Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91109-8099
(818) 354-4321

JPL

Refer to: 2006-002JAN.DOC

July 24, 2006

NASA Headquarters
Attention: Kenneth Kumor
300 E St., SW
Suite: 5E39
Washington, DC 20546-0001

Subject: Final Environmental Assessment for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory and FONSI

Ken,

Two copies of the Final Environmental Assessment for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory and two copies of the FONSI for the EA are enclosed. Electronic copies of both documents are included on the enclosed disk. A copy of the Legal Review Form from the NASA Management Office is also enclosed, as discussed.

Please feel free to call me at (818) 354-8634 or Charles Buril at (818) 354-0180, if you have any questions.

Sincerely,

Judith A. Novelly, NEPA Program Manager
Environmental Affairs Program Office

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91109-8099
(818) 354-4321

JPL

Refer to: 2006-003JAN.DOC

September 22, 2006

Mr. Howard Kass
NASA Headquarters
Facilities Engineering and
Real Property Division
NASA Mail
Washington, DC 20546

Subject: Finding of No Significant Impact (FONSI) for the Final Environmental Assessment for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory

Mr. Howard Kass,

Enclosed is a copy of the signed Finding of No Significant Impact (FONSI) for the EA for the Flight Projects Center at JPL, as requested.

Please feel free to call me at (818) 354-8634 or Charles Buril at (818) 354-0180, if you have any questions.

Sincerely,

Judith A. Novelly, NEPA Program Manager
Environmental Affairs Program Office

ARTICLE
7160 3901 9842 9619 5316
NUMBER

LINE 1•

Mr. Howard Kass
NASA Headquarters
Facilities Engineering and Real
Property Division
NASA Mail
Washington, D.C. 20546

Pouch mail

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REFERENCE: Mailed 9/22/06 R.O. Ref: 2006-003 JAN.doc

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTICE : JPL Document Number – CL#06-2110

National Environmental Policy Act; Environmental Assessment (EA) for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory

AGENCY: NASA Jet Propulsion Laboratory

ACTION: Finding of no significant impact

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA policy and procedures (14 CFR Part 1216, Subpart 1216.3), NASA has made a finding of no significant impact (FONSI) with respect to the proposed construction and operation of a Flight Projects Center (FPC) at the Jet Propulsion Laboratory (JPL) facility in Los Angeles County, California. The proposed FPC (Building 321) would be constructed on the existing site of Buildings 261, 278 and 311, which would be demolished. The proposed building would be approximately 17,000 square meters (180,000 square feet) in area within a footprint area of approximately 3,013 square meters (32,432 square feet).

On the basis of the EA for the proposed construction and operation of the FPC at the JPL and underlying reference documents, NASA has determined that the environmental impacts associated with the proposed action will not individually or cumulatively have a significant effect on the quality of the human environment. Therefore, an environmental impact statement is not required.

FOR FURTHER INFORMATION CONTACT: Mr. Peter Robles
NASA Management Office,
Jet Propulsion Laboratory,
M/S 180/801
4800 Oak Grove Drive
Pasadena, CA 91109
818-393-2920

SUPPLEMENTAL INFORMATION: NASA has reviewed the EA prepared for construction and operation of the FPC at the JPL and determined that it presents an accurate and adequate analysis of the scope and level of associated environmental impacts. NASA hereby incorporates the EA by reference in this FONSI.

NASA is proposing to construct and operate a Flight Projects Center within the JPL boundary. The building would consist of a one-story Project Review Center attached to a multi-story office tower of approximately 17,000 square meters (180,000 square feet). The building would be constructed on the existing site of three buildings, which would be demolished.

The purpose and need for the proposed action is to provide, in a cost-effective manner, a setting for the efficient and cost-effective development of space flight projects and the management of those projects during the development phases of the projects. The collocation (locating in the same office, building or closely spaced group of buildings) of key personnel and technical facilities is needed to increase project development efficiency, enhance communications by providing increased opportunities for face-to-face communications, provide a true teaming environment, enhance quicker and more efficient dissemination of lessons learned among projects, and allow multiple program/project functions to coordinate use of experts and facilities. In addition to locating flight project personnel together, it is critical that the flight project buildings provide shared resources and infrastructure for use during all phases of the flight projects. With such resources and infrastructure, missions can be accomplished more effectively and efficiently.

Alternatives that were considered include (1) use of privately-owned facilities outside the boundaries of the JPL; (2) modification of existing structures at the JPL; (3) use of space at other facilities owned or leased by the United States, and (4) No-Action (i.e., Flight Projects Center would not be constructed). The collocation required in order to satisfy project needs is not only of people, but of people, technical facilities and infrastructure which support flight projects. Tests of space flight hardware and software occur on a frequent and sometimes short-notice basis at buildings and testbeds located at the JPL. Flight Projects staff are involved with these tests on a regular basis. First hand observations allow engineers to fully understand how their analyses are different from the tests that were run. JPL experience has shown that first hand observation of tests is much more valuable than reviewing test results in reports. Frequent observation of tests gives staff the greatest chance of catching and correcting small anomalies before they become large problems to the mission. The time needed to commute to observe such testing from a location outside the borders of the JPL (studies have shown the closest available building that could meet project needs to be 10 miles away from the JPL) would have a significant aggregate impact on the amount of time that staff would be available to perform critical development functions. This would most likely significantly impact the ability of staff to attend meetings, participate in testing, or perform other necessary flight projects functions at the JPL and, therefore, would result in increased risk to flight projects missions. Based on space use studies conducted for NASA, there are no existing buildings at the JPL that could be modified to satisfy the basic criteria needed for

collocating flight project personnel with the requisite office space and support facilities. There are no facilities owned or leased by the United States in close proximity to the Laboratory that can accommodate the office space, conference space, and lecture hall needs specified in the criteria. In order to fully support flight projects, staff must be located in close proximity not only to other staff, but to technical facilities and infrastructure located at the JPL. Relocation of these facilities would be a significant cost impact. Failure to construct the Flight Projects Center would hamper JPL's efforts to increase project development efficiency, enhance communications by providing increased opportunities for face-to-face communications, provide a true teaming environment, speed dissemination of lessons learned among projects, and allow multiple program/project functions to coordinate use of experts and facilities. It would also hamper efforts to provide shared resources and infrastructures for use by all phases of the flight projects.

The EA addresses environmental impacts associated with both construction and operation of the FPC, and identifies potential impacts that may occur during implementation of the proposed action. Overall impacts individually and cumulatively to the human environment are not anticipated to be substantial. Potential impacts of the proposed action discussed in the EA include the following:

Land Resources. The proposed action would not result in a substantial impact to land resources. Normal construction practices would mitigate impacts associated with soil being temporarily exposed during construction. No outstanding geotechnical concerns were identified. The FPC would be built to current earthquake standards

Viewshed. The proposed action would not result in the loss of a significant aesthetic resource and would represent only an intensified urban use of the site. The buildings scheduled for demolition are of no unique aesthetic value. Proposed lighting would not add significantly to the brightness from recurring activities at the site. Implementation of the proposed action would modify views from residences and other areas with the JPL to the east, but these changes would not be significant.

Water Resources. During construction activities, potential erosion and unauthorized spills would be controlled in accordance with best management practices. The proposed action would not substantially alter surface drainage since the majority of the area currently contains buildings or pavement. Operational impacts on stormwater would be insignificant since the FPC would be used for office space only.

Air Resources. The proposed action would not result in a substantial impact to air resources. There would be temporary increases in airborne particulate matter (PM) and emissions during construction, but these would be of short duration and localized. Natural gas boilers proposed for use in the FPC would be operated in compliance with South Coast Air Quality Management (AQMD) rules.

Cultural and Historic Resources. None of the buildings to be demolished is eligible for inclusion in the National Register of Historic Places. NASA/JPL sent a letter to the California State Historic Preservation Office (SHPO) to notify the SHPO of the proposed project and seek concurrence with the conclusion that the proposed action would have no effect on cultural resources. Subpart B of the Section 106 process specifies that "If the SHPO/THPO fails to respond within 30 days of receipt of a request for review of a finding or determination, the agency official may either proceed to the next step in the process based on the finding or determination or consult with the Council in lieu of the SHPO/THPO." The SHPO has not responded to the letter dated July 19, 2005. NASA elects to proceed with the process.

Biotic Resources. The proposed FPC would be within a currently developed site, and no natural or native vegetation areas are immediately adjacent to the site. Removal of trees would not result in a loss of native habitat. Biological Inventories were conducted for the California Gnatcatcher, a threatened species. This species was not identified in the project site and there is no suitable habitat at the site. Some trees on the site may provide nesting habitat to predatory birds. Construction of the FPC would either avoid the nesting season or JPL would conduct a breeding bird survey immediately before tree removal. JPL will coordinate with the U.S. Fish and Wildlife Service to protect nests and comply with the U.S. Migratory Bird Treaty Act.

Floodplains and Wetlands. The proposed FPC would not be in or near a floodplain or wetland area and would not result in substantial impacts to floodplains or wetlands. Construction activities would not impact areas beyond the proposed project site, and operational activities would not release wastewater into the storm drain system.

Waste Management. The proposed FPC would not result in a substantial impact to the amount of hazardous waste generated at the JPL facility. Before demolition, any hazardous material stored in the existing buildings would be relocated to other buildings or transferred to an appropriate permitted disposal facility. During demolition, a certified asbestos removal contractor would remove asbestos-containing material (ACM). Lead paint covered material would be disposed of in accordance with California requirements. Non-hazardous construction debris would be sent to an appropriate landfill. Lighting ballasts would be managed as Universal Waste. The proposed FPC would be used strictly for office space and there would be no operations that handle or manage hazardous materials or waste other than routine janitorial and administrative materials.

Noise. The proposed action would not result in substantial impact regarding noise. There are no noise sensitive uses immediately adjacent to the proposed site. Standard noise abatement equipment and practices would reduce construction noise to normally acceptable levels. Noise associated with operational activities would be similar to noise levels from surrounding facilities, between 40 and 55 dB(A).

Traffic. Construction of the FPC would result in a short-term effect on vehicular traffic during the grading phase. These impacts would be short-term and insignificant. No additional traffic would be generated by the operation of the FPC.

Environmental Justice. Construction and operation of the FPC would not result in a disproportionate or adverse impact to identified low income or minority populations. There are no low-income populations within potentially affected census tracts. Minority populations were found in the potentially affected communities of Altadena and Pasadena. Construction activities would be localized to the construction zone within the secured JPL facility and impacts under the operation of the proposed facility would be localized within the FPC and JPL.

Socioeconomic Impacts. The proposed action would not result in an adverse impact on socioeconomics in the areas surrounding the JPL. The employees who would be located in the Flight Projects Center already work at the JPL. Thus, there would not be a change in employee impact on the local community. There might be a slight increase in impact to the community during construction activities because of additional personnel involved in construction. The additional workers involved in the construction might patronize local businesses, which would have a positive effect on the local economy.

Irreversible and Irretrievable Commitment of Resources. Implementation of the proposed action would include construction within a currently developed site. Construction and operation of the Flight Projects Center would alter the site, portions of which are currently vacant, committing it to another use for the foreseeable future. However, the alteration is not irreversible. NASA, if it chooses, may demolish the proposed building in the future and use the land for some other purpose. The proposed action would not result in substantial impacts associated with the irreversible and irretrievable commitment of resources.

Cumulative Impacts. Recent and future planned development at the JPL has focused on redevelopment of existing buildings and use of already developed areas such that the cumulative impacts of growth and associated impacts on human health and the environment are expected to be insignificant. The construction of the FPC would not have substantial adverse impacts and would not contribute to cumulative impacts.

On the basis of the EA for the proposed construction and operation of the FPC and the JPL and underlying reference documents, NASA has determined that the environmental impacts associated with the proposed action will not individually or cumulatively have a significant effect on the quality of the human environment.

Colleen A. Hartman

for Mary L. Cleave
Associate Administrator for
Science Mission Directorate
Suite 3C26
NASA Headquarters
300 E Street, SW
Washington, DC 20546-0001

FINAL

Environmental Assessment (EA)
For the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, CA 91109

Lead Agency:	NASA
Proposed Action:	Construct a Flight Projects Center at the Jet Propulsion Laboratory.
NASA Point of Contact:	Peter Robles, Jr. GS-819-15, Environmental, Health, Safety and Facility (EHS&F) Manager, NASA Management Office (NMO) – Jet Propulsion Laboratory (JPL), 4800 Oak Grove Drive, Pasadena, CA 91109, (818) 393-2920, Peter.Robles@jpl.nasa.gov
Date:	July 2006

Abstract: NASA is proposing to construct a Flight Projects Center within the JPL boundary. The building would consist of a one-story Project Review Center attached to a multi-story office tower of approximately 17,000 square meters (180,000 square feet). The building would be constructed on the existing site of three buildings, which would be demolished. Construction and operation of this building would meet the need to streamline communications between multiple program/project functions by locating Flight Project staff in the same building. .

