re-vegetation to avoid adverse visual impacts. Consequently, the modification of operations (less development) alternative is expected to have an impact on visual quality that is less than that expected from implementation of the 1987 LRDP.

g. Land Use

The 1987 LRDP proposes development on the original LBL site and development on the east site area. Development on the original site is contained in the center of the LBL site and would not affect any land use adjacent to, and outside of, LBL property.[55] However, development of the east site would utilize approximately four acres of open space, which would be converted beginning in 1992 from urban- to suburban-scale uses.[56] Implementation of the 1987 LRDP is not in conflict with provisions of UC

Berkeley local land use or general plans, local ordinances, or locally adopted environmental plans and goals. In contrast, the modification of operations (less development) alternative is not expected to add new buildings to the site nor introduce new activities onto the LBL site, therefore it would avoid any conflict with applicable land use or environmental plans, ordinances or goals.

h. Population, Employment and Housing

Implementation of the 1987 LRDP is expected to increase employment in the Bay Area. It is anticipated that the 1987 LRDP would increase the LBL population by 605 to the year 1992, persons, 400 of whom would seek to live in communities other than Berkeley. The increased population is expected to increase the demand for housing, but will not significantly affect the availability of owned and rented housing.[57]

The modification of operations (less development) alternative is not expected to cause any increases in the LBL population. By scaling down operations, the alternative could cause dismissal of LBL employees. If the alternative causes the dismissal of employees it could result in increased unemployment in the surrounding communities or increased migration from the area. Consequently, the alternative could exacerbate unemployment in the surrounding community and/or increase the availability of housing by initiating the emigration of the newly unemployed. However, any effects that the alternative has on unemployment or housing is difficult to estimate, but could be up to one-third of the LBL staff. In terms of impact, this could represent about 650 to 700 full-time employees.

The general effects of the LBL population growth on surrounding communities due to implementation of the 1987 LRDP is not expected to be significant. Population changes in the LBL environs communities would be the result of population factors which affect the San Francisco Bay region as a whole, and not LBL or the city of Berkeley in particular.[58] Because the modification of operations (less development) alternative is not expected to cause greater changes in the general population than would be caused by implementation of the 1987 LRDP, its effect on the surrounding community would be similar to or less than what is expected from implementation of the 1987 LRDP.

i. Traffic, Circulation and Parking

Daily traffic to and from LBL has not increased significantly. However, as the 1987 LRDP continues to be implemented, additional incremental increases in traffic are expected due to projected increases in the number of employees and visitors at LBL.[59] Implementation of the 1987 LRDP would cause peak hour traffic volume increases at the Blackberry Canyon and Grizzly Peak gates, with minimal impacts on the overall volume of traffic away from LBL. Implementation of the 1987 LRDP would slightly increase potential conflicts between motor vehicles and pedestrians and/or bicycles due to increased traffic and emphasis on use of alternate transportation.[60] In contrast, the modification of operations (less development) alternative is most likely to reduce the LBL population by scaling down operations. Consequently, its implementation is likely to improve traffic conditions around LBL.

LBL parking availability would be maintained during implementation of the 1987 LRDP.[61] However the modification of operations (less development) alternative is likely to improve parking conditions by reducing the number of LBL employees after scaling down operations.

Implementation of the 1987 LRDP would create a slight increase in the difficulty of bicycle and pedestrian circulation around the LBL complex.[62] In contrast, after implementation of the modification of operations (less development) alternative, bicycles and pedestrians should circulate with greater ease because the alternative would reduce the volume of traffic traveling to and from the LBL site by scaling down operations.

The largest use of on-site gasoline dispensing is by the LBL Shuttle Bus System. Removal of fuel dispensing operations from the LBL site would result in a shift of these services to commercial facilities in the City of Berkeley, thereby negating any benefits to air quality.

j. Air Quality

Implementation of the 1987 LRDP would adversely impact short-term air quality by increasing emission of particulates and air contaminants during and after construction. The objective of the modification of alternative operations (less development) is to reduce adverse impacts to the environment. Therefore,

technologies adopted under the alternative would reduce air contaminant emission. In addition, the scaling down of operations would also reduce emission.

Therefore, the modification of operations (less development) alternative would reduce adverse impacts to air quality while implementation of the 1987 LRDP would aggravate air quality.

k. Noise

Implementation of the 1987 LRDP could generate short-term construction noise which could have adverse impacts.[63] Activities made possible by implementation would not generate noise at levels in conflict with applicable noise ordinances and standards.[64] In contrast, the modification of operations (less development) alternative would reduce noise levels by scaling down operations at the Bevatron and the SuperHILAC and/or by replacing present technologies with substitutes which generate less noise. Consequently, the alternative would reduce noise levels while implementation of the 1987 LRDP would increase short-term noise levels.

l. Public Services

Neither implementation of the 1987 LRDP nor execution of the modification of operations (less development) alternative would negatively impact public services because LBL would continue to operate its own police, fire and security units during either alternative.[65]

m. Utilities

Project development under the 1987 LRDP would not create demands in excess of the capacity of existing and planned water supply, natural gas supply, electricity supply, or waste-water and sanitary waste capacity.[66] Nonetheless, expansion of the LBL complex would increase demand for water, natural gas, electricity, waste-water and sanitary waste disposal and treatment as shown in the 1987 LRDP. In contrast, the modification of operations (less development) alternative would reduce demand for water, energy, and waste disposal capacity by scaling down operations. In addition, the alternative would decrease demand for energy and water by replacing LBL's present technologies with technologies that are more energy efficient and less dependent on water resources.

Project development is not expected to have a significant adverse impact on LBL's ability to dispose of non-hazardous solid waste.[67] However, expansion of LBL would increase the generation of non-hazardous waste. On the other hand, the modification of operations (less development) alternative would decrease LBL's landfill capacity consumption rate by scaling down operations.

n. Energy

Increased energy demand from new facilities and increased employee-related transportation impacts would occur in conjunction with implementation of the 1987 LRDP.[68] However, the modification of operations (less development) alternative would decrease energy demand by scaling down operations and replacing present technologies with more energy efficient technologies. Therefore, the alternative would have a lesser adverse impact on the energy supply than would implementation of the 1987 LRDP.

o. Hazardous Substances

Implementation of the 1987 LRDP would increase the amounts of hazardous materials used by LBL increasing the potential impacts of those substances. On the other hand, the modification of operations (less development) alternative would reduce the amount of hazardous substances produced by scaling down operations and replacing present technologies with technologies which use lower quantities of hazardous substances. Consequently, the alternative would have a lesser impact on the environment due to hazardous substances than would implementation of the 1987 LRDP. LBL will continue to improve its management of hazardous substances during implementation of the 1987 LRDP to minimize all adverse environmental impacts.

2. Capacity to Achieve Project Objective

If LBL implements the modification of operations (less development) alternative, it could scale down operations which have traditionally placed it at the forefront of scientific research and development because the criteria for consideration under the alternative are independent of the operation's significance to research and development. Similarly, under the alternative, LBL may choose technologies which would reduce adverse impacts on the environment.

LBL's opportunities for developing and operating unique national experimental facilities would be hampered by implementation of the modification of operations (less development) alternative. The criteria for scaling down and substituting technologies are not necessarily consistent with LBL's need to provide unique national experimental facilities. For instance, the alternative provides no exemption to maintain valuable scientific tools such as the Bevalac, the 88-inch Cyclotron, the National Center for Electron Microscopy, and the National Tritium Labeling Facility.

If the modification of operations diminishes LBL's stature as a leader in research and development it would inevitably reduce LBL's achievements as an educator and trainer of future generations of scientists and engineers. Five hundred graduate students pursue research at the Laboratory with about 100 students receiving advance degrees every year.[69] The scaling down of operations and the substitution of technologies could limit the availability of advance research and development facilities, thereby reducing the quality of research and development. Deterioration of the quality of research and development would in turn reduce the number of leading scientists, professors and students interested in working with, or, visiting LBL. Consequently, not only would students no longer have the best research and development equipment and facilities with which to educate themselves, but they would also lack the guidance and comradeship of the best scientists, engineers, professors and students.

Similarly, a loss in stature would reduce LBL's ability to foster productive relationships between itself and industry. The Center for X-ray Optics, and the Center for Building Sciences, are examples of programs that collaborate with industry; technology transfer programs also promote the application of research results. As with scientists, engineers, professors and students, LBL's inability to remain at the leading edge of research and development would decrease the number of companies willing to collaborate with LBL because the potential benefits of collaboration would be reduced. Furthermore, the flow of Berkeley graduates to industry is one form of technology transfer that allows LBL to maintain close and supportive relationships with industry. However, as stated above, if the alternative diminishes the quality of research and development, the quality of education and training that students receive at LBL would also deteriorate; thereby reducing the number of Berkeley students employed by industry.

E. NO NEW DEVELOPMENT

The no new development alternative is the continued operation, including development of LBL projects already authorized and budgeted through FY 1992. Programs and projects would continue at their present (FY 1992) level, but no additional proposed projects except infrastructure improvements (as listed earlier in Table II-5) would be added.

Employment and funding levels, adjusted for inflation, would remain constant by program at FY 1992 levels. No new projects other than those funded, those required to maintain the existing infrastructure, and those required to comply with statutes and regulations (e.g., remediation of inactive sites) would be included.

The no new development alternative would result only in the partial fulfillment of the research and development missions established by Congress and the President.

1. Impact Analysis

a. Summary Impact Analysis

Generally, the no new development alternative would have a lesser adverse impact on the environment than would implementation of the 1987 LRDP. Less adverse impacts are expected regarding seismicity; hydrology; biological resources; visual quality; land use objectives; population and housing; traffic, circulation and parking; air quality; utilities; energy; and hazardous waste. The LRDP provides for infrastructure improvements including utilities and transportation and improved facilities for environmental and safety staff. These and other improvements are less likely to be funded in the event that the no new development alternative was to be selected. The 1987 LRDP would have a more favorable impact on employment conditions than would the no project alternative.

b. Geology, Soils and Seismicity

No portion of the LBL site is within the Alquist-Priolo Special Studies Zone, however, the LBL site is within an active fault zone. Consequently, there could be significant adverse impacts on people or

property due to surface rupture or liquefaction produced by an earthquake. Groundshaking, landslides, lurching and differential compaction may also injure persons and property during a seismic event.[70] Despite the present potential for harm, implementation of the 1987 LRDP is expected to have greater adverse impacts on persons and property than is expected under the no project alternative because the 1987 LRDP is expected to increase both the number of people and buildings on the LBL complex. This impact, however, is off-set by the removal of the oldest and least seismically safe LBL facilities. The no new development alternative does not provide for these activities.

No portion of the site is within a Mineral Resource Zone or Important Farmland. Therefore, neither the no new development alternative nor the 1987 LRDP would affect those types of areas.

Implementation of the 1987 LRDP may promote soil erosion, sedimentation and landsliding, which would adversely affect the stability of buildings placed on the site.[71] The no new development alternative would not lead to excavation, grading or clearing of vegetation. Therefore, it would not facilitate erosion, sedimentation and landsliding. Consequently, the no new development alternative is expected to have no adverse impact on building stability due to erosion, sedimentation and landsliding.

c. Hydrology and Water Quality

Continued construction on the LBL site is not expected to increase off-site flood hazard, erosion or sedimentation. Moreover, development under the 1987 LRDP is not expected to deplete the groundwater supply substantially, interfere with groundwater recharge, or substantially degrade surface or groundwater quality.[72] Therefore, neither the no new development alternative nor implementation of the 1987 LRDP is expected to change the risk of off-site flood hazard, erosion or sedimentation.

Although the additional effects of development on groundwater are not expected to be substantial, the presence of additional buildings and activities may affect groundwater recharge and the quality of surface or groundwater quality by affecting the pattern of groundwater run-off. Furthermore, particulates generated by construction during implementation of the 1987 LRDP could contaminate run-off. Therefore, the no new development alternative would have adverse impacts on the depletion of groundwater resources, the pattern of groundwater recharge, and groundwater quality, that are less than the impacts expected under the 1987 LRDP.

Moreover, implementation of the 1987 LRDP would not produce increased uncontrolled run-off and would not adversely affect the quality of water run-off.[73] Consequently, the no new development alternative is expected to have a lesser impact on the volume of uncontrolled run-off and a lesser impact on the quality of water run-off than would development under the 1987 LRDP.

d. Biological Resources

No rare, endangered or threatened plant or animal species has been located or is expected to appear on the LBL site. Accordingly, continued university operation of LBL, or 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 to cause any fish or wildlife populations to drop below self-sustaining levels.[74] Additional facility development would cause a loss of open space, portions of which may be vegetated and provide habitat for some non-critical species.[75] Consequently, the no new development alternative is expected to have a lesser impact on vegetation and natural habitat of noncritical species than would implementation of the 1987 LRDP. The no new development alternative and implementation of the 1987 LRDP are expected to have similar impacts on other biological resources.

e. Historical and Archaeological Resources

Implementation of the 1987 LRDP 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. Consequently, the no new development alternative and implementation of the 1987 LRDP are expected to have similar impacts on historical and archaeological resources.[76]

f. Visual Quality

Implementation of the 1987 LRDP could impact the visual quality of LBL and the surrounding environs; for instance, development would minimally disturb existing landscaping, possibly requiring re-vegetation and grading, and the additional grading, retaining walls and buildings would necessitate measures that would make them as visually compatible as possible with their surroundings.[77] Consequently, the no new development alternative is expected to have a lesser negative impact on visual quality than is expected under the 1987 LRDP.

g. Land Use

The 1987 LRDP proposes development on the original LBL site and development on the east site area. Development on the original site is contained in the center of the LBL site and would not affect any land use adjacent to, and outside of, LBL property.[78] Development of the east site would utilize approximately four acres of open space, which would be converted beginning in 1992 to urban- to suburban-scale uses.[79] Implementation of the 1987 LRDP is not in conflict with provisions of local land use or general plans.

h. Population, Employment and Housing

Implementation of the 1987 LRDP is expected to increase employment in the San Francisco Bay region. It is anticipated that the 1987 LRDP would increase the LBL population by 605 persons to the year 1992, 400 of whom would seek to live in communities other than Berkeley. The increased population is expected to increase the demand for housing, but will not significantly affect the availability of owned and rented housing.[80] The no new development alternative would maintain the LBL population at its present level, therefore, it would have no impact on the availability of owned and rented housing. However, implementation of the 1987 LRDP would provide additional jobs in the Bay Area while the no new development alternative would not.

The general effects of the LBL population growth on surrounding communities is not expected to be significant. Population changes in the LBL environs communities would be the result of population factors which affect the San Francisco Bay region as a whole, and not LBL or the city of Berkeley in particular.[81] However, the no new development alternative is not expected to contribute to population growth or decline in the communities surrounding LBL, therefore, the no new development alternative would have a lesser impact on the surrounding areas due to population changes than would implementation of the 1987 LRDP.

i. Traffic, Circulation and Parking

Daily traffic to and from LBL has not increased. However, if the 1987 LRDP is implemented, additional incremental increases in traffic are expected due to projected increases in the number of

employees and visitors at LBL.[82] Implementation of the 1987 LRDP would cause peak hour traffic volume increases at the Blackberry Canyon and Grizzly Peak gates, with minimal impacts on the overall volume of traffic away from LBL. Furthermore, implementation of the 1987 LRDP would increase conflicts between motor vehicles and pedestrians and/or bicycles due to increased traffic and emphasis on use of alternate transportation.[83] The no new development alternative would maintain the present LBL population. Therefore, the no new development alternative is expected to have a lesser impact on traffic conditions around LBL than would implementation of the 1987 LRDP.

LBL parking availability would be maintained during implementation of the 1987 LRDP.[84] Therefore, the no new development alternative, which would maintain the present size of the LBL population, would have a lesser impact on parking conditions around LBL than would implementation of the 1987 LRDP.

Implementation of the 1987 LRDP would create a slight increase in the difficulty of bicycle and pedestrian circulation around the LBL complex.[85] By keeping the LBL population constant, the no new development alternative would have a lesser adverse impact on bicycle and pedestrian circulation around LBL than would implementation of the 1987 LRDP, but would not include improvements to bicycle and pedestrian circulation systems.

j. Air Quality

Implementation of the 1987 LRDP would adversely impact short-term air quality by increasing emission of particulates and air contaminants during and after construction. Therefore, the no new development alternative, which would continue present levels of emission, would have a lesser impact on air quality than would implementation of the 1987 LRDP.

k. Noise

Implementation of the 1987 LRDP could generate construction noise which could have short-term adverse impacts on noise levels.[86] Activities made possible by implementation would not generate short-term noise at levels in conflict with applicable noise ordinances and standards.[87] Therefore, the

no new development alternative, which would preserve present noise levels, would have a lesser impact on noise levels than would implementation of the 1987 LRDP.

l. Public Services

Neither the 1987 LRDP nor the no new development alternative would negatively impact public services because LBL operates its own police, fire and security units.[88]

m. Utilities

Project development according to the 1987 LRDP would not create demands in excess of existing and planned water supply, natural gas supply, electricity supply, or waste-water and sanitary waste capacity.[89] Nonetheless, expansion of the LBL complex would increase demand for water, natural gas, electricity, waste-water and sanitary waste disposal and treatment as shown in the 1987 LRDP. Therefore, by maintaining present demands, the no new development alternative would have a lesser adverse impact on utilities.