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EXECUTIVE SUMMARY

LEAD AGENCY

The National Aeronautics and Space Administration (NASA).

PROPOSED ACTION

NASA is proposing to construct a Flight Projects Center (proposed Building 321) within the Jet Propulsion Laboratory (JPL), which is located on federal land and administrated by NASA. The JPL is adjacent to the cities of Pasadena, Altadena and La Canada/Flintridge, in Los Angeles County, California. The proposed action would be constructed on the existing site of Buildings 261 (Controlled Storage), 278 (Robotics Laboratory), and 311 (Ground Maintenance Storage), which would be demolished. The JPL Flight Projects Center, Building 321, is proposed for construction at the southeast corner of Mariner and Surveyor Roads, on a relatively steep, sloped site. The north portion of the site, at the Mariner and Surveyor Road intersection, would be developed with a one-story, concrete-walled Project Review Center with approximately 400 seats. The Project Review Center would be a lecture hall that would be used for large multi-discipline Flight Project reviews and JPL institutional meetings. To the south of the Project Review Center, along Surveyor Road and north of the Observational Instruments Laboratory (Building 306) would be a multi-story office tower of approximately 17,000 square meters (180,000 square feet). The Project Review Center and the attached office tower would comprise the Flight Projects Center.

SUMMARY

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. § 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions on NEPA (40 CFR Parts 1500-1508), and NASA policy and procedures (14 CFR Part 1216, Subpart 1216.3), NASA is preparing this Environmental Assessment (EA) for the proposed construction and operation of the Flight Projects Center.

The purpose of the project is to provide, in a cost-effective manner, a setting for the efficient and cost-effective development of space flight projects and the management of those projects during the development phases of the projects.

Collocation (location in the same office, building or closely spaced group of buildings) of Flight Project personnel and technical facilities is needed to increase project development efficiency, enhance communications among project development staff by providing increased opportunities for face-to-face communications, provide a true teaming environment, enhance quicker and more efficient dissemination of lessons learned among projects, and allow multiple program/project functions to coordinate use of experts and facilities. Collocation has become particularly challenging in recent years because the Laboratory has shifted from a pattern of completing one large Flight Project approximately every ten years to the current pattern where approximately forty projects are simultaneously moving through various stages of development and operation. Flight Project teams are currently scattered among six buildings across the Oak Grove site. However, upon completion of construction of the Flight Projects Center, flight project teams would be collocated into buildings as follows:

Flight Project Staff Location Based Upon Project Life Cycle

STAGE	PHASE	BUILDING
FORMULATION	Phase A: Mission & Systems Definition	301
	Phase B: Preliminary Design	301
IMPLEMENTATION	*Phase C: Detailed Design*	*Proposed Flight Projects Center*
	Phase D: Build and Test	*Proposed Flight Projects Center*
	Phase E: Operations	230 and 264

Grouping staff together in this manner would facilitate an increase in information exchange between peers who are working on similar aspects of different projects. Thus, lessons learned on any project can benefit many other projects. In the current situation, when a project completes a specific phase and the staff members assigned to that phase are released to work on other

projects, collocation of the new teams usually requires moving staff members from one building to another. Under the proposed re-organization of staff, many times, moving staff members to collocate as a new project would not be required because staff members with the expertise to specialize in a specific phase of the project life cycle, as well as the infrastructure and facilities needed for their work, would already be located in the same building.

Construction and operation of the Flight Projects Center would be expected to reduce the number of project-driven annual personnel moves from 1,100 to 500, while significantly improving inter- and intra-project communications on JPL's approximately 40 ongoing projects.

Scope of the Analysis

Five potential alternatives were identified for review: the proposed project, use of privately-owned facilities, modification of existing structures at the Jet Propulsion Laboratory, use of other facilities owned or leased by the United States, and the no-action alternative,.

The environmental issues assessed in this document are land resources, viewshed, water resources, air resources, cultural resources, biotic resources, floodplains and wetlands, waste management, noise, traffic, environmental justice and socioeconomic impacts. There were no significant adverse impacts identified from the proposed activity with respect to any of the abovementioned resources or issues. An analysis of potential cumulative impacts has shown no significant cumulative impact.

1.0 PURPOSE AND NEED

The NASA mission is "To understand and protect our home planet, to explore the universe and search for life, to inspire the next generation of explorers … as only NASA can." In support of that mission, "JPL's core competency is the end-to-end implementation of unprecedented robotic space and Earth science missions. We do this by developing and integrating world-class capabilities in science, engineering, and technology, in partnership with other organizations and using our hands-on, experienced in-house workforce."

The purpose of the project is to provide, in a cost-effective manner, a setting for the efficient and cost-effective development of space flight projects and the management of those projects during the development phases of the projects.

Collocation (locating in the same office, building or closely spaced group of buildings) and centralization of the flight program and project management functions is vital to the success of JPL missions. The collocation of key personnel and technical facilities is crucial, among other reasons, in order to increase project development efficiency, enhance communications by providing increased opportunities for face-to-face communications, provide a true teaming environment, enhance quicker and more efficient dissemination of lessons learned among projects, and allow multiple program/project functions to coordinate use of experts and facilities. In addition to locating flight project personnel together, it is critical that the flight project buildings provide shared resources and infrastructure for use during all phases of the flight projects. With such resources and infrastructure, missions can be accomplished more effectively and efficiently.

Each NASA project follows the Project Life Cycle, which has five major phases. The "formulation" stage consists of the Mission & Systems Definition Phase (Phase A), and the Preliminary Design Phase of the project (Phase B). After the formulation stage, the flight project enters the "implementation" stage, which consists of the Detailed Design Phase (Phase C), the Build and Test Phase (Phase D), and, finally, the Operations Phase (Phase E). Staffing levels and personnel change when a project moves from the formulation stage into the implementation stage and again when the project enters the operations phase. Phases C and D are typically the most labor-intensive phases of work on a mission. In the past, the JPL completed one large project approximately every 10 years. Relocation of personnel primarily occurred at project inception. As a project moved through the Project Life Cycle, only a few additional people were required to relocate as a project moved through the various phases. Today, approximately forty flight projects are simultaneously moving through various phases of the Project Life Cycle – not

only are there many more projects to manage, but individual project cycle times are dramatically shorter. This results in both a greater number and a higher frequency of personnel moves in order to collocate project teams.

JPL's experience beginning with the Cassini project and more recent spacecraft is that the collocation of project staff significantly increases the chances for success. The relationship between project success and project staff collocation is particularly true for small and medium sized missions, which are now the norm rather than the exception at the JPL. It would be advantageous to missions to have the ability to collocate staff by grouping together those working on the same phases of all missions in order to facilitate communication among, not just one, but many missions. Grouping staff together in this manner would help facilitate an increase in information exchange between peers who are working on similar aspects of different projects. Thus, many projects would benefit from lessons learned on one project.

2.0 ALTERNATIVES

Five alternatives were identified for review. These alternatives are: (1) the proposed action, (2) use of privately-owned facilities outside the boundaries of the JPL, (3) modification of existing structures at the JPL, (4) use of space at other federal facilities and (5) the no-action alternative.

In order to satisfy project needs, alternatives must meet the following minimum criteria:

- Collocation of JPL flight project management and staff in one or more buildings located in close proximity to Buildings 230 (Space Flight Operations), 264 (Space Flight Support) and 301 (Central Engineering). The relative locations of these buildings are shown in Figure 2-1. Close proximity to the technical facilities and mission personnel located in these buildings is required because the need for frequent interactions between staff on a short-notice basis during design, testing and operations of flight projects is an important factor in mission success. During a mission, staff members will frequently cover several aspects of development at once. This has the advantage of allowing experts in the field who have a deep understanding of the issues present in various development aspects to cross-check for potential problems on the spacecraft. However, it also means that individual staff members are extremely time constrained. If such staff members are located more than a few minutes away from other staff members and technical facilities, the time required to travel to and from project reviews, other mission required meetings, and space flight hardware and software tests would have a significant aggregate impact to time available to work on critical development tasks. This would result in an increase in risk to mission success.

  JPL experience has shown that first hand observation of complex tests is significantly more valuable than just looking at test reports after the tests have been completed. First hand observations allow engineers to fully understand how their analyses are different from the tests that were run. They allow managers to get a much better sense of how much risk is associated with planned spacecraft functions and also allow many more highly trained and skilled engineers the opportunity to uncover small problems that could have major ramifications to the success of the overall mission. Frequent observation of tests gives staff the greatest chance of catching and correcting small anomalies before they become large problems to the mission. Many times, a test or other function conducted in Buildings 230, 264, and 301 may span only a few minutes to a few hours in time. Because of enormous time constraints on mission personnel, frequent participation

in and first-hand observation of these tests and other functions is possible only where personnel are located within minutes of the test location.

- Provide office space and conference and support facilities for approximately 600 persons; and
- Provide a lecture hall with a capacity of approximately 400 seats.

2.1 PROPOSED ACTION

This alternative assumes the construction and operation of the Flight Projects Center within the existing JPL (Figure 2-1). As shown in Appendix A, Exhibits 1 and 2, the Flight Projects Center is proposed to be up to six stories in height, with one story below the adjacent street grade (Surveyor and Mariner Roads). The proposed building would be approximately 17,000 square meters (180,000 square feet) in area. Final building designs have not been completed, but the building would be designed to fit within the existing character of the JPL. The building would be designed to achieve a Leadership in Energy and Environmental Design (LEED) Silver Certification, as required by NASA. LEED is a green building rating system developed by the U.S. Green Building Council (USGBC). The LEED system grades buildings based on a variety of factors designed to lessen the potential for adverse impact to the environment in the construction or operation of the building. NASA's newest Construction Best Practices would be followed in order to optimize first and long term costs.

The Flight Projects Center would house approximately 600 personnel currently dispersed throughout the Laboratory. Flight Project teams are currently scattered among six buildings across the Oak Grove site. However, upon completion of construction of the Flight Projects Center, flight project teams would be collocated into buildings as follows:

Flight Project Staff Location Based Upon Project Life Cycle

STAGE	PHASE	BUILDING
FORMULATION	Phase A: Mission & Systems Definition	301
	Phase B: Preliminary Design	301
IMPLEMENTATION	*Phase C: Detailed Design*	*Proposed Flight Projects Center*
	Phase D: Build and Test	*Proposed Flight Projects Center*
	Phase E: Operations	230 and 264

Grouping staff together in this manner would facilitate an increase in information exchange between peers who are working on similar aspects of different projects. Thus, lessons learned on any project can benefit many other projects. In the current situation, when a project completes a specific phase and the staff members assigned to that phase are released to work on other projects, collocation of the new teams usually requires moving staff members from one building to another. Under the proposed re-organization of staff, many times, moving staff members to collocate as a new project would not be required because staff members with the expertise to specialize in a specific phase of the project life cycle, as well as the infrastructure and facilities needed for their work, would already be located in the same building.

Construction and operation of the Flight Projects Center would be expected to reduce the number of project-driven annual personnel moves from 1,100 to 500, while significantly improving inter- and intra-project communications on JPL's approximately 40 ongoing projects. The Flight Projects Center would provide project-dedicated/large conference rooms on each floor, a lecture hall (approximately 400 seats), at least one large meeting room and additional smaller meeting

rooms on each floor. The proposed landscaping would be similar to that along the adjacent streets (Surveyor and Mariner Roads). The Flight Projects Center would utilize existing JPL water and sewer, and other utility systems. No improvements to the existing systems would be required.

The three small buildings currently occupying the site, Buildings 261, 278, and 311 would be demolished prior to construction (Appendix A, Exhibit 3). In addition, the existing landscaping on the project site (Appendix A, Exhibit 4) would be eliminated and replaced with landscaping consistent with Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds memorandum (Federal Register, August 10, 1995) requirements and would be similar to other areas at the JPL. The trees that would be removed as part of the proposed action would be replaced on a 5:1 ration in various locations on the site. The type and location of the replacement trees are currently being determined. The proposed action would begin during 2005 fiscal year (subject to completion of the EA and pre-construction notices) and continue for approximately 24 months.