Project development is not expected to have a significant adverse impact on LBL's ability to dispose of non-hazardous solid waste.[90] However, expansion of LBL would increase the generation of non-hazardous waste, while the no new development alternative would maintain disposal of non-hazardous solid waste at its present rate.

n. Energy

Increased energy demand from new facilities and increased employee-related transportation impacts would occur in conjunction with implementation of the 1987 LRDP.[91] Therefore, because it would maintain energy demand at its present level, the no new development alternative would have a lesser adverse impact on the energy supply.

o. Hazardous Substances

Implementation of the 1987 LRDP would increase the amounts of hazardous materials used by LBL increasing the potential impacts of those substances. The no new development alternative better ensures a lesser adverse impact on the environment due to hazardous substances than would implementation of the 1987 LRDP by keeping the amounts of hazardous substances produced by LBL at their present levels.

2. Capacity to Achieve Project Objective

As scientific challenges abound, the need for research and experimentation also increases, therefore, failure to expand and construct LBL facilities could impede LBL's ability to provide the national leadership and support of technological innovation necessary to perform leading multidisciplinary research in the energy sciences, general sciences and life sciences in a manner that ensures employee and public safety and the protection of the environment.

Moreover, failure to expand would severely compromise LBL's ability to provide unique experimental facilities for use by qualified investigators. LBL has already constructed and continues to operate the Bevalac, the 88-inch Cyclotron, the National Center for Electron Microscopy, and the National Tritium Labeling Facility which are available for scientific research. To continue serving scientists whose work is at the leading edge of their disciplines, LBL must be able to plan and develop new programs and required facilities.

An absolute restriction on expansion would seriously impact LBL's ability to educate and train future scientists and engineers. Five hundred graduate students pursue research at LBL with about 100 students receiving advance degrees every year.[92] Failure to expand would limit the availability of advanced research facilities, thereby reducing the number of leading scientists, professors and students interested in working with or visiting LBL. Consequently, not only would students no longer have the most advanced equipment and facilities for their education, but they would also lack the guidance and comradeship of the best scientists, engineers, professors and students. LBL also has education programs for K-12 students and minority students from community colleges. Shut-down or no expansion would eliminate or limit these programs.

Failure to expand would undermine LBL's ability to foster productive relationships between itself and industry. The Center for X-ray Optics and the Center for Building Sciences are examples of programs that collaborate with industry; technology transfer programs also promote application of research results. As with scientists, engineers, professors and students, LBL's inability to remain at the forefront of science and research would decrease the number of companies that are persuaded that collaboration with LBL is worthwhile. Furthermore, the flow of Berkeley graduates to industry is one form of technology transfer that allows LBL to maintain close and supportive relationships with industry. A prohibition on future expansion would cause a deterioration of the quality of education and training that students receive at LBL, which would reduce the number of Berkeley students employed by industry, and thereby reduce technology transfer between LBL and industry.

F. OFF-SITE ALTERNATIVES

1. Overview of Screening Criteria

a. Overview of Screening Analysis

The following criteria were used to establish planning requirements for off-site development during the contract renewal term:

1) The site must be at least 30 acres in size in order to allow for proper placement of new (additional and replacement) facilities. The acreage would also provide for open space and parking needs, and a building floor area ratio of 1:3.

2) The site must be within 45 minutes' driving time of LBL in order to create the minimally acceptable operation relationship between the two sites.

3) Adequate access must be available to existing and future highways and public transportation systems.

4) Infrastructure and services must be in place or have expansion potential to serve proposed building development. Infrastructure and services include: water, sewer, power, police, fire, and recreational amenities.

5) Land must be easily assembled, preferably in single ownership.

6) The site must have no major environmental or land-use constraints, such as endangered species, rare plants or animals, etc.

A number of sites were identified for review based on the above planning criteria. An additional criteria, that the alternative site must meet DOE terms and conditions for leased space, was not applied. Two sites, the UC Richmond Field Station and the Concord site of the California State University-Hayward off-campus center are reviewed in detail. Other sites, including the Richmond School District

site, the Albany Waterfront, the Berkeley Waterfront, Harbor Bay Isle (Alameda), West of Grizzly Peak (Contra Costa County) and Broadway, Southeast of the intersections of Highways 13 and 24 were also reviewed, but rejected. The sites which are reviewed in detail (the Richmond Field Station and the Concord site) are described in Sections VI-F-2 and VI-F-3 which follow. The rejected sites are described generally in Section VI-F-4.

2. Richmond Field Station

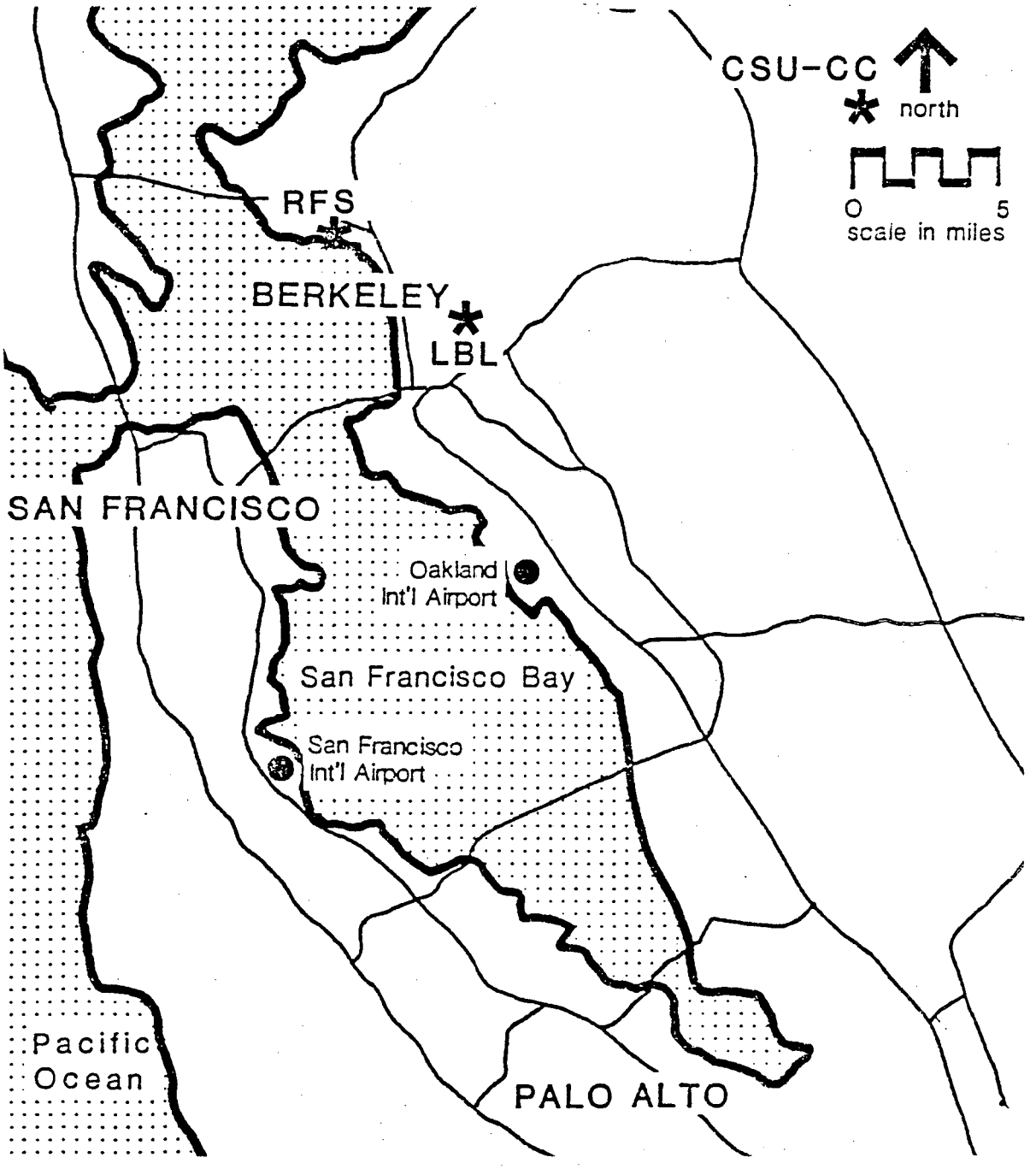
The Richmond Field Station (RFS) site is located in southwest Richmond west of I-580. The University of California currently owns the site, though the site is occupied by RFS, an operating unit of UC Berkeley. The western boundary of the site is the San Francisco Bay. The site is accessed by the I-580 interchange which connects to Seaver Avenue. Access points at the perimeter of the site provide local entry and exit. [The location of the RFS site in relation to LBL is shown in Exhibit VI-1.]

There is currently an average daytime population of about 250 students, faculty and staff which use the site for research in sanitary engineering, environmental health, earthquake engineering, transportation studies, forest products, hydraulics, coastal engineering, fire testing and naval architecture. The site also has the University of California Northern Regional Library facility for holding low circulation materials for UC Berkeley, UC San Francisco, UC Davis and UC Santa Cruz. The existing buildings on the site total about 500,000 gross square feet (GSF).

a. General Assumptions for Analysis

The analysis of the RFS site alternative focuses on land use, aesthetics, archeological, engineering, environmental, geological, demographic, transportation and public services factors. Unless clearly indicated otherwise, during the analysis it is assumed that an off-site expansion of LBL under the 1987 LRDP would produce similar effects as an off-site expansion of LBL facilities during the contract renewal term.

Exhibit VI-1
LOCATION OF RICHMOND FIELD STATION AND CONCORD SITES



1) Existing Conditions

Existing conditions on the RFS site are based upon the *Draft Environmental Impact Report: Long Range Development Plan, University of California, at Berkeley,* pp. 6-31 to 6-38 (citing documentation developed for UC Berkeley by ROMA Design Group and Associated Technical Consultants, the Shoreline Conservation and Development Strategy with Technical Memorandum by Hall, Goodhue, Halsey and Baker for the City of Richmond, and the *Draft EIR for the Berkeley Laboratory Consolidation and Expansion Project*).

2) Impact Analysis

Conclusions regarding impacts on the RFS site are based upon use of the site by LBL.

b. Summary Impact Analysis

If LBL develops the RFS site, impacts on the following elements of the site would be potentially significant: cultural resources, geology/soils, visual quality, land use, transportation, circulation and parking, and hazardous materials.

c. Geology, Soils and Seismicity

1) Existing Conditions

The project site's soils consist of deep alluvium on top of the Franciscan assemblage. Alluvium is typically a mixture of interbedded stiff clays, silts, gravels, and sands. Some soils are derived from the eastern hills. Other soil types were deposited by marine actions during the formation of San Francisco Bay.

The uppermost sediment (i.e., most recent geologically) is a marine deposit of soft grey silty clay known as Bay mud. There is probably some inter-layering with sands and silts near the shoreline. Much of the land surrounding the project site is Bay fill. The project site, however, is not located on Bay fill.

The Hayward Fault and the Wildcat Fault run approximately two miles northeast of the project site respectively, and the San Andreas Fault runs about 15 miles to the west.

Alluvial deposits, such as are contained on the RFS site, would be subject to liquefaction. Liquefaction is a process that occurs when sand, silt, or gravel experience a sudden loss of strength due to water saturation and behaves like a liquid when shaken, as during an earthquake.

2) Impact analysis

Geologic and seismic impacts would be similar to or less than those under LBL's 1987 LRDP because the RFS site is not within an active fault zone, whereas, the LBL site is within an active fault zone.[93] However, the RFS site could still be affected by a major seismic event in the Bay Area.

A detailed geotechnical investigation would be conducted prior to any construction on the RFS site to establish the potential for liquefaction. If the potential for liquefaction exists, site-specific geotechnical design recommendations would minimize structural damage associated with liquefaction. These recommendations would also indicate structural design parameters with regard to seismic safety over and above code requirements, where applicable.

The Environmental Protection Agency (EPA) suggests using a range of about four feet for planning for increases in mean sea levels. Planning for structures on the RFS site would use this as an assumption for planning and environmental review purposes.

d. Hydrology and Water Quality

1) Existing Conditions

The southern portion of the RFS site is within the 100-year coastal flood zone, Zone VI. This area of the site has experienced flooding problems in the past when major storm events have coincided with high tides. This combination of events typically impedes the site's normal drainage to the Bay.

Drainage in the areas with bay mud is poor. The poor drainage causes a very shallow groundwater basin. The groundwater basin is susceptible to pollution. However, the Regional Water Quality Control Board (RWQCB) is monitoring specific sites within the Shoreline Area.

The site currently drains directly into the San Francisco Bay. Siltation is carried to the bay by erosion of the site during periods of heavy rainfall.

2) Impact Analysis

Any buildings proposed within the 100-year coastal flood zone would be engineered so as to minimize damage and potential dangers to human safety in the event of a 100-year flood. Nevertheless, the potential for flooding is greater at the RFS site than it is at the LBL site because the RFS site is in a flood zone and has experienced flooding in the past, while the LBL site is not in a flood-prone area.

The siltation which is currently carried to the Bay from erosion of the open space areas of the site would be reduced by development of the site. Areas left in open space would be landscaped thereby reducing erosion and siltation. There would, however, be an increase in run-off speed and contamination from vehicular oil and other pollutants which would wash off the roadways and parking lots. Development on the RFS site could adversely affect quality of run-off while development on the LBL site would not.[94]

e. Biological Resources

1) Existing Conditions

The RFS site was used for agricultural production, during which time, most of the land was disturbed and existing natural vegetation removed. Some groves of eucalyptus trees remain as remnants of hedge-rows planted during this era. The hedge-row at the northern boundary has reseeded itself, creating a large grove of irregular boundary. Vegetation on the vacant portions of the site consists of annual grassland and bunch grass. The salt marsh area contains both aquatic and upland vegetation. The lower portion of the marsh, which is inundated during high tides, contains cord grass and alkali bulrush. The upland portion contains coyote brush, pampas grass and gum-plant.

The wildlife habitats on the site include the eucalyptus groves, the grassland and the salt marsh area. The developed portions of the site also provide for introduced species such as the starling, english sparrow, feral cat and norway rat. Eucalyptus groves provide habitat for the jackrabbit, pocket gopher, brown towhee, white-crowned sparrow, red-tailed hawk, sparrow hawk, and Anna hummingbird. Monarch butterflies are reported to congregate in the trees during winter migration. The trees provide roosting areas and are a source of food.

The salt marsh serves as habitat for several animal species. Some of the species have a special status. Those species include the salt marsh harvest mouse, California clapper rail and the California black rail, all of which are listed as endangered by both the State and federal authorities. Species common to the marsh include the snowy egret, black crested night heron, American avocet, killdeer, Black-necked stilt, and other shorebirds. Migratory species include common birds such as mallards, pelicans, loons, cormorants and herons.

2) Impact Analysis

The description of the RFS site development includes a provision for maintenance of the salt marsh in its existing natural state. Any activity located in this area, including a nature trail, would be designed in cooperation with the Department of Fish and Game to assure non-interference with sensitive habitat.

Since ecologically sensitive areas would be protected, the impact of this alternative should be similar to impacts of future development on the LBL site. However, the potential for loss of vegetation and natural habitat is greater than at the LBL site because development of the RFS site would occur in open space and the RFS site serves as a habitat for endangered species, while the LBL site does not.

f. Historical and Archaeological Resources

1) Existing Conditions

The southwestern half of the RFS site is within a sensitive zone for potential pre-European archaeological sites. Finds in this sensitive zone have been dated as early as 100 B.C. and have included

shells, jewelry, artifacts, and human bones. An area to the northwest of the project site is identified as a sensitive zone for more contemporary cultural resources.

Prior to the late 1700s the project site area was used as a gathering center by aboriginal Indians who called themselves "Huchium." In the 1770s and after, the area was settled by Spanish explorers and pioneers.

The structures on the project site were constructed in the 1940s and 1950s and are of wood-frame post-war military style architecture, ranging in height from 24 to 75 feet. None of the buildings on the site are of significant architectural value.

2) Impact Analysis

A higher potential for impacts on the archaeological resources exists on the RFS site than on archaeological resources in Oakland and Berkeley because the RFS site is within sensitive zones for potential European archaeological sites and is close to a sensitive zone for more contemporary cultural resources. In contrast, implementation of the 1987 LRDP is not expected to adversely affect any significant prehistoric, archaeological or paleontological site, or any property of historic or cultural significance, other than the Laboratory itself.[95] Prior to development, a certified archaeologist would survey the RFS site for any surface indications of cultural resources prior to any excavation activities. Additionally the area would be monitored during the excavation activities, and if any archaeological resources were discovered, activities would be stopped until the extent and value of the find could be determined.