Six potential building sites were considered prior to selecting the southeast corner of Mariner and Surveyor Roads. In addition to the selected site, consideration was given to the following five locations:

1. West Arroyo parking lot, east of Building 300 (Earth & Space Science Laboratory);
2. Surveyor Road Credit Union site;
3. Oak Grove Drive blue parking lot, west of Building 180 (Administration);
4. Mariner Mall, north of Building 168 (Instruments Systems); and
5. Building 82 (High Vaccuum Laboratory) and 83 (Quality Assurance) replacement.

Site number one is located along the perimeter of the Oak Grove site in a flood plain. Locating the Flight Projects Center at this site would displace parking and would interfere with shipping and receiving traffic on Ring Road. Site two is also along the site perimeter. This site is too small and too far away from Buildings 230, 264, and 301 to provide useful collocation. Site three is not owned by NASA and is not currently for sale. Site four is undeveloped, but is very near the site perimeter and is identified in the JPL Oak Grove Master Plan 2003-2013 as the potential site for a future Visitor and Conference Center. Site five is not on the main development corridor (Mariner Road), but is a sufficiently large site. However, use of this site would displace the approximately ninety people and several laboratories currently located in the

existing buildings so that the buildings could be demolished and the Flight Projects Center constructed.

The proposed site is largely unoccupied, requiring displacement of only fifty-three people and three small buildings. The site is at the geographic center of the Oak Grove site, away from neighbors and along the highest density band of development proposed in both the JPL 1984 Long Range Plan and the JPL Oak Grove Master Plan 2003-2013. By building the proposed building on a sloped site, a scarce resource of flat land is preserved for uses such as parking or development of landscaped green zones. This addition of offices along the preferred "development corridor" would form a project development triangle with Buildings 230, 264 and 301.

The proposed action would satisfy all of the criteria identified in Section 2.0 and, thus, would meet the project purpose and need.

2.2 USE OF PRIVATELY-OWNED FACILITIES OUTSIDE THE BOUNDARIES OF THE JPL

A recent review of available off-site lease space showed that the nearest available office space capable of housing the approximately 600 people proposed to be located in the Flight Projects Center is located approximately 10 miles from the JPL in Glendale, California. Relocation of personnel to an off-site building would require that JPL network infrastructure be extended to the building. In addition, measures would have to be taken to ensure an appropriate level of personnel and data security in an off-site building.

Flight projects staff requires close proximity to on-site technical facilities such as the Spacecraft Assembly Facility (Building 179), the Environmental Test Laboratory (Building 144), the Space Flight Operations Facility (Building 230) and Space Flight Support (Building 264) and the personnel located in these buildings on a frequent, short-notice basis during design, testing and operations of flight projects. Relocation of these facilities would be a significant cost impact. In addition, the program disruption associated with the cessation of activities during relocation would be problematic. For example, a temporary shutdown of the on-site Deep Space Network communication system monitoring would present a chance of project failure. Buildings 230 and 264 operate on a 24-hour, 7-day a week basis and require uninterruptible power supplies and emergency back-up generators. The collocation required in order to satisfy project needs is not only of people, but of people, technical facilities and infrastructure which support flight projects.

Tests of space flight hardware and software occur on a frequent and sometimes short-notice basis at buildings and testbeds located at the JPL. Flight Projects staff are involved with these tests on a regular basis. First hand observations allow engineers to fully understand how their analyses are different from the tests that were run. JPL experience has shown that first hand observation of tests is much more valuable than reviewing test results in reports. Frequent observation of tests gives staff the greatest chance of catching and correcting small anomalies before they become large problems to the mission. The time needed to commute to observe such testing from a location outside the borders of the JPL would have a significant aggregate impact on the amount of time that staff would not be available to perform critical development functions. This would most likely significantly impact the ability of staff to attend meetings, participate in testing, or perform other necessary flight projects functions at the JPL and, therefore, would result in increased risk to flight projects missions.

This alternative does not satisfy the project purpose or needs, therefore, it was not evaluated in detail.

2.3 REHABILITATION AND ADDITION TO EXISTING JPL BUILDINGS

The rehabilitation and addition to current JPL facilities was also considered as an alternative to the proposed action. Under this alternative, the Flight Projects Center would not be constructed and operations slated for this building would be conducted within an existing building or buildings within the JPL. Based on space use studies conducted for NASA, there are no existing buildings that could be modified to satisfy the basic criteria needed for collocating flight project personnel with the requisite office space and support facilities.

This alternative does not satisfy the project purpose or needs, therefore, it was not evaluated in detail.

2.4 USE OF OTHER FACILITIES OWNED OR LEASED BY THE UNITED STATES

There are no federal facilities located in close proximity to the Laboratory that can accommodate the office space, conference space, and lecture hall needs specified in the criteria. As previously mentioned, flight projects staff requires close proximity to on-site technical facilities such as the Spacecraft Assembly Facility (Building 179), the Environmental Test Laboratory (Building 144), the Space Flight Operations Facility (Building 230) and Space Flight Support (Building 264) on a regular basis during design, testing and operations portions of flight projects. Buildings 230 and 264 operate on a 24-hour, 7-day a week basis and require uninterruptible power supplies and emergency back-up generators. The collocation required in order to satisfy project needs is not

only of people, but of people and technical facilities and infrastructure which support flight projects. Relocation of these facilities would be a significant cost impact. In addition, the program disruption associated with the cessation of activities during relocation would be problematic. For example, a temporary shutdown of the on-site Deep Space Network communication system monitoring would present a chance of project failure. This alternative does not meet the project's needs. Therefore, this alternative was eliminated from further consideration.

2.5 NO ACTION

This alternative assumes that the Flight Projects Center would not be constructed. Operations and personnel slated for the Flight Projects Center would continue to be dispersed throughout the JPL and operate without having a centralized facility.

The inability to collocate and centralize the Flight Program/Project Management functions would hamper JPL's efforts to increase project development efficiency, enhance communications by providing increased opportunities for face-to-face communications, provide a true teaming environment, speed dissemination of lessons learned among projects, and allow multiple program/project functions to coordinate use of experts and facilities. It would also hamper efforts to provide shared resources and infrastructure for use by all phases of the flight projects.

This alternative would not satisfy any of the criteria identified in Section 2.0 and, thus, would not meet the project needs.

Jet Propulsion Laboratory

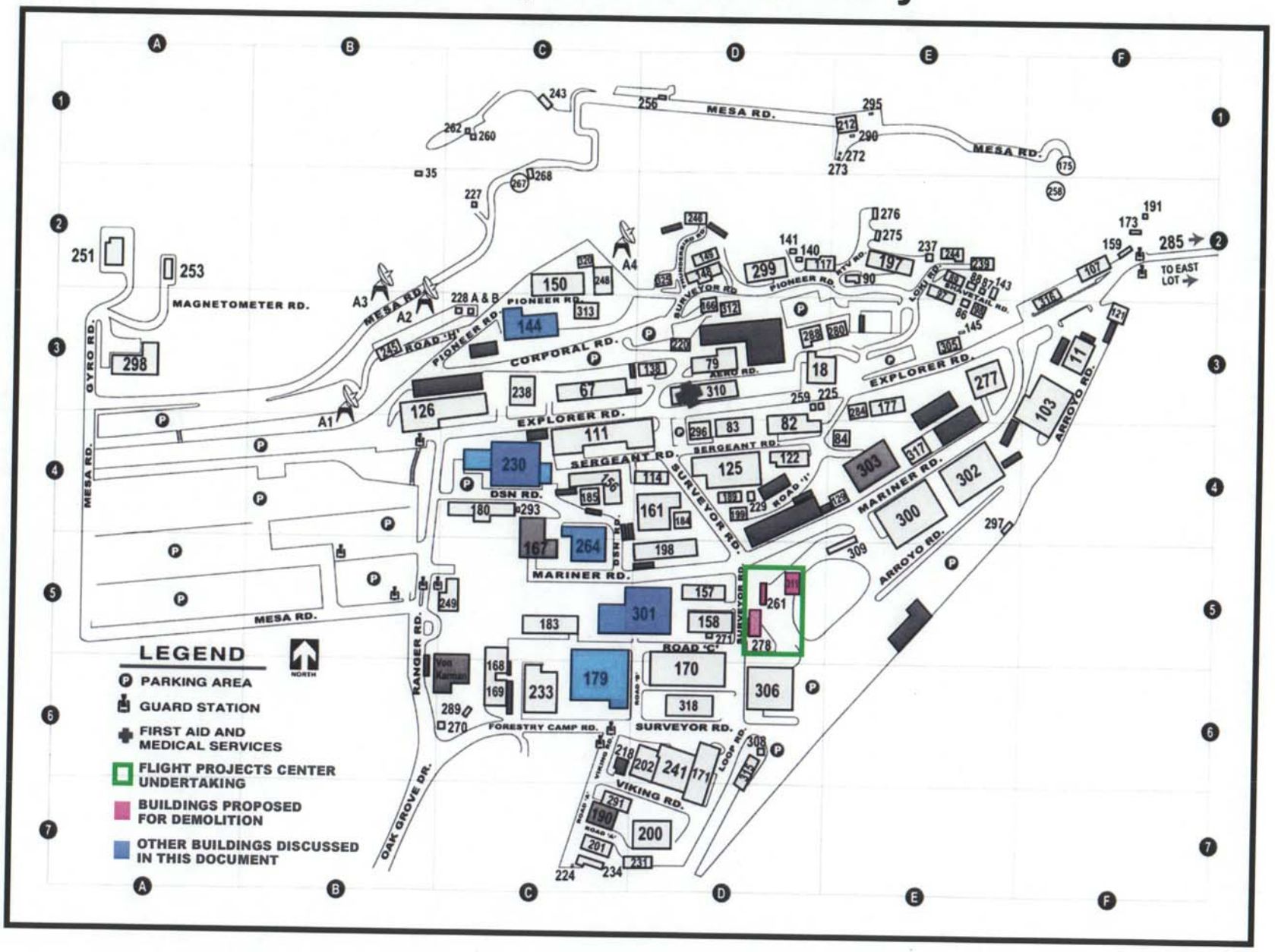

Figure 2- 1

3.0 EXISTING ENVIRONMENT

3.1 JPL FACILITY

The JPL, a research and development facility, is located on 176 acres on the northern edge of the metropolitan Los Angeles area (Appendix A, Exhibit 5). The Laboratory is separated from residential neighborhoods by the foothills of the San Gabriel Mountains to the north and the Arroyo Seco Canyon to the east. There are some residential areas adjacent to the west side of the JPL. The JPL has buildings, paved roads and sidewalks, parking lots, extensive landscaping, and site use designed to be compatible with the surrounding land uses.

About 220 structures and buildings currently occupy the site, of these, about 150 are buildings that are occupied. The remaining structures are unoccupied and are used for storage, maintenance activities and similar functions. A storm drain conveyance system effectively removes storm water from the JPL. Even in the heaviest of rains there are no areas in the JPL where water accumulates for long periods.

There are no federally designated threatened or endangered species, or California designated rare or endangered species known to exist on the JPL site.

JPL was listed on the National Priorities List in 1992 and a Federal Facilities Agreement (FFA) was subsequently entered into by NASA pursuant to Section 120 of CERCLA. Additional information on the CERCLA investigation can be found at http://jplwater.nasa.gov. A Remedial Investigation Report has been completed for the JPL. The investigation has focused on groundwater, soil and soil vapor. However, neither the groundwater, soil nor soil vapor would be an issue of concern for the proposed project. The groundwater is in excess of 100 feet below the ground surface. Similarly, there are no known chemical impacts to the soil located within the proposed building site. In addition, chemicals of concern have not been detected in the soil vapor near the surface of the proposed building site.

For a detailed description of the existing environmental setting at the JPL, please refer to the Environmental Resources Document (ERD) included as Appendix B. The ERD forms a baseline environment description against which the effects of subsequent proposed actions may be judged to determine significance.

3.2 PROPOSED SITE

The proposed site for the Flight Projects Center currently includes Buildings 261, 278, 311 and landscaped areas. The buildings are described as follows:

- Building 261: Controlled Storage, built in 1967, 2,215 square feet (1,445 square feet, useable), single-story used for storage.
- Building 278: Robotics Laboratory built in 1970, 3,279 square feet (2,233 square feet, useable), single-story, used for technical personnel.
- Building 311: Ground Maintenance Facility built in 1994, 4,056 square feet, single-story, used for offices.

The buildings proposed for demolition contain asbestos and lead paint components, which would require special handling. Neither the age of, architecture of nor activities that took place in these buildings would qualify the structures for inclusion on the National Register of Historic Places according to guidance issued by the Advisory Council on Historic Preservation and the National Parks Service (Appendix E). These buildings and surrounding paved areas cover approximately 80 percent of the proposed site.

The landscaped areas are on the steeply sloped north and west perimeter of the proposed site and cover approximately 20 percent of the site. These areas include 13 pine trees, 5 cedar trees, 10 liquidamber trees, 2 eucalyptus trees, 1 oak tree, 1 ornamental plum, 1 loquat tree, 2 strawberry trees, and various ornamental ground covers. With the exception of the one native oak tree, the vegetation on the proposed site is composed of exotic landscaping species. The oak tree located on the project site is not of heritage status, and, due to disease, would not be a good candidate for relocation to another area within the JPL. The May 21, 2001 Geotechnical and Environmental Feasibility Investigation (Report of Geotechnical Investigation for the Proposed Flight Center Building at Jet Propulsion Laboratory) did not identify significant geotechnical or environmental concerns.

4.0 ENVIRONMENTAL CONSEQUENCES

This section describes the potential consequences associated with implementing each alternative that would meet project purpose and need.

In consideration of the proposed action, both short-term and long-term impacts were evaluated. The short-term impacts would occur during the construction phase and include the demolition of Buildings 261, 278, and 311 and the removal of the landscaped slope along the north and west perimeter of the proposed site. This phase is expected to occur over a 24-month period. The long-term or operational impacts would last throughout the lifetime of the building, and result from the proposed operations to be conducted within the Flight Projects Center.

4.1 LAND RESOURCES

The JPL is located at the southwestern base of the San Gabriel Mountains. The northernmost portion of the site is mountainous and is topped by a narrow, level ridge which has been developed for radar testing. The remainder of the site slopes moderately and has been graded and developed extensively. The developed portion of the site is covered by buildings, paved roads, sidewalks, parking lots and introduced landscaping.

JPL is bordered by the Angeles National Forest to the north and the Arroyo Seco, an intermittent river bed to the east. The Arroyo Seco is currently used for flood control, spreading basins and recreational activities such as hiking and horseback riding. The low-density, single-family residential area of La Canada runs along JPL's western boundary. Two horseback riding clubs, the Hahamongna Park and a Los Angeles County Fire Department facility are located to the south.

4.1.1 Proposed Action

The potential effect of the proposed action on land resources was assessed. The surface soils would be exposed to potential erosion and runoff during construction. Best management construction practices of wetting dry soil and controlling surface water drainage would mitigate impacts associated with soil temporarily exposed to wind and water erosion. The construction phase of the proposed project would require excavating and regrading the area underneath Buildings 261, 278, and 311. Hazardous materials encountered during excavation would be cleared and disposed of in accordance with existing Federal and State laws and the FFA. Construction would be conducted in accordance with best management practices. Refer to section 4.8 Waste Management, for a detailed discussion on hazardous materials.

A Geotechnical and Environmental Feasibility Investigation Report has been completed. This document provides geologic data as well as an environmental assessment for the construction site. There were no outstanding concerns noted in this Report. The Flight Projects Center would be built to current earthquake standards.

This alternative would not result in a significant adverse impact to the land resources within the JPL nor would it have any effect on land resources located beyond the boundaries of the JPL.

4.1.2 No Action

The potential effect of the no action alternative on land resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the same configuration that currently exists. Therefore, this alternative would not result in any impact to the land resources within the JPL.

4.2 VIEWSHED

JPL is situated at the southwestern base of the San Gabriel Mountains and is a prominent feature from the surrounding area. The top of the mesa at the northern edge of the JPL lies approximately 60.96 meters (200 feet) above the more heavily developed part of the Laboratory. The steep slope that lies between the mesa and the more heavily developed part of the JPL is covered with approximately 26.30 hectares (65 acres) of native chapparal, coastal scrub, oak woodland, some introduced plants and mowed firebreaks. The northern foothills of the Angeles National Forest lie beyond the northern border of the JPL. The Arroyo Seco, which runs along the eastern edge of the JPL, is typically a dry river bed but contains water during periods of heavy rainfall. The Arroyo Seco has been partially developed with the addition of a parking lot, spreading basins, a water treatment plant, and recreational facilities such as hiking and horseback riding trails and a softball field. The area immediately south of the JPL has two riding clubs and a Los Angeles County Fire Department facility. The La Canada high school, Hahamongna Park, and the 210 freeway are further to the south. The eastern boundary of the JPL is adjacent to the residential community of La Canada.

The mesa ridge portion of the JPL contains several small buildings and antennas. The lower, more developed portion of the JPL has a mix of one to two story buildings and larger, multi-story offices and laboratories. This portion of the JPL is extensively landscaped and has a campus-like appearance.

4.2.1 Proposed Action

The potential effect of the proposed action on viewshed was assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site, within a dense campus-like setting. The JPL includes approximately 220 structures and buildings, of these, approximately 150 are buildings that are occupied. The remaining structures are unoccupied and are used for storage, maintenance activities and similar functions. There are no unique visual features located on the proposed site. Vegetation within the proposed project site consists of ornamental trees and shrubs. Those trees and shrubs would be removed as part of the construction process. However, they would be replaced at a 5:1 ratio elsewhere on the JPL. The specific location of these replacement trees has not been determined at this time. The area surrounding the Flight Projects Center would be landscaped after construction. The buildings scheduled for demolition are of no unique aesthetic value.

Outside the boundaries of the JPL, there are three national landmarks (the David B. Gamble House, Hale Solar Observatory, and the Rose Bowl) and approximately eighty (80) properties listed on the National Register of Historic Places located in Pasadena and neighboring communities. As part of its assessment under Section 106 of the National Historic Preservation Act, NASA has identified the Area of Potential Effect for the proposed project as the JPL. None of these structures are located within the project's area of potential effect as defined for purposes of the National Historic Preservation Act. JPL Buildings 150 (25-foot Space Simulator) and 230 (Space Flight Operations) have also been designated as national landmarks. Both buildings are located within the boundaries of the JPL and hence, the project's area of potential effect. However, NASA has determined that the proposed project would not affect either building.

Buildings currently located within the proposed location that would be demolished to make way for the Flight Projects Center are not greater than two stories in height. The proposed Flight Projects Center would be up to six stories in height, plus one story below grade. Therefore, up to six stories would be above street grade. This would make it similar in height to Building 157 (5 stories) which is located directly to the west of the proposed location and Building 306 (5 stories) which is located south of the proposed location. The view of the mountains to the north of the JPL from areas surrounding the JPL would not be affected by the construction and operation of the Flight Projects Center. Final building designs have not been completed at this time, but the proposed Flight Projects Center is anticipated to be of similar design to current buildings within the JPL. Proposed building plans are provided in Appendix A, Exhibits 1 and 2. The lighting associated with the new building would be similar to the existing lighting throughout the JPL and would not add significantly to the brightness resulting from activities at the JPL.

Short-term impacts to the existing viewshed would be related to temporary demolition and construction activities. The area would be an active construction site during this time which would detract from the appearance of the site for persons working at the JPL. Long-term visual changes would include an intensified urban appearance from residential areas east of the site across Arroyo Seco Canyon and areas within the JPL immediately adjacent to the project site.

As the proposed action would replace an area with 3 small buildings, asphalt paving in between the buildings, and a steeply sloping bank covered with various ornamental groundcovers, grasses, and non-native trees, it would not result in the loss of a significant aesthetic resource. Therefore, no significant impact would occur to the existing viewshed within the JPL or surrounding areas.

4.2.2 No Action

The potential effect of the no action alternative on viewshed was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the same configuration that currently exists. Therefore, this alternative would not result in any impact to the existing viewshed or aesthetic environment within the JPL or surrounding areas.

4.3 WATER RESOURCES

Drainage on the JPL is generally from north to south. Surface water runoff is channeled to one of nine drains to the Arroyo Seco through a storm water system. Storm water runoff is regularly monitored as set forth in the storm water permit for the JPL.

The JPL receives drinking water from the City of Pasadena. This water is pumped into three steel water tanks at the mesa level. Water is then distributed by gravity feed throughout the JPL.

The Arroyo Seco, an intermittent stream that lies along the eastern border of the JPL, carries water during heavy rainfalls. The City of Pasadena operates several spreading basins to recharge the aquifer that ranges from 30.48 to 73.15 meters (100 to 240 feet) below the JPL. This aquifer is part of the Monk Hill sub-basin of the Raymond Basin and provides part of the potable water supply for the surrounding communities of Arcadia, Alhambra, Altadena, La Canada-Flintridge, Pasadena, San Marino and Sierra Madre.

4.3.1 Proposed Action

The potential effect of the proposed action on water resources was assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site. Buildings 261, 278, and 311 would be demolished as part of the proposed action. During construction activities, potential erosion of surface soils and water runoff from the site would be controlled in accordance with best management practices. Construction materials would be stored and handled in a manner that minimizes environmental risks. If a spill does occur, spill containment procedures would be implemented immediately.

The proposed action would result in the relocation of staff from older buildings and trailers to the Flight Projects Center. Since this would not result in any significant increase in the population at the JPL, there would be no significant impact on water resources. There is currently a facility permit for JPL from the Los Angeles County Sanitation Districts to discharge to the Publicly Owned Treatment Works (POTW).

Since there are buildings at the proposed Flight Projects Center site and the majority of the area is paved, the proposed action would not substantially alter surface drainage. JPL's National Pollution Discharge Elimination System (NPDES) permit allows discharge of rainwater and irrigation run-off from the JPL into the Arroyo Seco. The proposed project would include an effective stormwater conveyance system from the site location into the NPDES-permitted stormwater discharge system.

The proposed action would not result in a significant impact to the water resources within the JPL or surrounding areas.

4.3.2 No Action

The potential effect of the no action alternative on water resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing building and trailers throughout the JPL. Under this alternative, the project would retain the existing configuration. Therefore, this alternative would not result in a significant impact to the water resources within the JPL or surrounding areas.

4.4 AIR RESOURCES

The JPL is located within the South Coast Air Basin (SOCAB). USEPA has classified the basin as a non-attainment area for achieving the National Ambient Air Quality Standards (NAAQS)

for suspended particulates (PM_{10} and PM_{25}), nitrogen dioxide (NO_2) and sulfates. The SOCAB has been classified as a serious non-attainment area for carbon monoxide (CO) and an extreme non-attainment area for ozone (O_3). SOCAB is in compliance for the NAAQS allowable ambient concentrations for sulfur dioxide (SO_2) and lead (Pb).

The JPL operates under a permit from the South Coast Air Quality Management District (SCAQMD) which specifies emission limits and other requirements relating to the operation of emission sources such as boilers, emergency generators, and internal combustion engines at the JPL.

4.4.1 Proposed Action

The potential effect of the proposed action on air resources was assessed. Construction activities would be performed in accordance with South Coast Air Quality Management (SCAQMD) rules and regulations and best management construction practices of wetting the construction zone during demolition, grading, excavation and other construction activities. Any impact would be of short duration and localized to the construction area and, therefore, would not be significant.

Depending on the size of the boilers, the natural gas boilers proposed for use during operations at the Flight Projects Center may require a modification to the current site-wide SCAQMD permit. If required, the permit would be modified and the boiler would be operated in compliance with the SCAQMD permit and regulations.

Indoor air quality in the proposed Flight Project Center would be improved relative to the older buildings and trailers where staff are currently located due to the modern High Efficiency Heating, Ventilating and Air Conditioning System that would be used in the Flight Projects Center.

The proposed action would not result in a significant adverse impact on air quality within the JPL or surrounding areas.

4.4.2 No Action

The potential effect of the no action alternative on air resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project would retain the existing configuration. Therefore, this alternative would not result in any impact to the existing air quality within the JPL or surrounding areas.

4.5 CULTURAL RESOURCES

Cultural resources include historic properties, cultural values, and cultural practices. The JPL is extensively developed with few undisturbed areas available for archeological inspection. The hillside between the more developed part of the JPL and the mesa area is the only undisturbed section of the JPL. This hillside is considered too steep to have supported a settlement and, therefore, is not archeologically sensitive. The area adjacent to the Arroyo Seco can be considered potentially sensitive due to the occurrence of archeological sites to the north and south of the JPL. However, a complete Cultural Resources Survey at the JPL near the Arroyo Seco completed in 1993 (McKenna et al. 1993) concluded that no known or recorded archeological resources are located within the boundaries of the JPL.