Impacts on buildings on the Natural Register of Historic Places would not occur if the alternative site or the LBL site is developed.

g. Visual Quality

1) Existing Conditions

The project site is visible from adjacent land uses including the I-580 freeway and boaters on the Bay. I-580 is a scenic freeway in the vicinity of the project site and a portion of the scenic corridor. Clear views of the project site are visible from a segment of I-580 that is adjacent to the project site. Views to the Bay are also afforded at the site.

2) Impact Analysis

The northeastern portions of the site are visible from I-580. Portions of I-580 are designated as a scenic highway. This portion of the site contains existing buildings and would likely remain unchanged. Views of portions of the site which would be developed under this alternative can be seen from local streets and surrounding development. As outlined in the "land use" discussion immediately below, the surrounding land uses are generally industrial and would not be adversely impacted by the proposed development.

h. Land Use

1) Existing Conditions

The RFS site contains 150 acres of land of which 104 acres are developable. A low-land area at the western edge of the site consists of wetlands which would be maintained in its existing condition. Open space amenities such as trails could be provided in this area.

Existing land use on the project site include University research facilities which are used by graduate students and researchers, and the UC Northern Regional Library Facility. Adjacent land uses include light industrial uses to the northwest and southeast, the I-580 freeway to the northeast, marshlands and the San Francisco Bay to the southwest.

The Land Use Element of the Richmond General Plan designates the site and surrounding area as Special Industrial. A new zoning district is proposed for the site which is also called Special Industrial District (M-S). The current research activities on the site would be a permitted use under this zoning district. Educational and housing uses would not be permitted within this zoning district. The current zoning districts on the site include Light Industrial (M2), Heavy Industrial District (M3) and Hazard Resource Additive District (HR).

2) Impact Analysis

The surrounding industrial land uses would not specifically interfere with LBL's new developments; however, they would not specifically complement it. For instance, residential land uses which would accompany LBL off-site development could be considered incompatible with some existing industrial land uses which surround the site. Specifically, the use, storage and disposal of hazardous materials which occur in some of the adjacent industrial uses could increase the risk of human exposure to these materials due to potential accidental releases of spills.

i. Population, Employment and Housing

1) Existing Conditions

The Association of Bay Area Governments (ABAG) projections show that Richmond is projected to add approximately 15,600 new persons to its population between 1985 and 2005/06. El Cerrito is expected to decrease by 500 residents and San Pablo is expected to decrease by 100 residents.

There are currently 250 people employed at the RFS site. Approximately 6,300 housing units have been built in West Contra Costa County since 1980. This compares to 12,600 in the North Central County and 10,900 in the East County.

2) Impact Analysis

Development on the RFS site would increase the RFS site population. Implementation of the 1987 LRDP is expected to increase the LBL population by approximately 810 to the year 20xx, therefore it

appears that a population equally large or larger would follow development of the RFS site. A population in excess of 810 is possible because it is likely that some employee positions at the LBL site would have to be duplicated if the alternative site is developed. Duplication of positions is expected because the distance between the LBL site and the RFS site would preclude some LBL employees from serving the RFS site, whereas such employees would be able to service additional developments on the LBL site. The new population influx would create a new daily population in the City of Richmond which would create new jobs in Richmond and surrounding communities and relocate jobs to those areas as well.

Development on the RFS site could potentially create a need for new local housing units and jobs; however, the magnitude of new housing demands is not expected to be significant. A similar impact is anticipated from implementation of the 1987 LRDP.[96]

j. Traffic, Circulation and Parking

1) Existing Conditions

South 46th Street in Richmond provides access to the Richmond Field Station. Access can be gained from Hoffman Boulevard (Interstate 580) to Bayview and onto South 46th Street. The El Cerrito Del Norte BART station is located about 2,500 feet from the Richmond Field Station. The Richmond Field Station area is also served by AC Transit Buses. Completion of the Hoffman Freeway (I-580) project between the San Rafael Bridge and I-80 has substantially improved regional access to the Richmond Field Station.

2) Impact Analysis

This alternative could add a minimum of approximately 1,766 daily commute trips to the local street system serving the Richmond Field Station, based upon current trip generation at LBL (810 employees x 2.18 trips per employee). Most of these trips would be made by motor vehicles because of the lack of developed public transportation in the area and the absence of large amounts of rental housing within walking or bicycling distance.

Relocation of this population to the RFS site would not necessarily improve traffic conditions around the Berkeley Campus or around the LBL site. The relationship between the Berkeley Campus, the LBL site and the Richmond Field Station would require students and faculty to commute between the three sites, thereby potentially increasing traffic volumes around the Berkeley Campus and the LBL site. Gradual in-fill of the vacated space at the LBL site could contribute to additional growth in traffic congestion around the Berkeley Campus and the LBL site.

Implementation of LBL's 1987 LRDP would produce incremental increases in traffic due to increases in the number of employees and visitors at LBL. However, development at LBL, in contrast to development at RFS, would possibly avoid the duplication of job positions. Therefore, development on the RFS site would have an impact on traffic and parking that is similar to, or greater than, the impact expected from implementation of the 1987 LRDP.[97]

k. Air Quality

1) Existing Conditions

Climate in the Richmond Field Station area is dominated by San Francisco marine winds which prevail southeasterly and southwesterly. The pollution potential in the area is low, due to the frequent occurrence of moderate to strong winds. The area contains several major point sources of air pollution emissions to the north and northeast of the site.

The nearest air quality monitoring station is located in Richmond, approximately three miles from the RFS site. According to information gathered by the Bay Area Air Quality Management District (BAAQMD), the State ozone standard was exceeded in Richmond in 1983. No violations of the State or federal standard for carbon monoxide, sulfur dioxide, nitrogen dioxide, or total suspended particulate concentration levels were detected between 1986 and 1990 at Richmond.

2) Impact Analysis

Regional air quality would be degraded by the generation of vehicle trips and associated carbon monoxide emissions. Most of the staff located at Richmond (along with UC Berkeley faculty and

graduate students who are supported by LBL) would also use LBL facilities during the day. Therefore, for the RFS site alternative, the existing shuttle bus system would have to be expanded to facilitate continual movement of the population between sites; however, it is expected that, for personal convenience, many individuals would choose to drive personal autos and would thereby increase the amount of vehicle emissions for this alternative above the emissions expected under the proposed project.

I. Noise

1) Existing Conditions

The prominent noise source at the project site is vehicle noise from I-580. Ambient noise levels measured adjacent to the freeway in the area of the project site in 1977 ranged from 69 to 76 dBA. If CalTrans constructs a noise barrier as planned, noise levels in 1995 would be 68 to 74 DBA. For research facilities, the acceptable noise levels generally range from 70 to 75 dBA. Acceptable levels for schools are up to 70 dBA. Acceptable levels for dormitories are up to 65 dBA.

2) Impact Analysis

Noise from I-580 would be in excess of normally acceptable levels for the land uses proposed under LBL's long-term plans in the northern portion of the site. Noise levels could be reduced to acceptable levels by construction of noise barriers incorporated into individual project designs or as a part of an overall plan to be developed in the future. In contrast, buildings on the LBL site are not exposed to continual, intolerable levels of ambient noise; therefore, future development on that site would not require noise mitigation expenses, except to diminish construction noise associated with on-site development.

Construction noise during project development could adversely impact neighboring land uses and existing on-site uses. Standard construction noise mitigation measures would be applied for all construction projects which have the potential to interfere with the functioning of existing adjacent land uses. Construction on the LBL site would have a similar impact on the surrounding communities in Berkeley and Oakland.

m. Public Services

1) Existing Conditions

a) Police Services

The City of Richmond Police Department (RPD) provides policing services to all of the incorporated areas of Richmond. For the Richmond Field Station, City police service is supplemented by one U.C. police officer. The County area of the Shoreline Area is policed by the Contra Costa County Sheriff's Department and California Highway Patrol.

Mutual assistance agreements exist between RPD and nearby cities such as El Cerrito, San Pablo and Pinole. Richmond has one police station located in the Civic Center on 25th Street between Barrett and MacDonald Avenues. The department operates on the basis of beats in which geographic boundaries are not fixed but generalized on the basis of the frequency or patterns of crime. There are usually eight beats. RPD has 168 sworn positions, a ratio of 2.2 positions per 1,000 persons, well above the standard of 1.5 per 1,000 persons.

b) Fire Fighting and Prevention Services

The Richmond Fire Department (RFD) provides fire fighting and prevention services to the incorporated areas of the City and manages the West County Fire District that serves San Pablo, El Sobrante, and unincorporated areas of western Contra Costa County, including North Richmond.

There are seven RFD stations in the City, in addition to five stations in neighboring communities, two companies in Chevron's refinery and a Navy unit at Point Olate. The department has a staff of 124. The Insurance Services Office rates the RFD as Class III (on a scale of I = best, X = worst), observing that the City is one fire company short.

2) Impact Analysis

LBL maintains its own police, fire and security units. Therefore, as with implementation of the 1987 LRDP, development at the RFS site would not affect public services in the area.

n. Utilities

1) Existing Conditions

a) Water Supply

The East Bay Municipal Utility District (EBMUD) provides water service to the RFS site. Groundwater is only used for some irrigation purposes. EBMUD presently has no capacity problem within the system, except as occasioned by California's continued six-year drought.

b) Waste-water

The Richmond Municipal Sewer District receives and treats sanitary waste-water for the RFS site. The District provides primary and secondary treatment of waste at a facility located at 601 Canal Boulevard. The treatment plant is limited to 40 mgd (million gallons per day) during wet weather conditions. Secondary treatment is provided only up to 16 mgd. Dry weather flows currently average approximately 5.5 to 6.0 mgd.

c) Solid Waste

The RFS site is within the jurisdiction of Richmond Sanitary Service. Richmond Sanitary Service contracts with West County Sanitary Landfill for disposal. This landfill is expected to reach capacity in 1993. Contra Costa County is currently undergoing processes to permit new landfills and to plan for disposal of solid waste in the County in the interim.

2) Impact Analysis

a) Water Supplies

Development at the RFS site would require a water supply similar to that which would be required after on-site development under LBL's 1987 LRDP. Because only new construction would be involved, water conservation could be incorporated into building designs to reduce overall demand. Extensions and/or upgrading of some water lines could be required. Accordingly, it is anticipated that EBMUD would be able to meet estimated water demands with its existing water distribution system. Therefore, neither development on the alternative site nor implementation of the 1987 LRDP should adversely impact the water supply or LBL's water needs.

b) Waste-water

Expansion onto the RFS site would generate approximately the same level of daily and peak waste-water loads as would developments under LBL's 1987 LRDP. Development on the RFS site is not expected to adversely affect LBL's ability to dispose of waste-water.

c) Solid Waste

Until the status of efforts to obtain permission to build new landfills in Richmond is known, the impacts of solid waste generated at the RFS site cannot be determined.

o. Energy

1) Existing Condition

Energy in the form of natural gas and electricity is currently supplied to the site by Pacific Gas and Electric.

2) Impact Analysis

Local energy demand would increase above current levels following development on the RFS site. However, it is not expected that Pacific Gas and Electric would have difficulties supplying the increased demand with current energy sources. Consequently, no adverse impact to the energy supply is expected from the alternative site project or from implementation of the 1987 LRDP.

p. Hazardous Materials

1) Existing Conditions

Hazardous materials are currently used on the RFS site. The Department of Environmental Health and Safety oversees the use of hazardous waste on the RFS site.

Richmond has a long history of industrial land use which has resulted in the potential for contaminated soils and groundwater. The RWQCB is currently monitoring 24 sites in the Richmond shoreline area. However, the RFS site is not one of the sites being monitored.

2) Impact Analysis

The use of hazardous materials would not significantly impact the RFS site. The general types and volumes of hazardous materials would increase at the RFS site, however, use of hazardous materials and the disposal of hazardous waste would be regulated under LBL's Environmental Monitoring Program. Consequently, the impact on human and environmental safety would be similar to that which would occur if development occurred on the LBL site.

q. Capacity to Achieve Project Objective

Off-site alternative development at the Richmond Field Station would destroy the close relationship between LBL and the Berkeley Campus which provides the basis for LBL's unique capability to conduct research in an environment that combines academic quality renewal with national laboratory R&D management experience and facilities. In effect, development at the alternative site would undermine

scientific and engineering faculty's and LBL's staff's leadership role in performing research designed to advance DOE's program goals.

Furthermore, staff assigned to the RFS site would, in effect, be commuters — unable to participate fully in LBL's intellectual environment. Similarly, it would be difficult to integrate core facilities located at the RFS site into the regular activities of LBL. Considerations such as increased travel time and additional administrative costs would prevent LBL from achieving its academic and programmatic objectives if this alternative were implemented, thus diminishing the outstanding research opportunities that LBL provides to a large number of science and engineering students.

Under this alternative, University faculty's responsibilities would be divided between the Berkeley Campus, the main LBL complex, and the RFS site, thereby eliminating important opportunities for scholarly interaction, mentoring, and shared research activity. The increased hardship of coordinating activities between the three sites would make it difficult for faculty, students and staff to attain the cohesiveness needed to foster LBL's purpose of providing national scientific leadership and supporting technological innovation. Consequently, LBL's success at educating and training future generations of scientists and engineers would decline. LBL's reduced success in education and training would, in turn, reduce the flow of Berkeley graduates to industry, which is one of the many forms of technology transfer that allows LBL to maintain close and supportive relationships with industry.

3. Concord Site

The Concord site was selected for study in part because it satisfied the above criteria and had been identified by the California Public Education Commission as a site for possible development of an institution of higher education, the California State University Hayward Off-Campus Center.

The Concord site is located between the City of Concord and the City of Clayton. The site is near the southwest corner of the intersection of Ygnacio Valley Road and Alberta Way. The majority of the 385-acre site consists of grass covered hills and sparsely placed oak trees, and has been used extensively for cattle grazing. Two tributaries to Galindo Creek cross the site which includes defined wetland areas. The site is largely undeveloped, with the exception of two single-family homes in the southeastern

portion of the site. The Concord site covers approximately 385 acres. Future construction under LBL's 1987 LRDP would cover approximately 30 acres, or about ten percent of the site.

a. General Assumptions for Analysis

The analysis of the Concord alternative focuses on land use, aesthetics, archeological, engineering, environmental, geological, demographic, transportation and public services factors. Unless clearly indicated otherwise, during the analysis it is assumed that an off-site expansion of LBL under the 1987 LRDP would produce similar effects as an off-site expansion of LBL facilities during the contract renewal term.

1) Existing Conditions

Existing conditions for the Concord site are based upon the *Draft Environmental Impact Report: Long Range Development Plan, University of California at Berkeley,* pp. 6-45 to 6-50, (citing EIR for the California State University's Hayward Off-Campus Center).

2) Impact Analysis

Conclusions about impacts on the Concord site are based upon use of the site by LBL.

b. Summary Impact Analysis

Development on the Concord site could have a significant impact on vegetation and wildlife, visual quality, land use, and waste-water disposal. Moreover, persons and buildings would be exposed to the risk of earthquake injuries and damages.

c. Geology, Soils and Seismicity

1) Existing Conditions

Site topography consists of three spur ridges stretching from north to south below a north-facing hillside. The site rests in a seismically active region. The Concord/Green Valley Fault lies less than two miles to the southwest and the Antioch Fault lies approximately six miles northeast of the site.

The Soil/Conservation Service (SCS) mapped five soil series on the project site. These include the Altamont, Altamont-Fontana, Briones, Posita, and Los Robles soil units. These soils range from mildly to highly expansive with low to high compressibility. Agricultural ratings range from poor (Altamont series) to prime (Los Robles series).

2) Impact Analysis

The concentration of students, faculty, and staff on the Concord site would be exposed to the risk of seismic activity. Like the LBL site,[98] the Concord site is in a seismically active region. Consequently potential seismic impacts at the Concord site would be similar to those that would be faced if development occurred on the LBL site.

Soils on the Concord site are subject to instability. Therefore, implementation of the 1987 LRDP on the Concord site would produce buildings which would potentially undergo differential settlement, unless appropriate site-specific remedies were implemented. Accordingly the impact on people and property would be similar to or less than the impact expected from implementation of the 1987 LRDP.[99]

d. Hydrology and Water Quality

1) Existing Conditions

The project site area is divided into three separate watersheds which drain from south to north, toward Ygnacio Valley road. Three intermittent streams presently drain these areas into culverts that have been

installed beneath Ygnacio Valley Road. The run-off potential of the soils is rated by the SCS as moderate to rapid, indicating that there is little natural retention of rainfall on the site.

The areas proposed for development of the project are all underlain by clayey soils with relatively low permeability. In combination with the moderately steep to steep natural topography of these areas, the low permeability clayey soils permit little percolation of rainwater into the soil. The undeveloped condition of both the project site and the elevation of the three drainage basins protect the quality of stormwater that runs off the site. There appears to be no active cultivation of the site's grasslands, therefore, livestock waste should be the primary contaminant affecting downstream surface waters.