Outside the boundaries of the JPL, there are three national landmarks (the David B. Gamble House, Hale Solar Observatory, and the Rose Bowl) and approximately eighty (80) properties listed on the National Register of Historic Places located in Pasadena and neighboring communities. Two buildings within the JPL have also been designated as national landmarks. These two buildings, Buildings 150 (Twenty-Five Foot Space Simulator) and 230 (Space Flight Operations Facility), have been designated as national landmarks based on the significance of the operations performed within the buildings during the early years of the American space program.

The communities near the JPL offer a wide range of cultural and recreational facilities. These facilities include the Rose Bowl, the Norton Simon Museum, the Huntington Library and Botanical Gardens, the Descanso Gardens, the Los Angeles Arboretum, and many educational facilities, churches and hospitals.

4.5.1 Proposed Action

The potential effect of the proposed action on cultural resources was assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site. Buildings 261, 278, and 311 would be demolished as part of the proposed action. Building 261 was originally built in 1967 for storage purposes and has not changed in usage. It is a one-story structure with a total square footage of 2,215. Building 278 was originally built in 1970 as a robotics laboratory and has not changed in usage. It is a one-story structure with a total square footage of 3,279. Building 311 was originally built in 1994 for grounds maintenance storage and has not changed in usage. It is a one-story structure with a total square footage of 4,056. These buildings, along with all buildings located at NASA Centers, were assessed for historic significance in 1984 by the National Parks Service as part of a

Man In Space Theme Study. This study evaluated all buildings based on the following general subthemes: A) Technical Foundations before 1958, B) The Effort to Land a Man on the Moon, C) The Exploration of the Planets and Solar System, and D) The Role of Scientific and Communications Satellites. Based on the findings of the study, the three buildings proposed for demolition were not nominated for and have not been designated as National Historic Landmarks. In addition, construction and operation of the Flight Projects Center will not result in the demolition, relocation, or alteration of the exterior nor impact to the interior operations of any other structures in the immediate vicinity of the proposed Flight Projects Center. NASA has obtained concurrence from the California State Historic Preservation Officer (SHPO) with respect to NASA's determinations under section 106 of the National Preservation Act.

There are no known or recorded archeological resources within the JPL, however, there are historic resources within and surrounding the JPL. Although surveys of the JPL have shown no evidence of archeological resources, all construction activities would operate under contracts that would require a stop work order in the unlikely event that any archeological findings are uncovered during subgrade construction activities. There are three national landmarks (David B. Gamble House, Hale Solar Observatory and Rose Bowl) located outside the boundaries of the JPL and approximately eighty (80) properties listed on the National Register of Historic Places located in Pasadena and neighboring communities. However, none of these structures are located within the project's area of potential effect as defined for purposes of the National Historic Preservation Act. JPL Buildings 150 and 230 also have been designated as national landmarks. Both buildings are located within the boundaries of the JPL and hence, the project's area of potential effect. Building 150 is approximately 354.64 meters (1,163.52 feet) from the proposed location for the Flight Projects Center. Building 230 is approximately 254.93 meters (836.38 feet) from the proposed location for the Flight Projects Center. The significance of these buildings is not based upon the physical structure of the building, but rather upon the significance of activities performed within each building during the early days of the American space program. Neither the construction of nor operations in the Flight Projects Center would have an effect on either of these buildings. Therefore, the proposed action would not have any impact on cultural resources within or near the JPL.

NASA has obtained concurrence from the California State Historic Preservation Office (SHPO) with respect to NASA's determinations under section 106 of the National Historic Preservation Act. In summary, NASA has concluded that the Area of Potential Effect for the proposed project is the JPL, that the only historic properties located within the Area of Potential Effect are the two National Landmarks located at the JPL, that the proposed project will not have any effect on

either of those landmarks and that none of the three buildings slated for demolition as part of the proposed undertaking are historic resources eligible for listing on the National Register of Historic Places (Appendix E).

4.5.2 No Action

The potential effect of the no action alternative on cultural resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the existing configuration. Therefore, this alternative would not result in any impact to cultural resources within or near the JPL.

4.6 BIOTIC RESOURCES

The JPL covers 71.22 hectares (176 acres) of land. Approximately 26.30 hectares (65 acres), or 37 percent, of the JPL remains relatively undeveloped. This undeveloped area is on the steep hillside between the more developed part of the JPL and the mesa area. Approximately 12.54 hectares (31 acres) of this undeveloped hillside are native chaparral, 5.26 hectares (13 acres) are coastal scrub, and 3.24 hectares (8 acres) are oak woodland. The remaining area is comprised of mowed firebreaks and non-native or landscape plants. The remainder of the JPL is a heavily developed campus-like setting with extensive landscaping.

A wide range of wildlife has been observed or is likely to be found within the JPL. This includes reptiles, birds (more than 60 bird species were observed during field surveys) and mammals. There are no federally designated threatened or endangered species, or California rare or endangered species known to occur at the JPL. No special-status plants were detected during site surveys.

Two special-status animals, the Cooper's hawk and the sharp-shinned hawk (both California Species of Special Concern), have been observed at the JPL. Four other special-status birds may occur but have not been observed at the JPL. They are the coastal California gnatcatcher, the golden eagle, the Bell's sage sparrow and the American peregrine falcon. The coastal California gnatcatcher is both a California Species of Special Concern and a federally listed endangered species. The golden eagle and Bell's sage sparrow are California Species of Special Concern. The American peregrine falcon is listed as a California endangered species.

Six special-status bat species (pallid bat, fringed myotis, long-eared myotis, small-footed myotis, spotted bat and Townsend's big-eared bat) may occur at the JPL but have not been observed. The Los Angeles pocket mouse also may occur at the JPL but has not been observed.

4.6.1 Proposed Action

The potential effect of the proposed action on biotic resources was assessed. Implementation of this alternative would include construction and operation of the Flight Projects Center within a currently developed site, which has dense campus-like setting. The site is located within a moderate pedestrian and vehicular traffic area within the JPL. No natural or native vegetation areas are adjacent to the site. Arroyo Seco Canyon is located approximately 1,500 feet to the east.

The vegetated area within the proposed site is a steeply sloped, irrigated and landscaped area. It includes 13 pine trees, 5 cedar trees, 10 liquidamber trees, 2 eucalyptus trees, 1 oak tree, 1 ornamental plum, 1 loquat tree, 2 strawberry trees, and various species of ornamental shrubs and ground cover. With the exception of one native oak, the vegetation on the site is composed of exotic landscaping species. JPL has contacted the Los Angeles County Fire Department (LACFD)-Forestry Division regarding the oak tree removal and relocation (Los Angeles County Title 22, Section 22.56.2060). The LACFD is the agency which enforces oak tree regulations in Los Angeles County. Their recommendation, based on a site visit, is that since the tree is damaged and infected, its removal would not be a concern (Appendix E). The other trees that would be removed as part of the proposed action would be replaced with other trees to be planted in various locations on the JPL. JPL has decided to replace the trees on a 5:1 ratio and the number of trees to be removed would not be greater than 35. Thus up to 175 new trees would be planted throughout the JPL to replace trees removed from the project site. The type and location of the replacement trees are currently being determined by JPL.

A facility-wide Biological Resources Inventory (BRI) was completed in September 2001 which provided a facility-wide general biological survey, a literature search, and a focused survey and habitat evaluation for two listed species: 1) the Southwestern Arroyo Toad, an endangered species, and 2) the California Gnatcatcher, a threatened species (Appendix D). There have been no significant changes in the environment or ecology at the JPL or in the surrounding area that would cause significant change in species present or biodiversification since the 2001 Biological Resources Inventory. The general biological survey found no endangered or threatened species on the site. At the time of the survey, the JPL was within the proposed critical habitat for the Arroyo Toad. In April 2005, when the critical habitat was finalized by the U.S. Fish and

Wildlife Service, the JPL was not included in the designated critical habitat. No Gnatcatchers were noted during any of the nine days of field surveys conducted. However, about four acres of habitat of the type preferred by the gnatcatcher is present in the native chaparral which lies approximately 395 meters (1,295.93 feet) from the proposed project site on the hillsides along the northern side of the JPL. Although no California gnatcatchers were observed at the JPL during the biological survey, a significant population of California gnatcatchers is known to exist in the Montebello Hills approximately 20 miles south of the JPL. Individual birds from that population or other populations could pass through or migrate to the habitat observed at the JPL. The proposed project site is not located within the habitat identified at the JPL, nor would any of the activities associated with the construction or operation of the Flight Projects Building result in the destruction or loss of any of the identified habitat.

A site specific nesting survey (Appendix C), completed on June 7, 2001, found that the large mature trees on the site appear to provide nesting habitat for birds, possibly including predatory birds (raptors). Four of the five nests observed at the time of the survey were potentially active nests. To ensure that no nestlings or fledglings that may be present in active nests are lost as a result of construction, the optimal time for tree removal would be during the non-breeding season. However, if tree removal activities are conducted during the nesting season, JPL would consult with a qualified biologist to conduct a breeding bird survey immediately prior to the trees being cut. If the biologist finds active nests in the trees, JPL would coordinate with the U.S. Fish and Wildlife Service to protect the nests and to comply applicable laws and regulations. Removal of the trees would not result in a loss of native habitat.

Because removed trees would be replaced elsewhere on the JPL at a 5:1 ratio, the proposed project would not adversely affect the number of trees available to nesting birds. In addition, care would be taken not to impact any nesting raptors.

For the reasons stated above, the proposed action would not result in a significant impact to the biotic resources within or adjacent to the JPL.

4.6.2 No Action

The potential effect of the no action alternative on biotic resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the existing configuration. None of the existing

ornamental vegetation would be removed. Therefore, this alternative would not result in any impact to the biotic resources within the JPL.

4.7 FLOODPLAINS AND WETLANDS

There are no areas within the JPL that qualify as "wetlands" for purposes of any federal or state law or regulation.

The Arroyo Seco is a floodplain. The County of Los Angeles Department of Public Works owns and operates Devil's Gate Dam. The elevation of the top of the dam parapet wall and the flood control easement is at an elevation of 327.66 meters (1,075 feet) mean sea level (msl). The JPL ranges in elevation from 327.66 meters to 472.44 meters (1,075 to 1,550) msl, and, therefore, is above the expected maximum flood water level.

4.7.1 Proposed Action

The potential effect of the proposed action on floodplains and wetlands was assessed. The proposed Flight Projects Center would not be in or near a flood plain or wetland area. JPL has assessed its vulnerability to flooding due to a 100-year and 50-year maximum rainfall event. Additionally, studies by the City of Pasadena have determined that the maximum flood plain elevation is 327.66 meters (1,075 feet) msl with the spillway gates of the Devils Gate Dam open. The elevation of the proposed Flight Projects Center is 342.90 meters (1,125 feet) msl.[1] Construction activities would be local and would not impact areas beyond the proposed project site.

Most of the JPL is covered with buildings, paving, and introduced landscaping. An effective stormwater conveyance system channels rainwater from the JPL streets into the Arroyo Seco in compliance with JPL's NPDES permit. Due to topography, the natural flow is away from the JPL. Consequently, there are no areas within the JPL where water collects, even in the heaviest of rainfall events. The Arroyo Seco is an intermittent stream which flows after heavy rains during the rainy season. However, the proposed Flight Projects Center is not located near the Arroyo Seco. There would be no possibility of inundation by flood at the proposed project site.

The proposed action would not result in a significant impact to flood plains or wetlands.

[1] Pasadena Quadrangle, Los Angeles County, California 7.5-minute series, USGS, De Lorme 1999.

4.7.2 No Action

The potential effect of the no action alternative on floodplains and wetlands was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the existing configuration. Therefore, this alternative would not result in any impact to flood plains or wetlands.

4.8 WASTE MANAGEMENT

The JPL generates 1,000 kilograms or more of a variety of hazardous waste per month in the course of its task of research and development and for overall laboratory maintenance. This qualifies the JPL as a large quantity generator. These wastes are managed through the JPL Hazardous Waste Program according to all Federal, State and Local regulations. Wastes are moved from the point of generation to JPL's Hazardous Waste Storage Facility, where they are temporarily stored (up to 90 days) prior to transport by a licensed hazardous waste hauler to permitted hazardous waste disposal or recycling facilities.