2) Impact Analysis

The development of new impervious surfaces associated with the project could result in increases in surface run-off and erosion into Galindo Creek. The surface run-off and erosion could adversely impact identified wetlands.

Grading and removal of vegetation prior to construction on the Concord site would promote erosion. The erosion could degrade the quality of water in the vicinity of the site. Furthermore, increased contaminant loads from the project site could adversely affect run-off.

Unlike, development on the Concord site, implementation of the 1987 LRDP would not potentially endanger wetlands. Consequently, the impact on water quality caused by development on the Concord site would be similar to or greater than that anticipated under 1987 LRDP.[100]

e. Biological Resources

1) Existing Conditions

The site has four general vegetation types: a) annual grassland, b) oak trees, c) riparian, and d) freshwater wetland. The majority of the site has been used extensively for cattle grazing; thus, little of the native flora remains. A diverse wildlife population inhabits and, or, utilizes the site, including several

bird and mammal species. There are no rare and endangered plants or animals in the area of the site, as noted in the certified EIR for the site.

2) Impact Analysis

Site development would occupy a total of approximately 30 acres of existing grassland, pasture and vegetation. Site development, buildings and open space would reduce the quality of biological habitats on the site. However, the site is already impacted by the amount of grazing that takes place on the site. Increased human activity related to LBL development on the Concord site could disturb sensitive habitats used by wildfowls, raptors and other birds that currently inhabit creeks and wetlands. Similarly, continued development on the LBL site would cause a small loss of open space, portions of which may provide habitats for noncritical species. Therefore, development at the Concord site would have an impact similar to the impact expected from implementation of the 1987 LRDP.[101]

f. Historical and Archaeological Resources

1) Existing Conditions

The Concord site lies within a region known to have been inhabited by the Bay Miwok Indians. Several prehistoric sites have been recorded in the vicinity. The proposed project site contains no recorded prehistoric or historic archaeological sites listed with the California Archaeological Inventory. Buildings on the site are not considered significant historical resources.

2) Impact Analysis

Archaeological artifacts (human remains, artifacts, or concentrations of shell/bone/rock/ash fragments) could be encountered during construction. A literature search of the site conducted by Sonoma State University recommended caution during excavation. Accordingly, impacts on cultural and historical resources are expected to be similar to or greater than those identified for the 1987 LRDP because implementation of the 1987 LRDP is not expected to adversely impact any significant prehistoric or archaeological, or any item of historic or cultural significance, other than the Laboratory itself.[102]

g. Visual Quality

1) Existing Conditions

Due to its undulating hilly topography, much of the site is visible from the surrounding area. The major topographic features of the area include Mt. Diablo to the southeast, and Lime Ridge to the south and west.

2) Impact Analysis

Construction on the Concord site could visually impact views to and from Ygnacio Valley road, and from the Lime Ridge Recreational area. Consequently, LBL development on the Concord site is potentially inconsistent with the City of Concord's hillside development ordinance. However, an evaluation of visual impact cannot be conclusive without first examining a specific site design proposal.

h. Land Use

1) Existing Conditions

Existing land uses adjacent to the project site include residential subdivisions to the north and east, the Clayton electrical substation at the northeast corner of the site, the Kaiser Quarry at the northwest corner, and permanent open space (under the City of Walnut Creek's jurisdiction) to the west. Adjacent land to the south of the site is currently undeveloped. There is a proposed 901-unit, single-family development for the land directly south and southeast of the project site in Concord.

The land use element of the Concord General Plan indicates three land use designations on the project site: Low-Density Residential; Medium-Density Residential; and Parks-Open Space. The Newhall Ranch Area Plan, which is currently undergoing revision and environmental review by the City of Concord, designates this area as the "State College Study Area."

2) Impact Analysis

Although LBL shares some characteristics with an institution of higher learning, it is primarily a research and development entity. Therefore, even though planning documents indicate that the Concord site may be suitable for a facility of higher education, a primarily research and development institution could adversely impact land use and development. Furthermore, LBL expects substantial growth in its material science, structural biology research, chemical sciences research, humane genome research and fusion accelerator research programs. Research plants in the expected areas of growth are not necessarily compatible with the Concord site's zoning as Low-Density Residential, Medium Density Residential and Parks-Open Space.

i. Population, Employment and Housing

1) Existing Conditions

1990 Association of Bay Area Governments (ABAG) projections show that Concord is projected to add approximately 11,400 new persons to its population. Walnut Creek will add 4,600 new residents, Clayton will grow by 3,300 residents, and Moraga and Pleasant Hill are expected to grow by about 1,600 people each. The population areas of Lafayette and Orinda are expected to remain relatively constant.

Nearly 12,600 housing units have been built in the communities along the northern section of I-680 (North Central Region) since 1980. This compares to 10,900 units added in East County, 6,300 in West County, and 5,900 in the San Ramon Valley. Cities in the North County Region which experienced the most housing development activity over the last seven years include: Concord (3,300), Martinez (2,600), and Pleasant Hill (1,700).

2) Impact Analysis

Development on the Concord site would contribute a small increase to the population of the City of Concord and, to a lesser extent, the populations in other portions of Contra Costa County. The 1987 LRDP is expected to increase the LBL population by approximately 810 persons, therefore, a similar or greater increase in population may be expected if development proceeds on the Concord site. A

larger population may follow development at the Concord site because the Concord site and the LBL site are several miles apart, which might necessitate the duplication of employment positions which implementation of the 1987 would not require.

Development at the Concord site would create jobs in the City of Concord and surrounding communities or relocate them from the City of Berkeley and the City of Oakland to those areas.

An increased demand for housing would accompany development at the Concord site. However, the significant amount of residential development that has occurred in the Concord area and the residential development planned for the future, would minimize any harmful impacts on housing supplies. In fact, the effects on housing in the Concord area should be insignificant, as would the effects on housing in Berkeley and Oakland if development occurred at the LBL site.

j. Traffic, Circulation and Parking

1) Existing Conditions

Ygnacio Valley Road services the site. The road lies directly north of the site. Ygnacio Valley Road is a congested roadway with level of service ratings of A and E for intersections with Ayers and Cowell Roads, and Alberta Way, respectively during PM peak hours. Public transit in the project area is provided by the Central Costa County Transit Authority. Two bus routes are in the immediate vicinity of the site.

2) Impact Analysis

Development of the 1987 LRDP project at the Concord site could introduce about 1,766 commuter trips per day to the site. Without a high level public transit system to transport staff between the LBL site and the Concord site, it is likely that the great majority of commuter trips would be made by personal motor vehicles.

It is uncertain whether removal of the large commuting population to the remote Concord site would improve traffic conditions around the LBL site. Instead, due to the necessary relationship between the

LBL site and any off-site development, the total volume of traffic might actually increase as students and faculty commuted between the sites. Furthermore, in the absence of strict controls, gradual in-fill of vacated spaces at the LBL site could contribute to additional population and traffic growth, over time.

Implementation of the 1987 LRDP would produce incremental increases in traffic due to increases in the number of employees and visitors at LBL, therefore, development on the Concord site would have an impact on traffic and parking that is similar to, or greater than, the impact expected from implementation of the 1987 LRDP.[103]

k. Air Quality

1) Existing Conditions

The Concord site is in the Bay Area Basin, which is designated as a non-attainment area for the federal and State ozone standard. The non-attainment designation also applies to the LBL site.

2) Impact Analysis

Short-term construction activities and emissions from vehicles commuting between the Concord site and the LBL site would adversely impact air quality. Air quality near the Concord site could deteriorate disproportionately more than would the air quality at Berkeley and Oakland under the 1987 LRDP, because the Concord site is not cooled by ocean and bay breezes.

l. Noise

1) Existing Conditions

Vehicle noise from Ygnacio Valley Road is the predominant source of noise for the Concord site. Ambient noise levels are about 60 dBA.

2) Impact Analysis

Noise generated by construction, the operation of facilities, and traffic will have a relatively small effect on the Concord site in comparison to the impact on areas around the LBL site because the Concord site is remote and large.

m. Public Services

1) Existing Conditions

a) Police Services

The Concord Police Department could provide law enforcement and traffic control on the site. The police force currently has 128 officers on the force and provides 24-hour service to the City of Concord. Between 6 and 18 officers are on duty at any given time. The Concord Police Department's headquarters are located in Downtown Concord at the corner of Willow Pass Road and Parkside Drive, approximately six miles from the project site.

b) Firefighting and Prevention Services

The Contra Costa Consolidated Fire Department would provide fire protection for the project site. Approximately 250 firemen work for the Department. Stations 6, 8 and 11 provide first alarm response to the project area.

The Fire Department's general policy is to have fire stations at three-mile intervals, thereby minimizing response time to five minutes. The proposed project is outside of all current five-minute response zones. Therefore, the distance to the project area is considered excessive and could lead to a substandard level of service.

2) Impact Analysis

LBL maintains its own police, fire and security units. However, implementation of the 1987 LRDP at an off-site location, such as development on the Concord site, would affect public services in the area, unless the LBL Fire Department could duplicate its activities. If not, fire suppression would need to be provided by the Concord Fire Departments.

o. Utilities

1) Existing Conditions

a) Water Supply

Currently, the closest water main to the Concord site crosses near the northeast corner of the site at the intersection of Pine Hollow Road and Alberta Way. The water main is a 30-inch main and primarily serves residential developments which are located to the north and east of the Concord site.

The project site is within the jurisdiction of the Contra Costa Water District (CCWD). The Sacramento–San Joaquin Delta at Rock Slough supplies the CCWD with water, which is then conveyed to the CCWD's Bollman Treatment Plant by way of the Contra Costa Canal. The project site is within Water District Zone 4.

The apparent lower quality of CCWD water would likely require increased water treatment by LBL to produce the needed quantities of low conductivity water used in LBL research. This will lead to an increased use of energy.

b) Waste-water

The Concord Department of Public Works facilities transports waste-water. The Central Contra Costa Sanitation District then treats the waste-water transported by the Department of Public Works at its treatment plant in Pacheco. The treatment plant has a wet weather capacity of 45 mgd. An average

daily flow of 36.3 mgd is common, therefore, there is usually only an 8.7 mgd capacity available to provide for future residential and industrial growth.

c) Solid Waste

The Concord site is within the jurisdiction of Concord Disposal, a private disposal firm, which disposes of solid waste. They are currently dumping at a disposal site in Antioch, which is scheduled to close on March 31, 1992. Thereafter, Concord Disposal will haul waste to the Acme Fill Transfer Station in unincorporated Martinez[104]. Contra Costa County land fill is currently undergoing change; a county official estimates the transfer site at Martinez may remain open less than two more years[105]. The Martinez site is not a recycling site, but rather is used for food wastes and disposal of construction debris.

2) Impact Analysis

a) Water Supply

If construction occurred on the Concord site, water conservation measures could be incorporated into building designs to reduce overall demand. Accordingly, it is anticipated that water supply from the Contra Costa Water District would be adequate for the associated population and business uses. Therefore, the amount of water used and the effect of the demand for water at the Concord site would be similar to the usage and the effect of demand that would be created by development on the LBL site, except that increased water treatment by LBL would likely be required to produce the needed quantities of low conductivity water used in LBL research.

b) Waste-water

Waste-water collection and treatment following development on the Concord site would not differ from collection and treatment resulting from development on the site. Consequently, no differences in impact is expected, so long as the LBL developments would not exceed the waste-water treatment capacity of the Central Contra Costa Sanitation District.

c) Solid Waste

Development on the Concord site and development under the 1987 LRDP would cause the same amounts of solid waste disposal and collection. Therefore, the solid waste generated, disposed of, and collected at each site would have similar environmental impacts, assuming Concord Disposal can provide adequate landfill space for the waste generated.

p. Energy

1) Existing Conditions

The Concord site is within the jurisdiction of Pacific Gas and Electric Company (PG&E). Currently, there is an 80-foot easement with a 115,000 volt transmission line on the east side of the site. Additionally, there are two overhead 12,000 volt lines located between the proposed development and Ygnacio Valley Road. There is a 20-inch, high-pressure gas transmission line that extends along the east side of the site approximately parallel to the 115,000 volt electrical transmission line. The PG&E Clayton Substation is located in the southwest corner of Ygnacio Valley Road and Alberta Way. Two gas mains terminate near the site and a high-pressure 60 PSI 3-inch gas line. One of the gas mains terminates at the end of Discovery Way and the other terminates at the end of Alberta Way. The high-pressure gas line lies north of the site along Larwin Avenue and the Ayers Road connection to Larwin.

2) Impact Analysis

Development on the Concord site would increase demand for electricity and gas. However, utility services to the Concord site would adequately accommodate the anticipated increased demand. Similarly, energy suppliers may or may not satisfactorily meet the increased energy demand caused by implementation of the 1987 LRDP, depending upon the LBL facilities that might occupy the site.

q. Hazardous Materials

1) Existing Conditions

The existing project site is primarily undeveloped. Other than very minor quantities of household items, hazardous materials are not currently used on-site.

2) Impact Analysis

Development on the Concord site would increase the presence of hazardous materials in the area. However, LBL would regulate the use and disposal of hazardous materials under its Environmental Monitoring Program. Consequently, use of hazardous substances at the Concord site would have an impacts on the environment similar to the impact anticipated under the 1987 LRDP.

r. Capacity to Achieve Project Objectives

Alternative development at the Concord site would destroy the close relationship between LBL and the Berkeley Campus which provides the basis for LBL's unique capability to conduct research in an environment that combines academic quality renewal with national laboratory R&D management experience and facilities. In effect, development at the alternative site would undermine scientific and engineering faculty's and LBL's staff's leadership role in performing research designed to advance DOE's program goals.

Furthermore, staff, faculty, and students assigned to the Concord site would, in effect, be "commuters" — unable to participate fully in the Berkeley Campus' and LBL's intellectual environment. Similarly, it would be difficult to integrate core facilities located at the Concord site into the regular activities of the Berkeley Campus and the LBL site. Considerations such as increased travel time and additional administrative costs would prevent LBL from achieving its academic and programmatic objectives if this alternative were implemented, thus diminishing the outstanding research opportunities that LBL provides to a large number of science and engineering students.

The increased hardship of coordinating activities between the sites would make it difficult for faculty, students and staff to attain the cohesiveness needed to foster LBL's purpose of providing national scientific leadership and supporting technological innovation. Consequently, LBL's success at educating and training future generations of scientists and engineers would decline. LBL's reduced success in education and training would, in turn, reduce the flow of Berkeley graduates to industry, which is one of the many forms of technology transfer that allows LBL to maintain close and supportive relationships.

4. Other Sites

a. Richmond School District Site

The Richmond School District site is located in the City of Hercules and consists of two parcels totalling about 75 acres of undeveloped land. It is located on Refugio Valley Road and is generally bounded by Partridge Street, Sparrow Street and Falcon Way. This site was rejected because of its remote location, and the potential for development to impact wetlands on the site. Environmental constraints relating to vegetation, noise, traffic and visual quality reduce the amount of space available for development.

b. Albany Waterfront

The Albany waterfront is located to the west of Highway 80 and is owned partially by Santa Fe-Pacific Realty Corporation and partially by the City of Albany. The property considered for the off-site development is the 142 acres of developable land owned by Santa Fe. The site has two access locations, one from Gilman Street and one from Buchanan Street. Environmental constraints associated with the wetlands restrict development along the waterfront. This site was rejected for further study because of environmental and planning constraints and because of limited access due to its location.

c. Berkeley Waterfront

The Berkeley Waterfront is located to the west of Interstate 80 and south of the Albany Waterfront. It is owned by Santa Fe-Pacific Realty Corporation. This site is accessed by Gilman Street and University Avenue in Berkeley. A Bay Shore Park is planned for the perimeter of the site at the water's edge. This site was rejected because of limited access due to its location west of the Interstate 80 and

because it contains environmentally sensitive areas such as wetlands which may be encroached upon by future off-site LBL developments.

d. Harbor Bay Isle Industrial Area

Harbor Bay Isle is located in the city of Alameda on Bay Farm Island. Much of the land in the area has been developed for medium to high income residential development. A portion of the area adjacent to the Oakland International Airport is designated for industrial development. Several sites in this location are large enough to accommodate some, but not all, of the future LBL developments within the period of the renewal contract. Each would generally have similar constraints. This site area was rejected because of location constraints, traffic issues, access problems through the City of Alameda or by way of the Oakland Airport, noise impacts from aircraft using the airport, and the possibility of the existence of the Salt Marsh Harvest Mouse, an endangered species.

e. West of Grizzly Peak

The area west of Grizzly Peak Boulevard and south of Lomas Cantadas Road within Contra Costa County has a large amount of open space which is not within the Regional Park District jurisdiction. This area is the site of the newly relocated Berkeley Shakespeare Theatre. The site could be accessed either by Grizzly Peak Boulevard or from Highway 24 off the Fish Ranch Road exit. This site was rejected because of environmental constraints to development association with site topography, steep grades, hydrology and drainage issues, lack of existing urban services, lack of infrastructure, and potential traffic problems stemming from existing road conditions and roadway geometries.

f. Broadway Southeast of the Intersection of Highways 13 and 24

The area located on Broadway in Oakland just southeast of the intersection of Highways 13 and 24 was also considered as a potential site. The site contains the North Oakland Sports Center which is surrounded on three sides by the potential development area. The site is accessed from Broadway off Highway 13. This site was rejected because of hydrological and topographical reasons, steep grades, lack of urban services, restricted entrance point and limited access resulting from its location on the south

side of Highway 24, and the likelihood that development would be limited due to the October 1991 Oakland/Berkeley Hills firestorm.