Non-hazardous solid waste (garbage) is collected in bins and barrels and disposed of by a licensed disposal contractor. Non-hazardous materials such as scrap metal, white paper, precious metals, toner cartridges and cardboard are recovered and recycled.

4.8.1 Proposed Action

The potential effect of the proposed action on waste management was assessed. Asbestos and lead paint assessments from the JPL Occupational Safety Program Office database would be provided to the construction contractor at bid time. This is provided in the form of the Asbestos Notification report, which identifies JPL buildings with asbestos containing materials and possible asbestos containing materials. Demolition elements such as buildings, electrical and plumbing utilities, landscape, and hardscape are identified on drawings and in specifications and would be included as part of the bid package. The construction contractor would be required to provide a plan for execution of abatement and demolition work. Preparation of required permits and notifications would be the responsibility of the construction contractor. However, all permit applications, notifications and communications with any regulatory agency would be coordinated with the JPL Environmental Affairs Program Office. Oversight and inspection of abatement and demolition work would be carried out by a combination of site personnel and contracted professional companies.

The demolition of Buildings 261, 278, and 311 would involve the removal of asbestos containing material and lead paint components (Appendix F). Asbestos containing materials would be removed by a certified asbestos removal contractor prior to demolition and disposed of at a landfill that is engineered and permitted to accept asbestos containing materials. In accordance with California requirements, lead paint-covered material where the paint is adequately bonded to the substrate would be disposed of as non-hazardous. Peeling or cracking paint would be removed from the substrate and managed as hazardous waste. Non-hazardous construction debris would be sent to an appropriate landfill. Lighting ballasts would be tested and disposed of in an appropriate permitted disposal facility.

Several of the existing buildings currently store potentially hazardous materials. Building 311 currently houses the ground maintenance activities. These activities would be relocated to other sites within the JPL as part of the proposed action. Prior to demolition activities, any hazardous materials currently being stored at these buildings would either be relocated to the new site or transferred off-site to an appropriate permitted disposal facility.

The proposed Flight Projects Center would be used strictly for office space. There would not be operations that handle or manage hazardous materials or waste, other than routine janitorial and administrative materials.

The proposed action would not result in a significant impact to the generation, handling or disposal of solid wastes and hazardous materials, including hazardous waste.

4.8.2 No Action

The potential effect of the no action alternative on waste management was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Under this alternative, the project site would retain the existing configuration. Therefore, this alternative would not result in any impact to the generation and management of any materials, including wastes at the JPL.

4.9 NOISE

The JPL is surrounded by open space areas along most of the north, east and south borders. The residential community of La Canada-Flintridge is located along the eastern JPL boundary. The residential communities of Altadena and Pasadena are east of the JPL across the Arroyo Seco.

The closest residential area to the JPL is to the west along Viro Road. Employee traffic during peak work periods is the major source of noise for these receptors.

Noise-producing sources such as diesel backup generators and various experiments are generally located inside buildings to control noise levels. The generators are muffled so that the units are inaudible at off-site receptors. Other noise sources, such as cooling towers, building air conditioners, fans and pumping stations contribute to background levels, which have been measured at the western edge of the site as between 43 and 60 dBA (equivalent to a small aircraft flyover) during daytime hours.

4.9.1 Proposed Action

The potential effect of the proposed action on noise was assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site. Buildings 261, 278, and 311 would be demolished as part of the proposed action. There are no noise sensitive uses immediately adjacent to the proposed site.

Short-term impacts would include those associated with demolition and construction activities. The noise strength of construction equipment ranges widely as a function of the equipment used and can range from 80 to 95 dB(A). Heavy equipment noise typically ranges up to about 90 dB(A) at 50 feet from the source. Best management construction practices would be implemented to protect workers as well as the local population at the JPL. These best management practices include, but are not limited to the following:

- The perimeter of the construction site would be cordoned off to prevent unrestricted entry.
- Signs would be posted notifying workers of the requirement for ear protection.

Standard noise abatement equipment and practices required for construction activities within the JPL would reduce noise to normally acceptable levels. The JPL standard conditions for construction contracts state that "Neither the Contractor nor any of its subcontractors shall operate or allow to be operated, any noise-producing equipment between the hours of 9:00 p.m. and 7:00 a.m. without specific prior written permission of JPL." The contractor would be required to submit a Health and Safety Plan, which would include noise-reduction plans and hearing protection measures, to the JPL Occupational Safety Program Office for approval before starting work.

Noise associated with operational activities would be similar to noise levels from surrounding facilities, between 40 and 55 dB(A).

Therefore, the proposed action would not result in significant noise impacts for receptors located within or beyond the boundaries of the JPL.

4.9.2 No Action

The potential effect of the no action alternative on noise was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers located throughout the JPL. Under, this alternative, no construction activities would occur and no change in the existing noise environment would occur. Therefore, this alternative would not result in any noise impact regarding noise within the JPL.

4.10 TRAFFIC

Transportation to and from the JPL is mainly by automobile, although bus, truck, bicycle and foot traffic also are used. The JPL has three major vehicular traffic routes. They are: (1) Foothill Freeway (I-210) to Berkshire Place Avenue/Oak Grove Drive interchange to the Oak Grove Drive entrance (the main entrance to JPL); (2) Foothill Boulevard to the Oak Grove Drive entrance; (3) Foothill Freeway (I-210) to Windsor Avenue Interchange to Windsor Avenue, to the east gate entrance.

Berkshire Place is a four-land road with no parking. Oak Grove Drive is a four-lane road with no parking, limited sidewalks and a bicycle lane. Foothill Boulevard is a four-lane road with limited parking and Windsor Avenue is a two-lane road with limited parking. Traffic congestion (due to two private high schools, a public high school, an elementary school, and the JPL being in the same vicinity) is common on weekday mornings on Foothill Boulevard between Crown Avenue and Oak Grove Drive. Periodic traffic congestion at the gates to the JPL occurs during high-profile media events, during high security times and when visitors and deliveries mix with employees entering the JPL. Site access and on-site parking are limited, so on-site traffic is low.

4.10.1 Proposed Action

The potential effect of the proposed action on traffic was assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site. Construction of the proposed Flight Projects Center would result

in a small increase in the number of trucks and other construction vehicles that enter and exit the JPL as part of the normal operation of the JPL. There would also be limited, short-term impacts to traffic flow within the JPL in the area immediately surrounding the proposed project site to allow for delivery of construction materials and movement of construction vehicles. The construction contractor would be responsible for providing traffic control for both vehicle and pedestrian traffic when the normal traffic pattern is interrupted by construction activities. Traffic would be slightly increased along Oak Grove Road in La Canada and within the JPL during construction. However, these impacts would be short-term and are not expected to be significant.

During the operational phase of the project, the building would house approximately 600 personnel. However, these personnel are currently dispersed in the existing buildings and trailers within the JPL, and therefore, no additional traffic would be generated by the proposed action.

Therefore, the proposed action would not result in a significant impact on existing traffic within the JPL or surrounding areas.

4.10.2 No Action

The potential effect of the no action alternative on traffic was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Therefore, this alternative would not result in any impact to the existing traffic within the JPL or surrounding areas.

4.11 ENVIRONMENTAL JUSTICE

Environmental justice entails checking for disproportionate or adverse impacts to low-income or minority populations. A screening analysis using data from the U.S. Census Bureau was used to identify low income and minority populations in the surrounding communities of Altadena, Pasadena, and La Canada/Flintridge. The definition of "minority" and "low income" populations was taken from the U.S. Department of Housing and Urban Development (HUD) guidance. The following census tracts, which are within a five-mile radius of the JPL, were used to determine the minority or low income households that could be affected by the proposed action:

- Altadena – Census Tracts 4603.01, 4603.02 and 4610.
- Pasadena – Census Tract 4604.

- La Canada/Flintridge – Census Tracts 4605.01, 4605.02, and 4607.

Minority populations were found in the potentially affected communities of Altadena and Pasadena. However, none were found in the community of La Canada/Flintridge. There were no low-income populations as defined in HUD guidance in the potentially affected census tracts.

Low Income

The definition of "low income populations" is defined by HUD as populations where "50% or greater are low-income individuals." Census data (2000) were reviewed to determine the number of persons from each census tract within a five-mile radius that are low income individuals living below the poverty level.

The total number of people over the age of 18 living below the poverty level was divided by the total number of people in the census tract to obtain the percent of people living in poverty. As shown in Tables 4-4, 4-5, and 4-6, the data demonstrate that low income individuals do reside within the surrounding community. However, the percentages are well below the 50% required to be considered a "low income population," as defined in the HUD Guidelines.

The median household income for the entire City of Altadena is $60,549 (1999). As shown in Table 4-1, two of the three census tracts within a five mile radius of the project site have a median household income that is less than the overall city and one census tract has a greater median household income than the city. The median household income for the City of Pasadena is $46,012 (1999). As shown on Table 4-2 the census tract within a five-mile radius of the project site has a median household income greater than the overall city. The median household income for the City of La Canada/Flintridge is $109,989 (1999). Two of the three census tracts within a five mile radius of the project site have a greater median income than the city, and one tract is below (see Table 4-3).

Table 4-1
Altadena Low Income and Poverty Levels (2000)

Census Tract	Total Population	Median Household Income	Percent of Total Income	Persons Below the Poverty Level
4603.01	4,515	$63,681	105.1%	195 (4.3%)
4603.02	4,303	$42,090	69.5%	256 (5.9%)
4610	6,000	$40,517	66.9%	641 (10.7%)

Table 4-2
Pasadena Low Income and Poverty Levels (2000)

Census Tract	Total Population	Median Household Income	Percent of Total Income	Persons Below the Poverty Level
4604	886	$48,977	106.4%	68 (7.7%)

Table 4-3
La Canada/Flintridge Low Income and Poverty Levels (2000)

Census Tract	Total Population	Median Household Income	Percent of Total Income	Persons Below the Poverty Level
4605.01	5,560	$112,286	102.1%	117 (2.1%)
4605.02	4,430	$100,213	91.1%	103 (2.3%)
4607	5,202	$133,246	121.4%	167 (3.2%)

Minority

The racial classification used by the U.S. Census Bureau generally adheres to the guidelines in Directive 15 issued by the Office of Management and Budget (OMB). The racial categories include: White, Black, American Indian, Eskimo or Aleut, Asian or Pacific Islander, and other. There were no Eskimo or Aleut populations within the project area, and therefore this was not included in the tables. Although the Census Bureau does not consider "Hispanic" a separate race, data demonstrate a percentage of people who consider themselves of Hispanic origin. These individuals are included with the aggregate minority data.

Minority populations in the community census tracts were identified where the aggregate minority populations exceed 50% of the total census tract populations. This definition was chosen because the surrounding potentially affected areas easily exceed 50% of the total population. Potentially affected census tracts within a five-mile radius were evaluated for minority populations. However, only census tracts in Altadena and Pasadena meet the definition of minority population.

Census Tracts 4603.01, 4603.02, 4610, and 4604 would be areas of potential Environmental Justice concern due to minority population.

Table 4-4
Altadena Minority Populations (2000)

Census Tract	Population Total	American Indian	Black	Hispanic	Asian	Total Minority
4603.01	4,515	12 (0.3%)	2,196 (48.6%)	697 (15.4%)	163 (3.6%)	3,068 (68%)
4603.02	4,303	7 (0.2%)	2,251 (52.3%)	1,322 (30.7%)	91 (2.1%)	3,671 (85.3%)
4610	6,000	27 (0.5%)	2,636 (43.9%)	2,512 (41.9%)	191 (3.2%)	5,366 (89.4%)

Table 4-5
Pasadena Minority Populations (2000)

Census Tract	Population Total	American Indian	Black	Hispanic	Asian	Total Minority
4604	886	2 (0.2%)	439 (49.5%)	223 (25.2%)	64 (7.2%)	728 (82.2%)

Table 4-6
La Canada/Flintridge Minority Populations (2000)

Census Tract	Population Total	American Indian	Black	Hispanic	Asian	Total Minority
4605.01	5,560	7 (0.1%)	22 (0.4%)	217 (3.9%)	1,355 (24.4%)	1,601 (28.8%)
4605.02	4,430	5 (0.1%)	0	187 (4.2%)	1,010 (22.8%)	1,202 (27.1%)
4607	5,202	1 (0.01%)	28 (0.5%)	325 (6.2%)	867 (16.7%)	1,221 (25.5%)

4.11.1 Proposed Action

The proposed action was analyzed to determine if implementation of the proposed action would result in disproportionate or adverse impacts on low-income or minority populations were assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within the currently developed JPL. Construction activities associated with the proposed action would be localized to the construction zone, within the secured JPL. Thus, construction impacts would not pose a disproportionate effect on the identified minority populations in the local community.