Notes for Section VI:

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9. *Ibid.*, pp. 246-248 and p. 262.

10. *Ibid.*, pp. 88-90.

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KELICH, John
SANDERS, Dale

Others

CUNHA, Bonnie (Oakland Scavenger)
REED, Michael (Acme Fill Corporation)
CURRAN, Chris (Contra Costa County Environmental Health Division)
STORY, JoAnn (Concord Disposal)

APPENDICES

Appendix A: Notice of Preparation and Responses

Appendix B: LBL Building Numbers and Descriptions

Appendix C: 1991 Hazardous Materials Business Plan AB 2185/87/89 Chemicals

Appendix D: 1991 Report of Extremely Hazardous Chemicals at LBL

Appendix E: Executive Summary - Tiger Team Report

Appendix F: Acronyms and Abbreviations

APPENDICES

Appendix A: Notice of Preparation and Responses

Lawrence Berkeley Laboratory
University of California Berkeley, California 94720
Office of Environment & Laboratory Development
(415) 486-4361 • FTS 451-4361

September 11, 1991

State Clearinghouse
1400 Tenth Street
Sacramento, CA 94607

NOTICE OF PREPARATION – SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT (SEIR)

Project Title: UC Contract with DOE for Operation and Management of LBL

Project Location: Berkeley and Oakland, California

PROJECT DESCRIPTION

The proposed project involves the extension of the contract of the University of California with the United States Department of Energy (DOE) to manage the Lawrence Berkeley Laboratory. The current contract expires on September 30, 1992.

An Environmental Impact Report (EIR) on the LBL Long Range Development Plan (LRDP) was approved by the Regents of the University of California in October, 1987. The 1987 LRDP EIR was a programmatic EIR that addressed the potential environmental impacts of proposed future development described in the 1987 LRDP. The implementation status of the 1987 LRDP is updated annually in a Site Development Plan (SDP).

The proposed extension of the University's contract with DOE will confirm the continued operation of LBL as a preeminent basic and applied science energy research institution. The proposed UC/DOE contract extension also provides the University with the opportunity to update the information and environmental analysis presented in the 1987 LRDP EIR, in the form of a Supplemental Environmental Impact Report (SEIR). In particular, the SEIR will: (1) describe the implementation status of the 1987 LRDP; and (2) update baseline data by integrating

significant new information which has become available since 1987. Since the University does not propose in the contract extension to develop additional facilities or add employees beyond the levels identified in the 1987 LRDP, the scope of the SEIR will be limited to these two categories of new information.

The proposed UC/DOE contract extension would cover the period from October 1, 1992 through September 30, 1997 and will involve the continuation of LBL activities described below:

> LBL is a multi-program national laboratory. LBL's major role is to conduct basic and applied science research that is appropriate for an energy research laboratory but generally not suited to the program goals or resources of a university or an industrial laboratory. The development and utilization of large experimental facilities is emphasized and the interdisciplinary, team approach to research is stressed.
>
> As a national laboratory, the LBL site houses a number of internationally important facilities and their support functions, including the Bevalac Complex, the 88-Inch Cyclotron, the National Center for Electron Microscopy, the National Tritium Labeling Facility and the Advanced Light Source.

LOCATION

LBL is situated 15 miles east of San Francisco on the western slope of the Berkeley hills overlooking the University of California, Berkeley Campus and the San Francisco Bay. The LBL site is within the boundaries of and leased from the University of California, as shown in the attached maps. LBL encompasses approximately 130 acres, contains 1.6 million square feet of buildings, and employs 3,400 persons including full time employees, part time employees, and employees with joint appointments at UC Berkeley.

There are 81 permanent buildings on the LBL site, with additional facilities located off-site, notably the Donner Laboratory of Biology and Medicine and the Melvin Calvin Laboratory situated on the UC Berkeley Campus.

PROBABLE ENVIRONMENTAL EFFECTS

The SEIR will update the LBL 1987 LRDP EIR by assessing potential environmental impacts in relation to new information that was not known and could not have been known at the time the LBL 1987 LRDP EIR was certified as complete. In particular, the following topics require an analysis of new information not previously addressed in detail: air quality, hazardous materials, waste handling and disposal.

Other topics will be addressed where relevant; however, no substantive new information or significant environmental impacts of the project beyond those previously considered have been identified in the following areas: land use; archaeological/historical; population/demography; geology/soils; housing; traffic, transportation, circulation and parking; utility services; hydrology and water quality; energy consumption/conservation; municipal services; noise; construction; vegetation; wildlife; landscape and open space; visual/aesthetics; and light and glare.

In compliance with the State and University of California guidelines for implementation of the California Environmental Quality Act, this Notice of Preparation is hereby sent to inform you that the University of California, Lawrence Berkeley Laboratory is preparing an SEIR on the above-named project.

We need to know the views of your agency as to the proposed scope and content of the environmental information in relation to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the SEIR prepared by the University of California when considering aspects of the project which come under your authority.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 30 days after receipt of this Notice. Please send your response to us at the address below. We will need the name for a contact person in your agency as well.

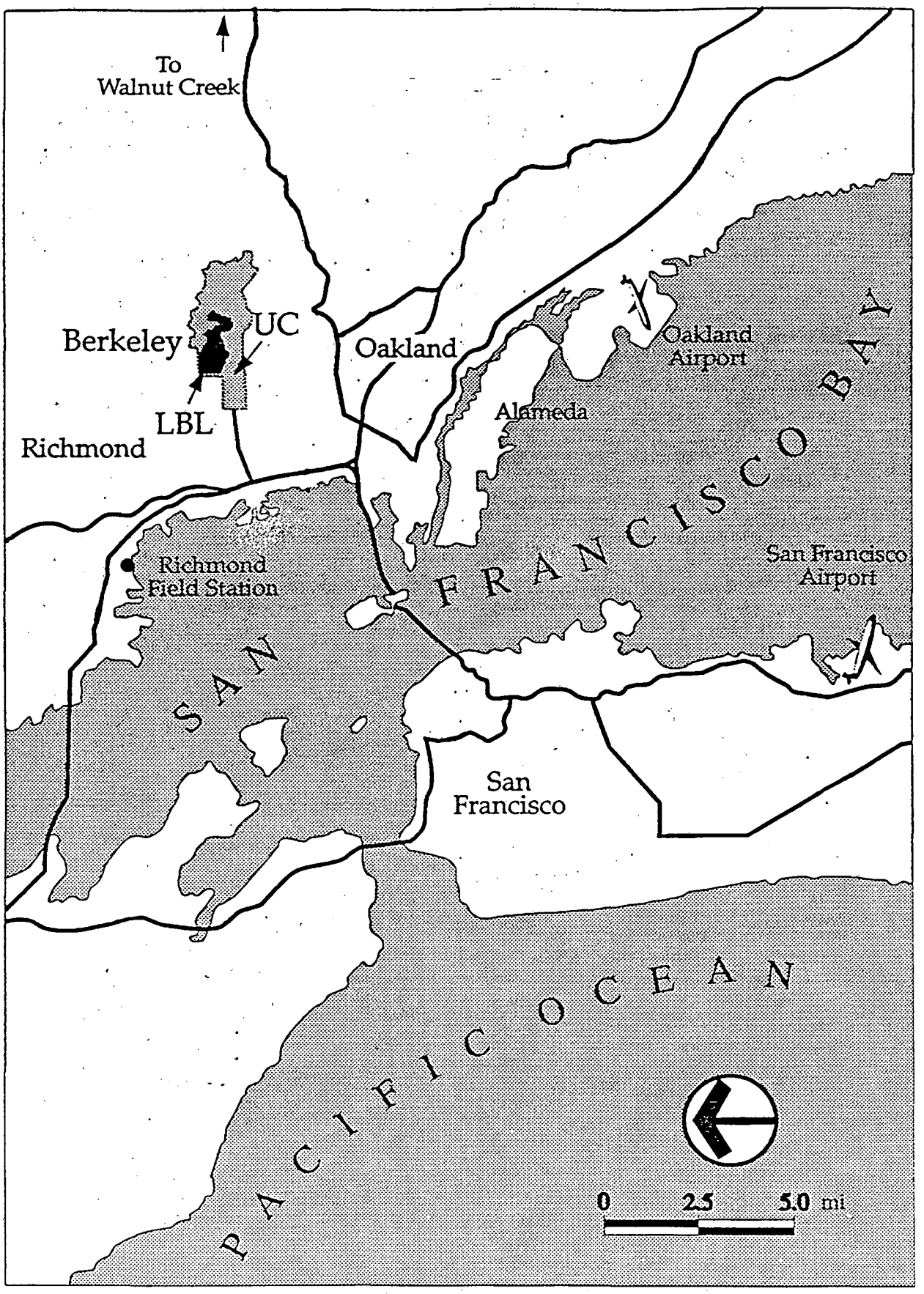
Please feel free to call us if you have any questions.

Michael Chartock for Martha Krebs

Martha A. Krebs
Associated Director for Office of
Planning & Assurance
Building 50A, Room 4112
Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720
(415) 486-4361

cc: Vice President,
Budget and University Relations

Attachments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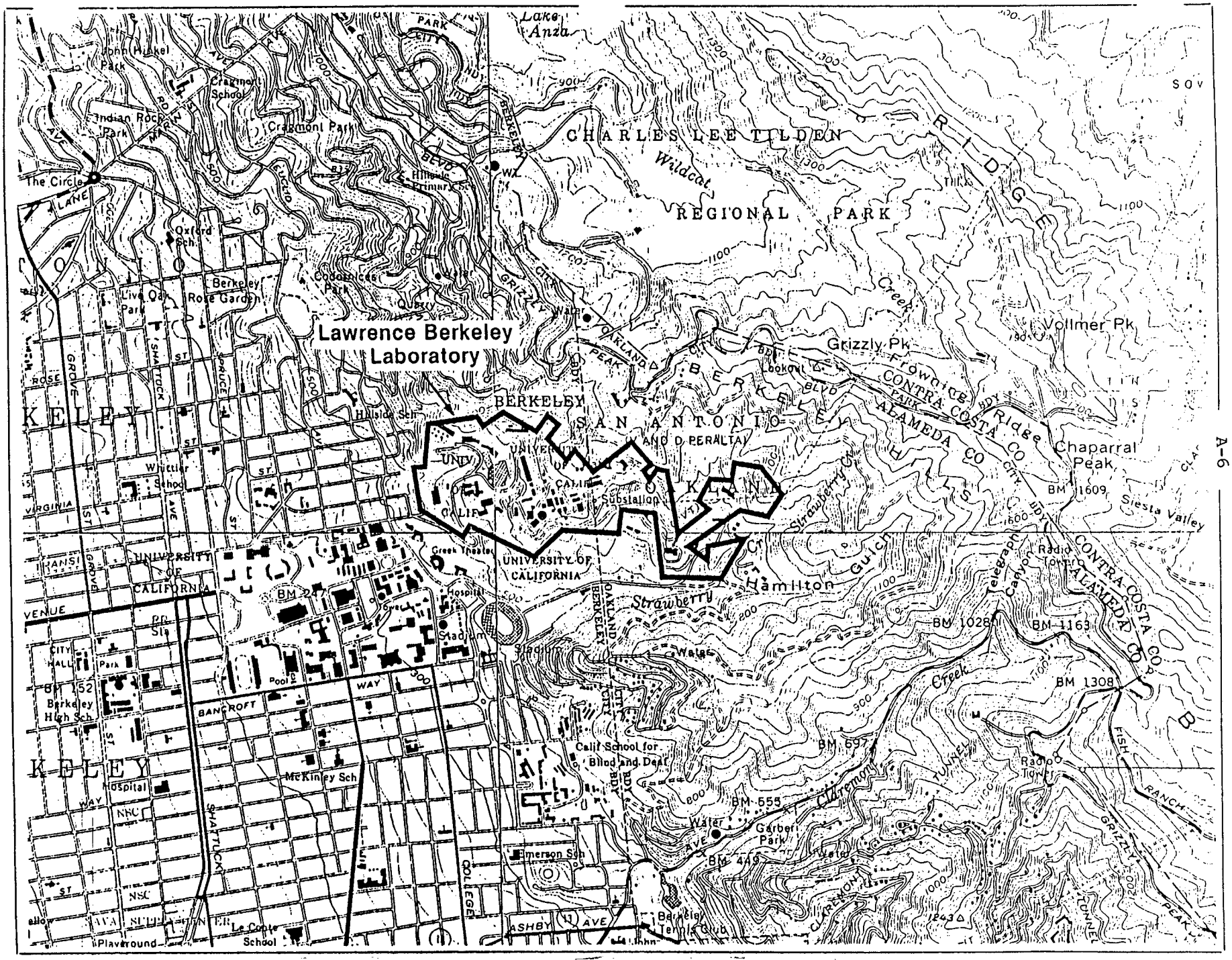
Lawrence Berkeley Laboratory
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REGIONAL PARK
RIDGE
Lake Anza
Wildcat
Creek
Grizzly Pk
Vollmer Pk
Chaparral Peak
Siesta Valley
Strawberry Gulch
Hamilton
Strawberry
Creek
Telegraph Canyon
Radio Tower
BM 1609
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BM 1308
BM 697
BM 555
BM 445
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BM 152
BERKELEY
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AND PERALTA
HILLS
OAKLAND
UNIVERSITY OF CALIFORNIA
Berkeley Rose Garden
Live Oak Park
Codornices Park
Cragmont Park
Indian Rock Park
The Circle
Oxford Sch
Hillside Sch
Whittier School
Berkeley High Sch
McKinley Sch
Emerson Sch
Le Conte School
Calif School for Blind and Deaf
Berkeley Tennis Club
Garber Park
Stadium
Hospital
Pool
Playground
Greek Theater
Substation
Water
CONTRA COSTA CO
ALAMEDA CO
GROVE
SHATTUCK
SPRUCE
VIRGINIA
ROSE
BANCROFT WAY
ASHBY AVE
COLLEGE
CLAREMONT
GRIZZLY PEAK
FISH RANCH
TUNNEL
BERKELEY
OAKLAND
CITY
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STATE OF CALIFORNIA PETE WILSON, Governor

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814

A-7

RECEIVED
OCT 02 1991
ENVIRONMENT AND
LABORATORY DEVELOPMENT

DATE: Sep 24, 1991

TO: Reviewing Agency

RE: LAWRENCE BERKELEY LABORATORY's NOP for
UC CONTRACT WITH DOE FOR OPERATION AND MANAGEMENT OF LBL
SCH # 91093068

Attached for your comment is the LAWRENCE BERKELEY LABORATORY's Notice of Preparation of a draft Environmental Impact Report (EIR) for the UC CONTRACT WITH DOE FOR OPERATION AND MANAGEMENT OF LBL.

Responsible agencies must transmit their concerns and comments on the scope and content of the EIR, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of this notice. We encourage commenting agencies to respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

MARTHA KREBS
LAWRENCE BERKELEY LABORATORY
UC BERKELEY
BERKELEY, CA 94270

with a copy to the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the review process, call Daralynn Cox at (916) 445-0613.

Sincerely,

David C. Nunenkamp
Deputy Director, Permit Assistance

Attachments

cc: Lead Agency

NOP Distribution List

SCH# 91093068

S = sent by lead agency
X = sent by SCH

Resources Agency

- [ ] Karen Cagle
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- [ ] Reed Holderman
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- [ ] Fred A. Worthley, Jr., Reg. Manager
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Native American Heritage Comm.
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Sacramento, CA 95814
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- [ ] William Meyer
Public Utilities Commission
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San Francisco, CA 94102
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- [X] Betty Eubanks
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916/324-1833

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- [ ] Quy Tu
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Sacramento, CA 95814
916/323-6111

- [ ] DHSTSCD: _____

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- [ ] Jeannie Blakeslee
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916/327-0454

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- [ ] Allan Patton
State Water Resources Control Board
Division of Clean Water Programs
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Sacramento, CA 94244-2120
916/739-4414

- [ ] Dave Beringer
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- [ ] Ed Anton
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Division of Water Quality
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- [ ] Mike Falkenstein
State Water Resources Control Board
Division of Water Rights
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Sacramento, CA 95814
916/324-5636

- [X] APCD/AQMD: _____

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Santa Rosa, CA 95401
707/576-2220 (8-590)

- [X] SAN FRANCISCO BAY REGION (2)
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Oakland, CA 94614
415/464-1255 (8-561)

- [ ] CENTRAL COAST REGION (3)
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San Luis Obispo, CA 93401-5414
805/549-3147 (8-629)

- [ ] LOS ANGELES REGION (4)
101 Center Plaza Drive
Monterey Park, CA 91754
213/266-4460 (8-640)

- [ ] CENTRAL VALLEY REGION (5)
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Sacramento, CA 95827-3098
916/361-5600
  - ( ) Fresno Branch Office
    3614 East Ashlan Avenue
    Fresno, CA 93726
    209/445-5116 (8-421)
  - ( ) Redding Branch Office
    415 Knollcrest Drive
    Redding, CA 96002
    916/224-4845 (ATS 441)

- [ ] LAHONTAN REGION (6)
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Suite #2
South Lake Tahoe, CA 96150
916/544-3481
  - ( ) Victorville Branch Office
    15428 Civic Drive, Suite 100
    Victorville, CA 92392-2359
    619/241-6583

- [ ] COLORADO RIVER BASIN REGION (7)
73-271 Highway 111, Suite 21
Palm Desert, CA 92260
619/346-7491

- [ ] SANTA ANA REGION (8)
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Riverside, CA 92506
714/782-4130 (8-632)

- [ ] SAN DIEGO REGION (9)
9771 Clairemont Mesa Blvd., Suite B
San Diego, CA 92124-1331
619/265-5114 (8-636)

- [ ] OTHER: _____

- [ ] OTHER: _____

A-8

6/20/91

City of Berkeley

A-9

City Manager's Office
Martin Luther King, Jr.
Civic Center Building
2180 Milvia Street
Berkeley, California 94704
(415) 644-6580

RECEIVED
OCT 10
ENVIRONMENTAL
REGULATORY DEVELOPMENT

October 8, 1991

Ms. Martha A. Krebs
Associate Director for Office of
Planning and Assurance
Building 50A, Room 4112
Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720

Subject: RESPONSE TO NOTICE OF PREPARATION ON SUPPLEMENTAL EIR ON THE LBL LONG RANGE DEVELOPMENT PLAN

Dear Ms. Krebs:

Thank you for sending the City of Berkeley Planning and Community Development Department the Notice of Preparation for a Supplemental EIR on LBL's Long Range Development Plan (LRDP) EIR, as triggered by an extension of U.C.'s contract with the United States Department of Energy to manage LBL.

We agree that the contract extension to 1997 presents a good opportunity to update and revise information contained in the LRDP EIR, which was prepared in 1987. The proposed approach to describe the implementation status of the 1987 LRDP and to update baseline data to integrate significant new information which has become available since 1987 appears to be a reasonable approach for the Supplemental EIR (SEIR).

We do, however, have some additional comments on the Probable Environmental Effects that are proposed be examined in the SEIR. We have also identified some additional areas which we feel should be addressed in the SEIR. These comments are outlined as follows:

Hazardous Materials/Waste Handling and Disposal

The SEIR should provide an impact assessment update to reflect the proposed Replacement Hazardous Waste Handling Facility (HWHF) with emphasis on cumulative hazardous materials/waste handling and disposal issues. This update should specifically address LBL's agreement to prepare a Hazardous Waste Minimization Plan and the status of this plan.

This section and/or one on Permit Requirements should reflect the City of Berkeley's statutory responsibilities in connection with the proposed project. In response to your inquiries about the City's role as a Responsible Agency,

Berkeley's Toxics Program is the Administering Agency for State and local laws and regulations governing hazardous Materials, hazardous waste and underground storage. The City regulates all hazardous materials and hazardous waste handling, storage and management with the exception of LBL's Treatment, Storage and Disposal Facility which is currently under review. The City's Toxics Program is dedicated to ensuring facility compliance with the requirements of State and local laws regulating hazardous materials and underground storage tanks. These laws include, but are not limited to the California Health and Safety Code, the State's Code of Regulations and the City of Berkeley Municipal Code.

The Toxic Program is also committed to protecting public health and the environment. The City thus requests that potential pathways of exposure and the estimated levels of risk to public health and the local environment be included in the environmental analysis performed for this project.

Air Quality

The SEIR should address the issue of cumulative air quality impacts resulting from the HWHF and other LRDP projects. Particular attention should be paid to ozone-depleting gases, of which LBL is the largest emitter in Berkeley.

U.C. Berkeley LRDP/Cumulative Analysis

One of the most significant relevant changes that has taken place since 1987 is the adoption of U.C. Berkeley's 1990-2005 Long Range Development Plan (LRDP). The 1990-2005 LRDP includes significant potential new development in the LBL vicinity (i.e., the Hill Area). The Hill Area development along with other U.C. Berkeley LRDP development has the potential to significantly affect the LBL vicinity in a cumulative sense. Potential cumulative impacts in the Hill Area due to the U.C. Berkeley and LBL LRDP's were recognized in the Final EIR for the HWHF.

Because it represents significant new environmental information, this cumulative assessment and identification of mitigation measures should be carried over into the SEIR. Environmental areas of particular concern include land use changes, traffic levels, parking concerns, drainage impacts, loss of vegetation and wildlife, visual impacts and generation of light and glare, and construction impacts, including road conditions. It is important that the SEIR summarize this analysis and improve upon it where it may be deficient, particularly as it pertains to the LBL LRDP.

The City questions the assumption made in the NOP that "no substantive information" or significant impacts over those previously identified for two of the areas noted: Hydrology/water quality and Circulation and Parking. The City requests that information be updated for hydrology and water quality to include the most recent sampling and site assessment data available related to hazardous waste contamination and plume definition. We also believe that updated information should be included for Circulation and Parking as discussed below.

Traffic/Parking Impacts Update

As part of a settlement with the City of Berkeley regarding the adequacy of the 1987 LBL LRDP EIR, LBL has been conducting gate counts of LBL traffic as a monitoring device. The results of this agreement, a copy of which is attached, should be summarized in the SEIR, collected data should be presented, and any necessary adjustments to the terms of the settlement should be discussed.

It should be noted that the City has been receiving quarterly counts for gate traffic and would like to continue to receive such counts, and that the goal of limiting the total "Peak Hour Trips " to 823 as specified in the Agreement be maintained.

The EIR's traffic analysis should also identify the average size of trucks and the number of daily and peak truck trips. In addition, the routing and timing (arrival and departure schedules) of hazardous materials to and from LBL and the type of containers used for transport should be evaluated. Finally, each mode choice (single occupancy vehicles, car-pools, buses bicycles, and pedestrians) should be enumerated as to their estimated number and their percentage of the total number of commuters to LBL.

We hope these comments are useful to you in developing the scope of the SEIR. Please contact John Thelen Steere, City-University Planner in the Planning and Community Development Department (644-6534) if you have any questions on this response to the Notice of Preparation. For discussing regulatory and other issues, please contact Cheri Eir, Administrator of the City's Toxics Program (644-6510).

Sincerely,

Michael F. Brown, City Manager

cc:

John Thelen Steere, City-University Planner
Gil Kelley, Planning Director
Lois Jones, Environmental Review Officer
Cheri Eir, Toxics Program Administrator, Environmental Health Division
Gary Bard, Fire Marshal, Fire Department
City-University Planning Committee (Subcommittee of Planning Commission)

js18:lblseir

SETTLEMENT AGREEMENT

A. This Settlement Agreement is between the City of Berkeley ("the City") and The Regents of the University of California ("the Regents"). On October 21, 1987 the City filed in Alameda County Superior Court an action entitled City Of Berkeley vs. Regents Of The University Of California, No. 631717-9. The City filed a Petition for Writ of Mandate and Complaint for Declaratory and Injunctive Relief. The Petition alleged that the Regents' approval of Lawrence Berkeley Laboratory's Long Range Development Plan ("LRDP") and the Regents' certification of the Final Environmental Impact Report ("FEIR") on the Plan violated the California Environmental Quality Act ("CEQA"), the CEQA Guidelines in the California Administrative Code, and the University of California's Procedures for Implementation of CEQA.

B. On November 30, 1987, the City filed a First Amended Petition for Writ of Mandate and Complaint for Declaratory and Injunctive Relief. On January 25, 1988, the Regents filed an Answer to the City's First Amended Petition and Complaint.

C. The City and the Regents have since conducted settlement discussions pursuant to California Public Resources Code Section 21167.8. They now wish to settle this action on the following terms:

1. Both parties acknowledge that the City's principal concern in this litigation is the traffic to be generated by future population growth at Lawrence Berkeley Laboratory ("LBL"). The population and traffic increases are projected in LBL's Final Environmental Impact Report.

2. An important measure of traffic growth at LBL is the increase in p.m. peak hour trips at LBL's three gates. The p.m. peak hour trips are measured by counting cars entering and leaving the three gates between 3:00 and 7:00 p.m. The "peak hour" is the hour with the largest number of cars entering and leaving.

3. In May, 1986, LBL conducted gate counts which showed a total of 743 trips during the p.m. peak hour of 4:45 p.m. to 5:45 p.m. Based on this data and expected population growth at

LBL from 1986 to 1992, LBL projected an increase of 189 new p.m. peak hour trips by 1992. The total p.m. peak hour trips projected by 1992 is therefore 932.

4. For settlement of this litigation, LBL's goal will be to reduce the projected increase in p.m. peak hour trips from 189 to 80. LBL's goal is therefore to limit the total number of p.m. peak hour trips to 823 by May 31, 1992. LBL and the Regents will continue to comply with CEQA thereafter.

5. In addition to this goal, LBL has identified the following interim goals for limiting p.m. peak hour trip increases:

Time Period	No. of P.M. Peak Hour Trips
By May 31, 1989	763
By May 31, 1990	783
By May 31, 1991	803

These interim goals assume relatively even growth in population, and hence traffic, at LBL. Since LBL's projected population growth, however, will not necessarily occur in even increments during this period, these interim goals are general targets. Nevertheless, LBL and the Regents will comply with Paragraph 8 of this Agreement if these interim goals are not attained.

6. LBL's methods for achieving its goals include but are not limited to the following:

6.1 Preferential parking for carpools at LBL's hill site;

6.2 Elimination of parking privileges for persons who park at LBL's hill site but work elsewhere; and

6.3 Transportation Systems Management ("TSM") measures such as the following measures referred to in the Draft and Final Environmental Impact Reports:

a. Increasing the number of daily LBL shuttle bus trips from 70 to 82;

b. Studying the feasibility of satellite parking in cooperation with U.C. Berkeley;

c. Instituting a "BART Day" and "No Car Day" to encourage use of public transit at least one day each week.

LBL will regularly monitor the effectiveness of these measures, including the number of persons using carpools and participating in other TSM programs.

7. The methods for measuring LBL's progress in reducing p.m. peak hour trip increases will be as follows:

7.1 Gate counts will be conducted by LBL at each of its three gates. These counts will be conducted three times per year, in the Fall, Winter and Spring. The counts will be conducted on Wednesdays, during non-holiday periods, between 3:00 p.m. and 7:00 p.m.

7.2 LBL will conduct a comprehensive employee survey in the Spring of 1988, and will include in it inquiries about employee transportation methods.

LBL will share with the City the information obtained in the gate counts and survey. LBL will provide this information to the City within 30 days of completion of the gate counts and survey.

8. If LBL does not attain its 1992 goal, or any interim goal, LBL will do the following:

8.1 LBL will consider additional traffic reduction measures, including but not limited to the following:

a. Subsidized BART tickets and AC Transit tickets;

b. Charging for parking at LBL's hill site;

c. Further restrictions on parking eligibility at LBL's hill site.

8.2 LBL will make changes in its traffic reduction programs, and these changes will be reasonably calculated to achieve the goals specified in this Agreement.

8.3 LBL will provide the City with a written Status Report by June 15 of each year from 1989 through 1992, reporting on:

a. LBL's progress in attaining its goals for reducing p.m. peak hour trip increases;

b. The additional traffic reduction measures considered by LBL;

c. The changes to be made in LBL's traffic reduction program in order to meet the goals specified in this Agreement.

These annual Status Reports will be in addition to the data furnished to the City concerning LBL's gate counts and employee survey.

D. In consideration of the terms recited above, the City agrees to do the following:

1. The City will dismiss with prejudice the action referred to in Paragraphs A and B above.

2. The City will execute a formal Release, which will release the Regents, the University of California, Lawrence Berkeley Laboratory, and all of their respective board members, executive officers, employees and agents, from:

2.1 All claims which were or could have been asserted in the lawsuit referred to in Paragraphs A and B above; and

2.2 All claims arising out of or related to the preparation of LBL's Long Range Development Plan, the preparation of environmental impact reports about the LRDP, the sufficiency of those environmental impact reports about the LRDP, and/or the review, approval and certification of the environmental impact reports and the LRDP.

3. The City will execute the Release and Dismissal with Prejudice within ten days of execution of this Settlement Agreement by both parties.

DATED: July 7, 1988. City of Berkeley

By _____
Hal Cronkite
City Manager

DATED: Sept 12, 1988. The Regents of the University of California

By _____
George L. Pappas
Associate Laboratory Director

Raymond Mathis • Architect

RECEIVED
OCT 07 1991
ENVIRONMENT AND
LABORATORY DEVELOPMENT

04 October 1991

M.A. Krebs
Bldg 50A, Rm 4112
L.B.L
UCB
Berkeley, CA 94720

RE: S. E. I. R.

We request that your contract address maximum emission of the 'toxic' which most concerns Panoramic Hill residents: Noise (I recommend zero emission) and that it be based upon the best ambient sound study yet conducted for our area - a copy is attached.

A continuous noise can be clearly heard comming from your lab during evening hours. I know of no technical reason why such pollution need exist.

I thank you for your September 11, 1991 notification of the SEIR.

Sincerely,

Raymond Mathis
39 Canyon Road
94704-1815

phone::::548-3828
fax::::::8451115

susp. 12/91

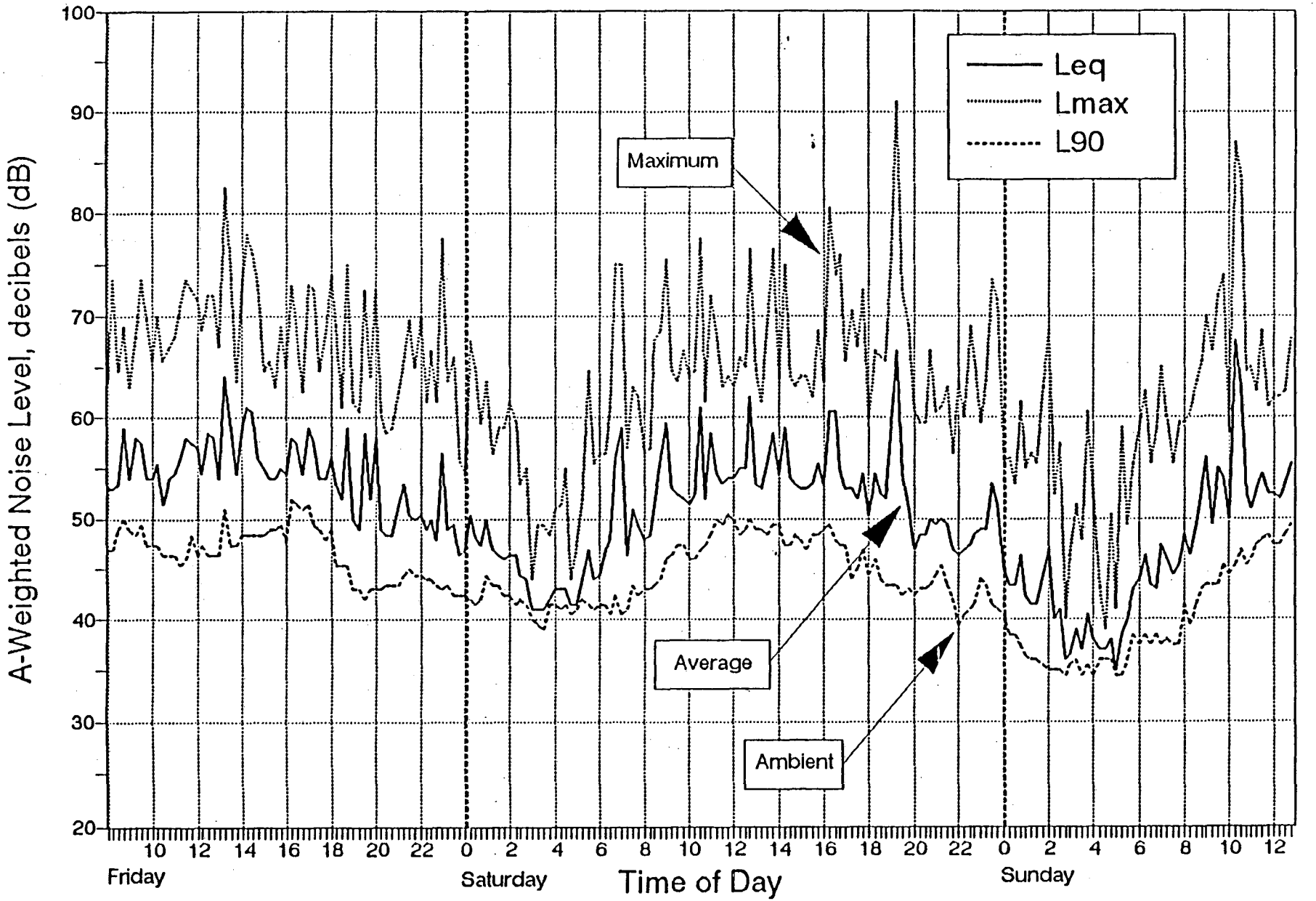

Figure 2: Typical Weekend Noise Levels Measured at 39 Canyon Road
16-18 March 1990