Impacts under the operation of the proposed building would also be localized within the Flight Projects Center and the JPL. Noise levels would be within the same range as existing operations. There would be no bulk quantities of chemical storage, liquid or gas, within the proposed building, thus eliminating the potential for an accidental release of hazardous material. Air quality permits would be obtained prior to equipment operation.

Therefore, the proposed action would not result in a disproportional or adverse impact to the identified local populations, including low income and/or minority populations.

4.11.2 No Action

The potential effect of the no action alternative on disproportionate or adverse impacts on low-income or minority populations was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL. Therefore, this alternative would not result in a disproportionate

or adverse impact to the identified local populations, including low income and/or minority populations.

4.12 SOCIOECONOMIC IMPACTS

A large percentage of JPL employees live in the Pasadena, La Canada-Flintridge and Glendale areas. Most employees live in Los Angeles County. However, some employees commute from Orange, San Bernardino, Ventura and Riverside Counties. The JPL is open to the public on a limited basis. Employees who eat and shop in the surrounding communities have a positive effect on the income of those communities.

4.12.1 Proposed Action

The potential socioeconomic impacts of the proposed action on socioeconomics were assessed. Implementation of this alternative would include the construction and operation of the Flight Projects Center within the currently developed JPL. The employees who would be located in the Flight Projects Center already work at the JPL. Thus, there would not be a change in employee impact on the local community. There might be a slight increase in impact to the community during construction activities because of additional personnel involved in construction. The additional workers involved in the construction might patronize local businesses, which would have a positive effect on the local economy. Therefore, the proposed action would not result in an adverse impact on socioeconomics in the surrounding areas.

4.12.2 No Action

The potential effect of the no action alternative on socioeconomics was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL, and no changes would occur. Therefore, this alternative would not result in any impact on socioeconomics in the surrounding areas.

4.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

In addition to discussion of specific impacts of the proposed action, the irreversible and irretrievable environmental changes of an action must also be discussed. Examples of irreversible and irretrievable commitment of resources include the following:

- Consumption of natural resources and renewable materials during construction, such as lumber and other building materials, and fossil fuels;

- Consumption of natural, renewable, and non-renewable resources during project operation, such as fossil fuel, electricity, natural gas, and potable water;
- Removal of biological resources, such as special status plants or animals, or cultural resources; and
- Irreversible damage from the potential release of hazardous materials.

4.13.1 Proposed Action

The proposed project was evaluated to determine if any irreversible and irretrievable commitment of resources will occur if the proposed project is implemented. Implementation of this alternative would include the construction and operation of the Flight Projects Center within a currently developed site. Construction and operation of the Flight Projects Center would irreversibly alter the site, portions of which are currently vacant, committing it to another use for the foreseeable future. However, the alteration is not irreversible. NASA, if it chooses, may demolish the proposed building in the future and use the land for some other purpose.

Implementation of the proposed action would also result in the consumption of natural and renewable resources during construction and operation of the Flight Projects Center. The commitment of resources and the levels of consumption associated with this alternative are consistent with, and would represent a very small percentage of, planned future development within the project vicinity. Therefore, commitment of these resources would not result in a significant impact.

Biological resources that would be removed consist of ornamental trees, a small diseased oak tree and shrubs. The trees would be replaced at a ratio of 5:1 elsewhere within the JPL. The nesting habitat for some birds, possibly including predatory birds, may also be removed. None of the natural resources that would be removed is considered threatened or endangered and therefore their removal does not represent a significant impact. No cultural resources would be impacted by the proposed project.

The use of hazardous materials on-site would be limited to fuel and lubricant for construction equipment. As such, this alternative would not present an additional or unacceptable risk or irreversible damage from environmental accidents.

The proposed action would not result in a significant impact associated with the irreversible or irretrievable commitment of resources.

4.13.2 No Action

The potential effect of the no action alternative on irreversible and irretrievable commitment of resources was assessed. This alternative assumes that the operations slated for the proposed Flight Projects Center would continue to be dispersed in the existing buildings and trailers throughout the JPL, and no changes would occur. Therefore, this alternative would not result in any impact associated with the irreversible or irretrievable commitment of resources.

4.14 CUMULATIVE IMPACTS

Cumulative impacts, as defined in the Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.7, refer to the incremental environmental impacts of the proposed action when added to other "past, present, and reasonably foreseeable future actions". This cumulative impacts assessment considers the collective impact of all development and operations on the site of the Jet Propulsion Laboratory from the inception of the JPL to date and future reasonably foreseeable construction projects. Construction projects slated for fiscal year 2007 have not yet entered the design stage. Therefore, evaluation of these sites is based on preliminary information regarding the size, features and location envisioned as of the date of this document. For years following fiscal year 2008, NASA has not even begun the process of considering projects for funding. Therefore, information provided on these potential future projects is only an estimate. All potential future projects discussed in this report are subject to availability of funding. Each project would be subject to a separate NEPA evaluation process.

The JPL was developed over many years, beginning in the early 1940's and continuing to the present. The area that is now the JPL was originally undeveloped fields. These fields were used for experimentation in propulsion, which lead to the construction of a few small shacks and some buried bunkers used to test propellants and other fuels. In 1940, the JPL was acquired by the U.S. Army and construction of permanent/semi-permanent buildings began. Until 1942, only ten buildings/structures, mostly testing enclosures, were at the JPL. In 1942, with the start of activities to support World War II, the first permanent structure described as an engineering building was built. During the remainder of the 1940's, at least 97 additional buildings/structures were constructed. At this time, some of the earlier, temporary or inadequate buildings/structures were replaced with more permanent buildings/structures. During the 1950's, another 60 buildings/structures were completed. Once again, some of these buildings/structures replaced earlier inadequate buildings/structures. During the 1960's, 78 buildings/structures were constructed. Some of these replaced older, outdated buildings/structures. During the period 1970 to 1980, 51 additional buildings/structures were constructed at the site as either new

construction or to replace outdated buildings/structures. In the 1980's, 10 buildings were added to the JPL. From 1990 to current time, an additional 49 buildings/structures have been constructed. A significant number of these buildings/structures were temporary trailer offices. Over the life of JPL, more than 325 buildings/structures have been constructed. Of these, about 220 buildings and structures are still standing, about 150 of which are occupied. The remaining structures are unoccupied and are used for storage, maintenance activities and similar functions.

If funded and approved, the Advanced Interferometry Development & Test Facility would include a large thermal vacuum chamber, an enclosure for the chamber, a high bay clean room, and supporting workspaces. The facility is needed to provide testing for projects of NASA's Navigator Program. The building is currently in the design process. The proposed site is between two buildings on the northern edge of the developed section of the Laboratory. The proposed project's target date for construction is fiscal year 2007.

If funded and approved, the South Gate Security Modifications project would reconfigure the south entrance to the Lab to enhance traffic flow and security by providing a loop to turn traffic, an internal fence around the area, and a change in parking configuration. The areas affected by this project would be within the JPL and are already developed. The proposed project's target date for construction is fiscal year 2008.

If funded and approved, a project to widen and straighten Arroyo Road would change the configuration of the road by making changes to parking spaces, some sidewalks, and the currently paved road in order to make the road easier for trucks to navigate. This proposed project's target date for construction is fiscal year 2008.

If funded and approved, the Software Intensive Systems Facility would provide approximately 11,519.98 square meters (124,000 square feet) of consolidated office and computational laboratory space in a multi-story building. Activities in this building would focus on rapid development of mission software and provide IT laboratories and testbeds for future missions. The proposed location for this building is on the northeast corner of Mariner and Surveyor Roads in an area currently occupied by temporary office trailers. The proposed target date for beginning construction is late in fiscal year 2008.

If funded and approved, the Mariner Road Pedestrian Mall Project would change the section of Mariner Road west of Surveyor Road from a vehicular traffic road to a pedestrian mall. This project would remove the paved road and some ornamental trees and install new paving and landscaping. The proposed target date for construction is fiscal year 2009.

If funded and approved, the Advanced Planetary Systems Facility would provide approximately 9,290.30 square meters (100,000 square feet) of multi-story office space in an already developed area next to the Software Intensive Systems Facility. The proposed target date for construction is fiscal year 2010.

From a cumulative perspective, past development of the Jet Propulsion Laboratory from its initial appearance as undeveloped fields to the urban setting that exists at the current time has been a significant impact. However, the existing footprint of the JPL has been in place for approximately 50 years. Recent and future planned development at the JPL has focused on redevelopment of existing buildings and use of already developed areas such that the cumulative impacts of growth and associated impacts on human health and the environment are expected to be insignificant.

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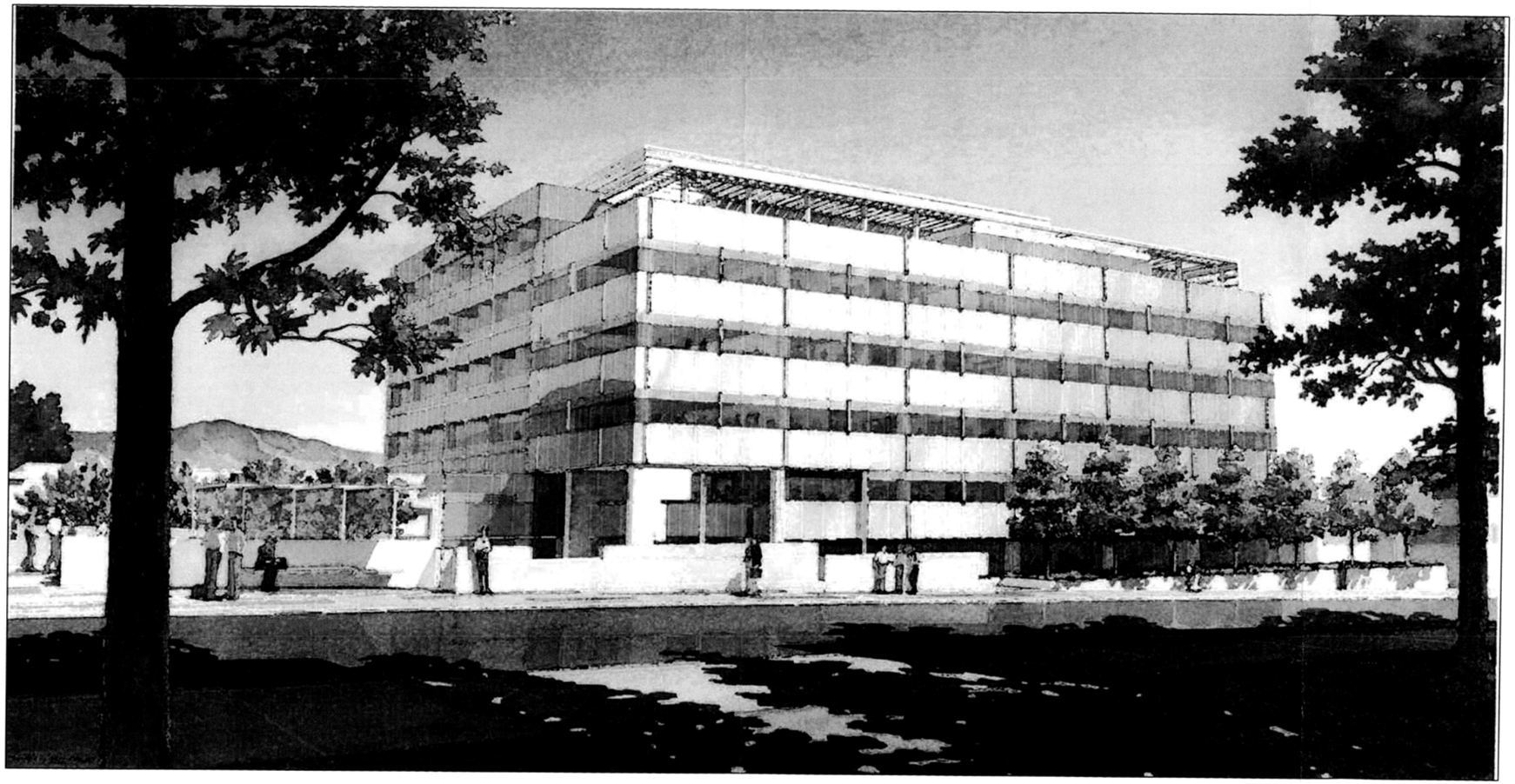
APPENDIX A