APPENDICES

Appendix B: LBL Building Numbers and Descriptions

APPENDIX B
LBL BUILDING NUMBERS AND DESCRIPTIONS

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
	HILL-SITE BUILDINGS			
2	Advanced Materials Laboratory (AML), Center for X-Ray Optics (CXRO)	85,838	119	1
4	Magnetic Fusion Energy (MFE)	10,133	29	3
5	Magnetic Fusion Energy (MFE)	7,149	12	3
6	Advanced Light Source (ALS)	81,000		1
7	Central Stores and Electronics Shops	21,760	42	3
10	ALS and Photography	16,038	24	3
14	Accelerator and Fusion Research and Earth Sciences	4,200	7	3
16	Magnetic Fusion Energy Laboratory	11,419	13	3
17	EH&S	1,993	0	3
25	Mechanical Technology	20,101	27	3
25A	Electronics Shops	7,335	16	2
26	Medical Services	6,663	30	2
26Addn[a]	EH&S	3,100		
27	Cable Shop and High Voltage Test Facility	3,288	0	3
29	Electronics Instrumentation Department, Research Medicine and Radiation Biophysics Office	10,576	28	3
31	Chicken Creek Maintenance Building	6,060	15	1
36	Grizzly Substation Switchgear Building			
37	Utilities Service	5,784	0	1
40	Electronics Development Laboratory	994	0	3
41	Magnetic Measurements Laboratory	994	5	3
42	Salvage	1,215	2	3
43	Compressor Building	1,007	0	1
44	Indoor Air Pollution Studies	800	1	3
45	Fire Apparatus	3,278	0	1
46	Accelerator Electronics Department, ALS	51,952	169	2
46A	Computer Systems Engineering Department	5,504	34	1
47	Advanced Accelerator Study	6,098	26	3
48	Fire Station	4,221	23	1
48Addn[a]	Fire Station Addition	1,700		
50	Physics, Accelerator and Fusion Research, LBL Library	47,421	130	2
50A	Director's Office, Planning and Lab Development, Administration Division, Patents, Laboratory Counsel	67,863	167	2
50B	Physics, Telephone Services, ICSD, Computer Center	65,108	146	2
50C	Public Information Department (PID)	3,037	29	1

(Continued)

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
50D	Nuclear Science and MCSD	5,010	21	1
50E	Earth Sciences	10,150	50	1
50F	Information Resources Computing Services	8,396	41	1
51	Bevalac/Bevatron	85,788	0	2
51A	Bevatron Experimental Area	25,910	66	2
51B	External Particle Beam (EPB) Hall	42,075	0	1
52	Magnetic Fusion Energy Laboratory	6,542	3	3
53	Super HILAC Development, Magnetic Fusion Energy	6,806	8	3
54	Cafeteria	11,662	12	2
54Addn[a]	Cafeteria Addition	2,200		
55	Research Medicine and Radiation Biophysics (RMRB)	18,678	37	1
55A	Nuclear Magnetic Resonance (NMR)	1,535	0	1
56	Cryogenic Facility	961	0	3
56Addn[a]	Biomedical Isotope Facility	1,039		
58	Heavy Ion Fusion (HIF)	9,979	21	3
58A	Accelerator Research and Development Addition	11,484	2	1
60	High Bay Laboratory	3,400	0	1
61	Standby Propane Plant	323	0	1
62	Materials and Chemical Sciences	55,398	96	2
63	Accelerator and Fusion Research	2,624	11	3
64	Accelerator and Fusion Research	23,667	48	2
65	Data Processing Services	3,306	14	3
66	Surface Science and Catalysis Laboratory	44,123	101	1
68	Upper Pump House	500	0	1
69	Material Management, Purchasing, Mailroom	17,239	53	1
70	Nuclear Science, Applied Science, and Earth Sciences	62,237	134	2
70A	Nuclear Science, Chemical Sciences, Earth Sciences, Cell and Molecular Biology	68,302	76	2
71	Heavy Ion Linear Accelerator (HILAC)	54,226	46	1
71A	HILAC Rectifier	3,696	0	1
71B	HILAC Annex	6,936	14	1
72	National Center for Electron Microscopy (NCEM)	5,308	11	1
72A	High Voltage Electron Microscope (HVEM)	2,532	0	1
72B	Atomic Resolution Microscope (ARM)	4,383	0	1
72C	ARM Support Laboratory	5,600	11	1
73	Atmospheric Aerosol Research	4,304	8	2
74	Research Medicine and Radiation Biophysics, Cell and Molecular Biology Laboratory	45,054	77	2
74B	Research Medicine & Radiation Biophysics, Cell and Molecular Biology Laboratory Annex	3,436	7	1

(Continued)

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
75	Radioisotope Service, National Tritium Facility (NTF)	8,545	13	1
75A	Compactor, Processing, and Storage Facility	4,064	0	3
76	Craft and Maintenance Shops	30,960	137	1
77	Mechanical Fabrication Shops	68,768	107	2
77A	Ultra High Vacuum (UHV) Assembly Facility	10,854	2	1
78	Craft Stores	5,373	2	1
79	Metal Stores	4,278	3	1
80	Electronics Engineering, Accelerator & Fusion Research	26,216	33	2
80A	Electronics Installation & Fabrication	947	5	1
81	Liquid Gas Storage	1,124	1	1
82	Lower Pump House	537	0	1
83	Cell and Molecular Biology	6,940	18	1
85[a]	Hazardous Waste Handling Facility	13,000		
88	88-Inch Cyclotron, Nuclear Science	52,188	52	1
90	Applied Science, Employment, Engineering, Personnel, Protective Services	87,519	336	2
	SUBTOTAL HILL-SITE BUILDINGS	**1,549,751**	**2,771**	
	SMALL BUILDINGS AND TRAILERS			
B-4A	Safety Equipment Storage	133	0	3
B-5A	Mechanical Storage	160	0	3
B-5B	Electrical Storage	160	0	3
B-7A	Radio Shop	120	0	3
B-7B	Inventory Management	473	3	3
B-7C	Materiel Management	473	3	3
B-7E	Office Trailer	1,040	0	3
B-10A	Utility Building	242	0	3
B-13A	Environmental Monitoring Station, West of Building 88	76	0	1
B-13B	Environmental Monitoring Station, West of Building 90	76	0	1
B-13C	Environmental Monitoring Station, South of Strawberry Clubhouse	76	0	1
B-13D	Environmental Monitoring Station, North of Building 71	76	0	1
B-13E	Environmental Monitoring Station, Southwest of Building 88	68	0	1
B-13F	Environmental Monitoring Station, North of Strawberry Clubhouse	36	0	1
B-13G	Waste Monitoring Station, West of Building 70	140	0	1
B-13H	Radiation Monitoring Station, Southeast of Building 37			
B-16A	Power Supply House	339	0	3
B-17A	ALS Test Facility	160	0	3

(Continued)

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Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
B-29A	Electronics Engineering, Computer Sciences	1,673	10	3
B-29B	Electronics Drafting	1,420	6	3
B-29C	Applied Science	1,282	8	3
B-29D	Rest Room Trailer	283	0	3
B-31A	Earth Sciences	624	1	3
B-33A	Strawberry Canyon Gatehouse	52	1	1
B-33B	Blackberry Canyon Gatehouse	97	1	3
B-33C	Grizzly Peak Gatehouse	80	1	1
B-42A	Emergency Generator House	156	0	3
B-44A	Plant Engineering Inspectors	181	3	3
B-44B	Applied Science	1,420	6	3
B-45A	Smoke House	128	0	3
B-46B	Applied Science	1,260	4	3
B-46C	Mechanical Engineering	1,024	5	3
B-46D	Accelerator & Fusion Research, Mech Eng	786	5	3
B-48A	Fire Station Storage	320	0	3
B-51C	Bevatron Plumbers Storage	400	0	1
B-51D	Bevatron Electricians Shop	512	5	1
B-51E	Bevatron Electrical Storage	496	0	1
B-51F	HISS Building	1,543	0	3
B-51G	HISS Building	1,263	0	3
B-51H	HISS Building	1,556	5	3
B-51L	VAX User Facility	864	0	1
B-51M	Bevatron Trailer	560	0	3
B-51N	Bevalac Patient Facility	640	0	1
B-51P	Carpenter Shack	384	1	1
B-52A	MG House	516	0	3
B-52B	Materiel Management Department	1,180	5	3
B-53A	Gardener's Storage	192	0	3
B-53B	Accelerator & Fusion Research	511	2	3
B-54A	Wells Fargo Express Service	195	0	1
B-55A	Research Medicine & Radiation Biophysics	517	5	3
B-55B	Emergency Generator	209	0	1
B-62A	Applied Science, Material Science	1,292	10	3
B-62B	Utility Building			
B-64A	Bevatron Riggers	515	6	3
B-65A	DPS Office Trailer	1,425	18	3
B-65B	DPS Office Trailer	1,020	8	3
B-67B	Applied Science	1,189	4	3
B-67C	Laboratory Trailer	1,189	0	3

(Continued)

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
B-67E	Laboratory Trailer	290	0	3
B-70A	Storage	173	0	1
B-70B	Telephone Terminal	382	0	1
B-70C	Storage Container	156	0	1
B-70D	Storage Container	160	0	1
B-70E	Storage Container	432	0	1
B-71B	AFRD Exploratory Studies	511	1	3
B-71C	AFRD Exploratory Studies	511	3	3
B-71D	Chemical Sciences	511	5	3
B-71E	AFRD, Chemical Sciences	511	3	3
B-71F	Applied Science	511	0	3
B-71G	Office Trailer	511	0	3
B-71H	Electronics Engineering Department Office	1,416	6	3
B-71J	AFRD	1,239	5	3
B-71K	Electronics Engineering & Computer Science	484	2	3
B-72D	Center for Advanced Materials	617	7	3
B-73A	Utility Building	403	0	1
B-74C	Emergency Generator Building	180	0	1
B-75B	EH&S	4,681	21	3
B-75C	Calibration Range	450	0	3
B-75D	Waste Storage	1,035	4	3
B-75E	Tritium Group	410	4	3
B-76A	Paint Storage			
B-76B	Plumbing	160	0	1
B-76C	Maintenance Supplies	64	0	1
B-76D	Electrical	160	0	3
B-76E	Electrical	160	4	3
B-76F	Small Engine Shop	160	0	3
B-76G	Battery Storage	56	0	3
B-76H	Emergency Utility Storage			
B-77C	Welding Storage	23	0	1
B-77D	Drum Liquid Storage	108	0	1
B-77G	Mechanical Technology Department	710	2	3
B-77H	Auxiliary Plating Building	576	0	3
B-83A	Laboratory Trailer	493	0	3
B-88A	Storage	342	0	1
B-88B	Compressor Shelter and Storage	534	0	1
B-88C	Flammable Gas/Liquid Storage	80	0	3
B-88D	Emergency Generator Building	265	0	1
B-90A	Plant Engineering	1,440	8	3

(Continued)

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
B-90B	Plant Engineering	1,440	3	3
B-90C	Plant Engineering	1,183	8	3
B-90D	U.C. Auditors	192	7	3
B-90E	U.C. Auditors	188	3	3
B-90F	Plant Engineering	2,461	10	3
B-90G	Plant Engineering Department	1,847	9	3
B-90H	Plant Engineering	1,846	11	3
B-90J	Plant Engineering	2,840	17	3
B-90K	Plant Engineering	2,882	15	3
B-90P	Library (Branch)	2,130	0	3
B-90Q	Rest Room Trailer	425	0	3
B-90R	Utility Building	160	0	3
	SUBTOTAL SMALL BUILDINGS AND TRAILERS	**71,301**	**284**	
	TOTAL HILL-SITE BUILDINGS AND TRAILERS	**1,621,052**	**3,055**	
	OFF-SITE LEASED BUILDINGS			
901	Receiving/Warehouse, 1450 64th Street, Emeryville	69,680	9	
901A	Used Furniture/Excess Material, 1450 64th Street, Emeryville	26,802	0	
934	DYMO Building: Print Plant, Cell and Molecular Biology, 91 Bolivar Drive, Berkeley	30,720	46	
936	Berkeley Center: Accounting and Financial Management, 2070 Allston Way, Berkeley	13,107	60	
940	Cholesterol Research Center, 3101 Telegraph Avenue, Berkeley	415	3	
	TOTAL OFF-SITE LEASED BUILDINGS	**140,724**	**118**	
	CAMPUS BUILDINGS ASSIGNED LBL NUMBERS			
1	Donner Laboratory	25,323	106	
3	Melvin Calvin Laboratory (MCL)	23,543	109	
8	Hearst Mining	13,284	81	
11	Hildebrand Hall	22,848	120	
18	Gilman Hall	8,732	44	
19	LeConte Hall	4,888	24	
19A	Birge Hall	13,345	64	
20	Life Sciences Building (LSB), being rehabilitated			
20A	Life Sciences Building Addition	660	2	

(Continued)

Lawrence Berkeley Laboratory Supplemental Environmental Impact Report (SEIR)

Bldg. No.	Building Description	Area (Sq. Ft.)	Persons	Rehab Status
21	Low Temperature Laboratory - Giauque Hall	9,458	28	
22	Latimer Hall	13,508	77	
24	Etcheverry Hall	5,547	20	
38	Lewis Hall	3,079	41	
39	Cory Hall	511	4	
57	Cowell Hospital (Donner Pavillion)	2,614	10	
905	Hesse Hall	5,711	10	
921	Stanley Hall	1,804	11	
983	Wurster Hall	4,998	4	
984	Davis Hall	833	4	
987	Warren Hall	423		
990	Evans Hall	195	3	
995	Barker Hall	1,364	4	
	TOTAL CAMPUS BUILDINGS	**162,668**	**766**	
	RICHMOND FIELD STATION			
911-177	Radon Research House	2,092	0	
911-180	Indoor Air Quality Laboratory	2,290	0	
911-198	Earth Sciences Laboratory	1,711	0	
	TOTAL RICHMOND FIELD STATION	**6,093**	**0**	
	TOTAL ALL SITES			
	HILL-SITE BUILDINGS AND TRAILERS (gsf)[a]	1,621,052	3,055	
	OFF-SITE LEASED BUILDINGS (gsf)	140,724	118	
	CAMPUS BUILDINGS ASSIGNED LBL NUMBERS (nsf)	162,668	766	
	RICHMOND FIELD STATION (nsf)	6,093	0	
	TOTAL ALL SITES	**1,930,537**	**3,939**	

Notes:
a = Hill-site buildings and trailers, includes proposed construction for FY 1992.

Source: Area: 1991 LBL Space and Personnel Database, Survey date September 1991, updated February 1922, LBL Plant Engineering Department
Persons: 1990 LBL Space and Personnel Database, Survey date July 1990, LBL Plant Engineering Department
Rehab Status: 1991 LBL Space and Personnel Database, Survey date September 1991, updated February 1992, LBL Plant Engineering Department
(1 = Adequate; 2 = Substandard, Can Be Made Adequate; 3 = Substandard, Cannot Be Made Adequate)

APPENDICES

Appendix C: 1991 Hazardous Materials Business Plan AB 2185/87/89 Chemicals

APPENDIX C
1991 HAZARDOUS MATERIALS BUSINESS PLAN[1]
AB 2185/87/89 CHEMICALS

CHEMICAL NAME	CAS NUMBER	MAX QTY	UNITS	STATE
Acetylene	74-86-2	13,489	CuFt	G
Aluminum Welding Rod		3,500	Lbs	S
Ammonia	7664417	1,805	CuFt	G
Chlorodifluoromethane (Freon 22)	75456	6,683	CuFt	G
Dichlorodifluoromethane (Freon 12)	75718	4,765	CuFt	G
Fuel	74986	119,112	Gal	L
Hydrochloric Acid	7647010	298	Gal	L
Hydrofluoric Acid	7664393	148	Gal	L
Hydrogen	1333740	6,533	CuFt	G
Kerosene	8008206	620	Gal	L
Liquid Nitrogen	7727370	3,914,000	CuFt	G
Lubricants		1,786	Gal	L
Mercury Compounds (Salts and Metal)		1,518	Lbs	L
Methyl Alcohol	67-56-1	1,333	Gal	L
Nitric Acid	7697-37-2	216	Gal	L
Nickel Salts Solutions		189	Gal	L
Nickel Salts, Dry		694	Lbs	S
Oils[2]		[2]40,367	Gal	L
Propane	74-98-6	30,787	Gal	L
Sodium Hydroxide	1310732	2,198	Lbs	L
Sodium Hypochlorite	7681529	113	Gal	L
Sulfur Hexafluoride	2551624	1,200	CuFt	G
Sulfuric Acid	7664939	289	Gal	S
Trichloroethane 1,1,1-	71556	1,396	Gal	S

CHEMICAL NAME	CAS NUMBER	MAX QTY	UNITS	STATE
Trichlorofluoromethane (Freon 11)	75694	1,679	CuFt	G
Trichlorotrifluoethane	76131	1,149	Gal	G
Waste-Alkaline Batteries (2)		501	Lbs	S
Waste-Combustible Liquid		1,335	Lbs	L
Waste-Corrosive (Acid Liquid)		5,415	Lbs	L
Waste-Corrosive (Alkaline Liquid)		1,835	Lbs	L
Waste-Corrosive (Alkaline)		5,006	Lbs	L
Waste-Corrosive Liquid		6,508	Lbs	L
Waste-Corrosive Solid		4,964	Lbs	S
Waste-Cyanide		2,670	Lbs	L
Waste-Flammable Gas		834	Lbs	G
Waste-Flammable Liquid		7,300	Lbs	L
Waste-Flammable Liquid, Corrosive		667	Lbs	L
Waste-Flammable Liquid, Raw		501	Lbs	L
Waste-Flammable Solid		3,254	Lbs	S
Waste-Halogenated Solvent		1,835	Lbs	L
Waste-Non-RCRA, Liquid		14,016	Lbs	L
Waste-Non-RCRA, Solid		25,988	Lbs	S
Waste-Oily Rags		1,835	Lbs	S
Waste-ORM-A		4,297	Lbs	S
Waste-ORM-B		1,502	Lbs	S
Waste-ORM-E		49,349	Lbs	S
Waste-Oxidizer		7,050	Lbs	L
Waste-Oxidizer/Corrosive		501	Lbs	L
Waste-PCB Ballasts		4,589	Lbs	S
Waste-PCB Light Ballasts		2,753	Lbs	S

CHEMICAL NAME	CAS NUMBER	MAX QTY	UNITS	STATE
Waste-Poison B		12,565	Lbs	L
Waste-Solvent Consolidate		1,377	Lbs	S

1. The LBL chemical inventory was sorted by volume; those chemicals in excess of the threshold amounts defined in the Business Plan Act are presented in this Appendix.

2. 30,000 gallons of the oil are presently in use in electrical transformers.

APPENDICES

Appendix D: 1991 Report of Extremely Hazardous Chemicals at LBL

APPENDIX D
1991 REPORT OF EXTREMELY HAZARDOUS CHEMICALS AT LBL[1]

Chemical	CAS	Quantity (Pounds)
Ammonia, Anhydrous	7664417	1,224.45
Hydrofluoric Acid Solution	7664393	238.32
Nitric Acid, ≤40%	7697372	1,544.75
Phosphorus Pentoxide	1314563	11.55
Sulfuric Acid	7664939	3,256.59

Note: 1 =

Source: Lawrence Berkeley Laboratory

APPENDICES

Appendix E: Executive Summary - Tiger Team Report

APPENDIX E
EXECUTIVE SUMMARY - TIGER TEAM REPORT

[This summary was taken verbatim from the *U.S. Department of Energy, Office of Environment, Safety and Health, Tiger Team Assessment of the Lawrence Berkeley Laboratory*, (February 1991), pp. ES-1 to ES-4.]

This report documents the results of the Department of Energy's (DOE's) Tiger Team Assessment of the Lawrence Berkeley Laboratory (LBL) conducted from January 14 through February 15, 1991. The Tiger Team Assessment was conducted by a team comprised of professionals from DOE, contractors, and consultants. The purpose of the assessment was to provide the Secretary of Energy with the status of environment, safety, and health (ES&H) programs at LBL.

LBL provides national scientific leadership and technological innovation through its mission to provide leading multidisciplinary research in the energy sciences, general sciences and life sciences; develop and operate unique national experimental facilities for use by qualified investigators; educate and train future generations of scientists and engineers; and foster productive relationships between LBL research programs and industry.

LBL and DOE's San Francisco Operations Office (SAN) conducted comprehensive self-assessments prior to the arrival of the Tiger Team although neither have institutionalized the self-assessment process.

The Tiger Team concluded that curtailment or cessation of any operations at LBL is not warranted. However, the number and breadth of findings and concerns from this assessment reflect a serious condition at this site. An early, proactive, aggressive ES&H program in concert with the Secretary's initiatives was not put in place. Follow-up activities from the previous Environmental Survey and the Technical Safety Appraisal did not receive aggressive management attention. Many of the findings and concerns form this assessment had been previously identified. Repeat findings generally reflect inadequate root cause analysis and follow-up.

In spite of its late start, LBL has recently made progress in increasing ES&H awareness at all staff levels and in identifying ES&H deficiencies. Corrective action plans are inadequate, however, many compensatory actions are underway. Also, LBL does not have the technical expertise or training

programs nor the tracking and follow-up to effectively direct and control sitewide activities. The situation is further compounded by the lack of adequate guidance and oversight by DOE of ES&H activities at LBL. As a result of these deficiencies, the Tiger Team has reservations about LBL's ability to implement effective actions in a timely manner and, thereby, achieve excellence in their ES&H program.

A. SUMMARY OF KEY FINDINGS AND PROBABLE ROOT CAUSES

1. Environmental

Environmental and waste management programs at LBL are not consistently complying with regulatory and DOE requirements. Lack of compliance and failure to implement best management practices are widespread, applying to virtually all of the environmental disciplines assessed by the Tiger Team. To give perspective, it is important to note that none of the Tiger Team findings represents a substantial threat of large-scale environmental contamination or danger to human health. This is because operations at LBL do not involve large sources of potential environmental contaminants. However, it must be stated that current line management and oversight do not meet the requirements of DOE Secretary of Energy Notice (SEN)-6-89, SEN-7-89, and SEN-11-89 and their subsequent revisions and have not been effective in achieving compliance or monitoring and controlling the impacts of LBL activities on the environment.

The Environmental Subteam's findings involving line management indicate weaknesses on the part of LBL, SAN, and ER in the areas of providing clear policy directions, preparing and implementing formal procedures, ensuring adequate training, and providing effective oversight of LBL activities. Environmental programs have not been accorded the appropriate priority and, thus, suffer from a lack of resources. In particular, in the area of waste management, the number and scope of Tiger Team findings, as well as the recurrence of programs noted in the 1988 DOE Environmental Survey and in several Notices of Violation issued by the California Department of Health Services, indicate a serious problem in line management's performance.

Key environmental programmatic findings are as follows:

Waste management at LBL exhibits pervasive and long-standing noncompliances and deficiencies which indicate a serious lack of management and oversight on the part of LBL and SAN.

Virtually all LBL and SAN-related environmental programs and activities lack quality assurance and quality control plans, procedures, documentation, and auditing.

The environmental monitoring program at LBL lacks sufficient strategic planning to establish comprehensive monitoring requirements and then integrate them into the total LBL operations program.

There is a pervasive lack of effective oversight on the parts of both LBL and SAN for environmental programs and activities at LBL. In this usage, oversight is defined as providing guidance, documenting requirements and objectives, and setting up programs of routine supervision, as well as formal audits and appraisals, to assure that procedures are followed and objectives are met.

2. Safety and Health

LBL is undergoing change as it moves toward institutionalizing a new safety culture. The institutionalization of this culture appears to be occurring more rapidly than the implementation of a formal sitewide safety program. Management is committed to an improved safety culture, but has not fully demonstrated its ability to implement and manage the changes necessary to bring it about. Communicating the new safety culture to its people, correcting significant safety and health resource deficiencies, demonstrating its ability to implement an effective sitewide safety and health program, and developing the management tools to assess LBL safety programs are critical challenges facing LBL management.

The Safety and Health section of this report cites 136 concerns. Seven of these concerns were classified as Category II; none were Category I. Key concerns relate to the execution of the ES&H program and the organization in place to carry it out; both are judged to fall short of enabling compliance with DOE requirements, which is attributed to inexact definition and poor management implementation of program elements. Other concerns and their probable root causes derive from (1) serious deficiencies in

personnel resources available to management to provide the necessary expertise and depth required to meet DOE requirements, (2) an employee training program that lacks formality in organization and execution, and (3) administrative practices that fail to provide the measures and discipline needed to meet DOE requirements.

An underlying problem is less SAN oversight than needed. A stringent system of controls to ensure compliance with DOE requirements, enforced by proactive SAN oversight measures, is not currently in place. As a result, there is widespread noncompliance with DOE Orders and other Federal regulations.

B. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) COMPLIANCE

A comprehensive safety and health compliance appraisal covering general industry and construction standards was conducted to determine compliance with existing OSHA regulations as adopted by DOE. During this appraisal, the team primarily looked for "serious" noncompliances. Therefore, there is a higher percentage of "serious" versus "other than serious" noncompliances, as classified by OSHA. Of the 456 noncompliance issues identified, 420 were considered "serious" and 36 were classified as "other than serious".

This appraisal confirmed deficiencies in hazard communication related to training, the availability of Material Safety Data Sheets, labeling, written programs for work locations, appropriateness of hazard warnings, and the use of the Hazardous Material Information System. A major problem noted in construction activities is the failure to install and use fall protection. Significant deficiencies were identified with the program for inspection of slings, chokers, and related rigging. The handling and storage of regulated carcinogens was also found to be inconsistently administered across Laboratory facilities.

1. Management and Organization

LBL has recently begun a number of actions which can help establish an effective ES&H program. Examples of these actions include:

Top management attention to increase ES&H awareness at all levels of the Laboratory;

Recent reorganization to better focus on ES&H requirements;

Recognition that ES&H policies and procedures, and the process for their implementation, are weak;

First steps to acquire additional ES&H staff for policy guidance; assessment and technical support needs; and

Completion of a comprehensive self assessment prior to the Tiger Team Assessment.

LBL has made a start, but faces a significant challenge in implementing an effective ES&H program. Concerns and reservations regarding LBL's ability to follow through and effectively implement ES&H requirements are based on the following Tiger Team observations:

LBL does not possess the experience and expertise to effectively plan, develop and implement an ES&H program that meets DOE's requirements. LBL's actions to secure the additional resources needed are inadequate.

LBL's informality of operations does not lend itself to the more rigorous management style and systems needed to implement ES&H requirements.

LBL's current policies and procedures are inadequate and there is not an effective mechanism to ensure that the Laboratory is complying with ES&H requirements.

Management systems are inadequate to provide management with information on the status and performance of ES&H activities.

The Tiger Team is concerned that without more aggressive actions by LBL to address these deficiencies the Laboratory may not be able to follow through on its planned actions.

Another key component of a successful ES&H program at LBL is the existence of adequate oversight of ES&H activities. DOE Headquarters has not accorded ES&H oversight the priority needed to ensure that these requirements are being met. SAN has not demonstrated that it assigns a high priority to ES&H. Additionally, the University of California has not provided adequate policy guidance or oversight with regard to LBL's ES&H activities. Oversight, which is the cornerstone of management's responsibility, must be significantly enhanced to help ensure that LBL will fully implement DOE's ES&H requirements.

APPENDICES

Appendix F: Acronyms and Abbreviations

APPENDIX F:
ACRONYMS AND ABBREVIATIONS

AAL	Applied Action Levels
A&E	Architects and Engineers
ABAG	Association of Bay Area Governments
ACBM	Asbestos-Containing Building Materials
AEA	Atomic Energy Act
AEDE	Annual Effective Dose Equivalent
AHM	Acutely Hazardous Materials
ALARA	As Low As Reasonably Achievable
ALS	Advanced Light Source
asf	Assignable Square Feet
AST	Aboveground Petroleum Storage Tank Act
ATOMS	Command Center Team, Firefighting Team, First Aid Team, and Traffic Control Team
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
C&M	Construction and Maintenance Department
DHS or Cal/EPA	California Department of Health Services
CalTrans	California Department of Transportation
CAP	Clean Air Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCAP	California Clean Air Plan
CCWD	Contra Costa Water District
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHP	California Highway Patrol
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CO	Carbon Monoxide
CWQCB	California State Water Resources Control Board
D&D	Decontamination and Decommissioning
DAs	District Attorneys
DEIR	Draft Environmental Impact Report
DGC	Derived Concentration Guidelines
DOE	Department of Energy
DOE/SF	Department of Energy's San Francisco Operations Office
DOT	Department of Transportation
DTSC	Department of Toxic Substance Control

EA	Environmental Assessment
EBMUD	East Bay Municipal Utilities District
EH&S	Environmental Health and Safety Division (formerly EPHS, formerly OHD)
EIR	Environmental Impact Report
EMTs	Emergency Medical Technicians
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
EPIPs	Emergency Plan Implementing Procedures
ERWM	Environmental Restoration and Waste Management (also known as EM)
ES&H	Environment, Safety, and Health
ESHC	Environment and Safety Hazards Control (Department), now part of EH&S
FEIR	Final Environmental Impact Report
FPES	Fire Protection Engineering Survey
FTE	Full-Time Equivalent
FYP	Five-Year Environmental Restoration and Waste Management Plan
GMP	Groundwater Monitoring Plan
GPMPP	Groundwater Protection Management Program Plan
gsf	Gross Square Feet
HEAST	Health Effects Assessment Summary Table
HEPA	High-Efficiency Particulate Air (filter)
HLA	Harding Lawson Associates
HSITA	Hazardous Substances Information and Training Act
HWCL	Hazardous Waste Control Laws
HWHF	Hazardous Waste Handling Facility
HWMA	Hazardous Waste Management Act
HWSF	Hazardous Waste Storage Facility
IES	Integrated Environmental Systems
IMMP	Institutional Mitigation Monitoring Program
IRIS	Integrated Risk Information Service
ISC	Industrial Source Complex
LBL	Lawrence Berkeley Laboratory
LISA	LBL Institutional Self-Assessment
LOS	Levels of Service
LLRWPA	Low Level Radioactive Waste Policy Act
LRDP	Long Range Development Plan
MACT	Maximum Available Control Technology
MCL	Maximum Contaminant Level
MCSD	Materials Chemistry and Science Division
MEI	Maximally Exposed Individual
MEP	Master Emergency Plan
MMD	Materials Management Department
MSDS	Material Safety Data Sheets

MSRI	Mathematical Sciences Research Institute
MWH	Megawatt Hours
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NFPA 45	National Fire Protection Association Standard 45
NFPA 99	National Fire Protection Association Standard 99
NMR	Nuclear Magnetic Resonance
NOI	Notice of Intent
NRC	Nuclear Regulatory Commission
NSR	New Source Review Rules
NTLF	National Tritium Labeling Facility
OCCA	Occupational Carcinogenic Control Act
OES	Office of Emergency Services
OSHA	Occupational Safety and Health Administration
PAs	Preliminary Assessments
PCB	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Precursor Organic Compounds
PPM	Parts Per Million
RCRA	Resource Conservation and Recovery Act
REM	Roentgen Equivalent in Man
RFA	RCRA Facility Assessment
RFD	Richmond Fire Department
RFI	RCRA Facility Investigation
RFS	Richmond Field Station
RI	Remedial Investigations
RMPPs	Risk Management & Prevention Programs
ROGs	Reactive Organic Compounds
RPPP	Residential Permitted Parking Program
RPD	Richmond Police Department
RWQCB	Regional Water Quality Control Board
SAA	Satellite Accumulation Area
SAP	Self-Assessment Program
SARA	Superfund Amendment and Reauthorization Act
SCS	Soil/Conservation Service
SDP	Site Development Plan
SDWA	Safe Drinking Water Act
SEIR	Supplemental Environmental Impact Report
SI	Site Investigation
SMP	Site Management Plan
SPCC	Spill Prevention, Control and Countermeasures
SRGMP	Site Restoration and Groundwater Management Program

SRP	Site Restoration Program
SSC	Superconducting Super Collider
TACs	Toxic Air Contaminants
TLV	Threshold Limit Value
TRU	Transuranic
TSA	Technical Safety Appraisal
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulate
UCB	University of California, Berkeley
UCLA	University of California, Los Angeles
UCSF	University of California, San Francisco
US/EPA	United States Environmental Protection Agency
USPCI	United States Pollution Control, Inc.
USPS	U.S. Postal Service
UST	Underground Storage Tank
VDTs	Video Display Terminals
VOC	Volatile Organic Compounds
WAA	Waste Accumulation Area
WDR	Waste Discharge Requirement
WIPP	Waste Isolation Pilot Plan
WIPP	Waste Isolation Pilot Plant
WMPP	Waste Management Program Plan