Exhibits



JPL FLIGHT PROJECTS CENTER

BRIDGING DOCUMENTS

JANUARY 21, 2005

EXHIBIT 1 - PROPOSED BUILDING PLANS

JOHNSON FAIN
ARCHITECTURE · PLANNING · INTERIORS
A CALIFORNIA CORPORATION

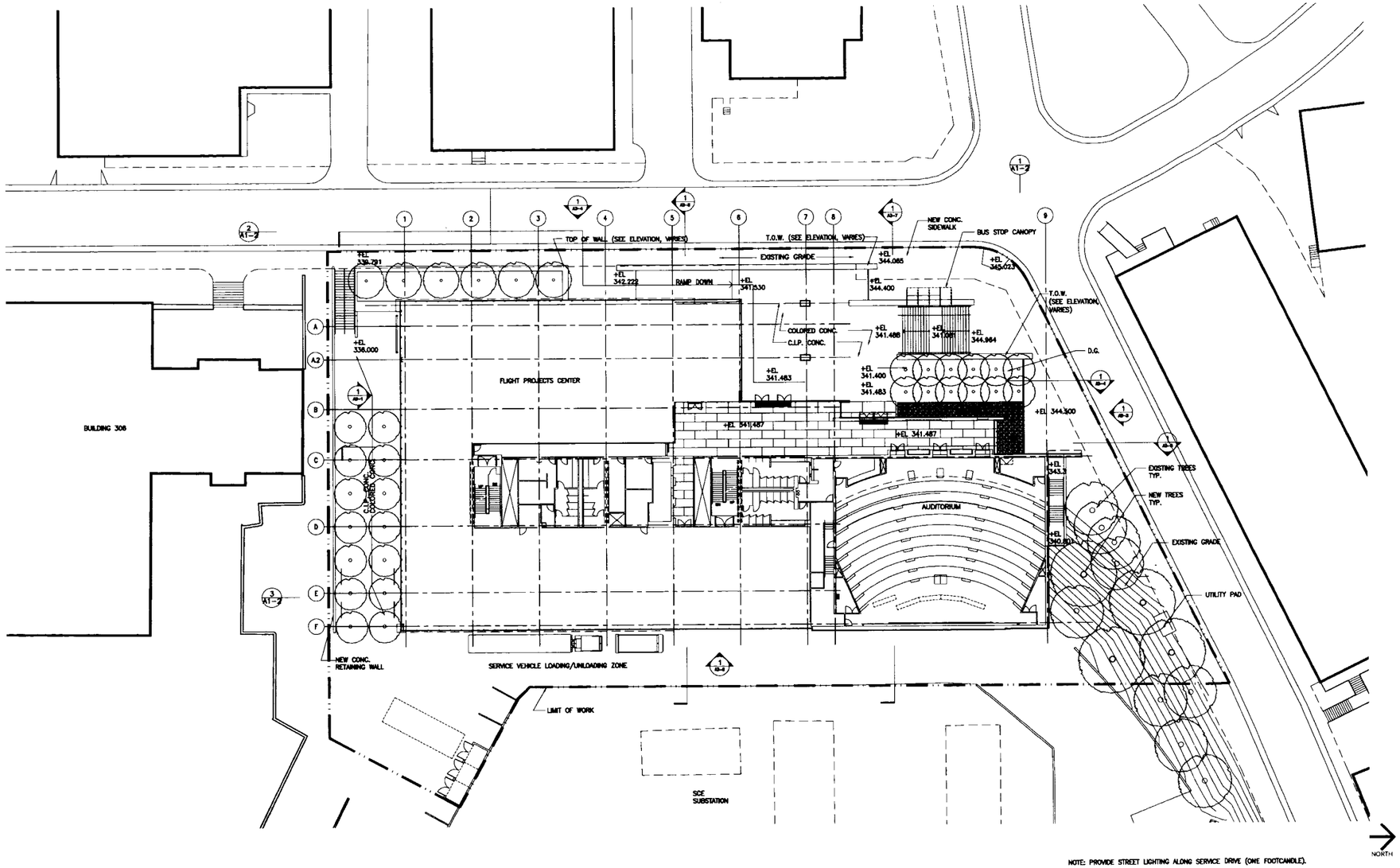
1201 NORTH BROADWAY
LOS ANGELES, CA 90012
TELEPHONE 323.224.6000
FACSIMILE 323.224.6030

REV	DATE	B.R.	DESCRIPTION	ORIG.	PROJ.	P.C.	G.S.	CHK.	QTY	REV.	SHEET
	01/21/05		PRE-DESIGN/BUILD BID PACKAGE								

Jet Propulsion Laboratory
California Institute Of
Technology Facilities Division

JPL FLIGHT PROJECTS CENTER
COVER SHEET

SCALE | SHEET | DRAWING



SITE PLAN

EXHIBIT 2 - PROPOSED BUILDING PLANS

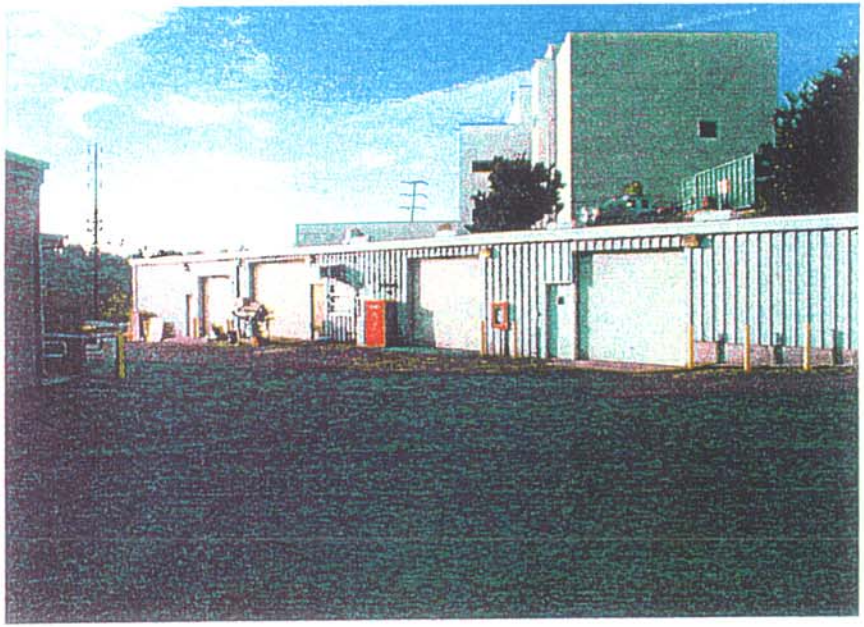
JOHNSON FAIN PARTNERS
ARCHITECTURE · PLANNING · INTERIORS
A CALIFORNIA CORPORATION
800 WILSHIRE BOULEVARD
LOS ANGELES, CA 90017
TELEPHONE 213.623.3500
FACSIMILE 213.623.6532

Jet Propulsion Laboratory
California Institute Of Technology
Facilities Division

JPL FLIGHT PROJECTS CENTER
SITE PLAN

SCALE 1:200 SHEET A1-1

Existing Conditions



Proposed site -
Mariner @ Surveyor

EXHIBIT 4 – EXISTING VEGETATION

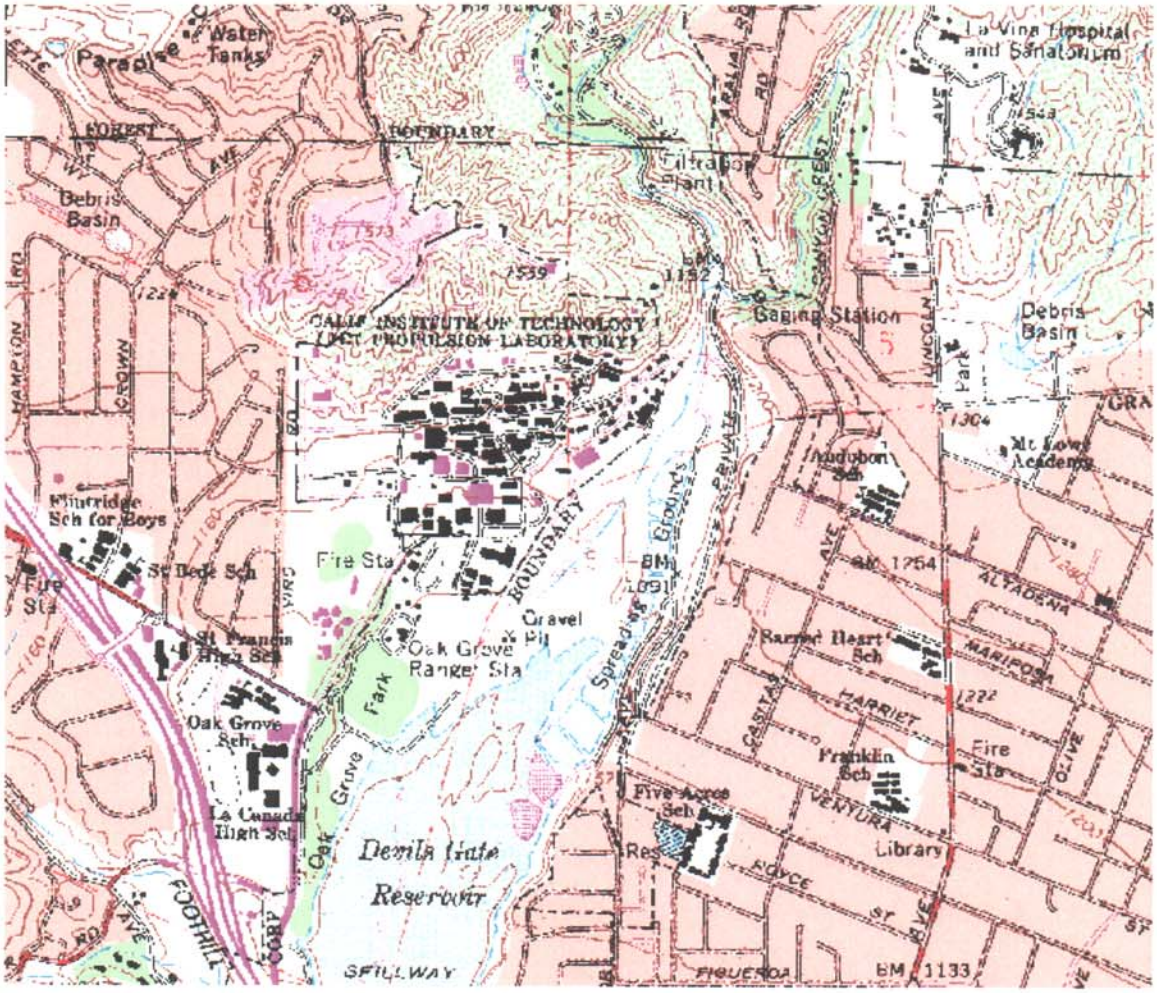


Exhibit 5. Location of the Jet Propulsion Laboratory.

APPENDIX B

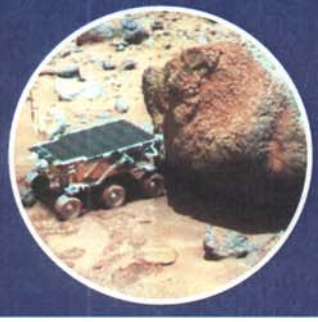
JPL Environmental Resource Document

Environmental Resources Document

Prepared for:
National Aeronautics and Space Administration
Jet Propulsion Laboratory

Prepared by:
Jacobs Engineering Group Inc.

December 2002

ENVIRONMENTAL RESOURCES DOCUMENT

Prepared for:

National Aeronautics and Space Administration
Jet Propulsion Laboratory

Prepared by:

Jacobs Engineering Group Inc.
1111 South Arroyo Parkway
Pasadena, California 91105

December 2002

PREFACE

This Environmental Resources Document (ERD) is meant to be of assistance to the surrounding community, JPL employees, its contractors, and other interested parties in understanding the various environmental issues, programs, and policies in place at JPL as well as those contemplated for the near future (i.e., five-year). The ERD is comprehensive in that it provides a summary of all the major environmental activities, programs, resources, and issues of significance for Jet Propulsion Laboratory Oak Grove Facility (JPL). For more extensive information beyond that presented in the ERD, the reader is directed to the reference section of the report.

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Tables

Figures

ACRONYMS AND ABBREVIATIONS

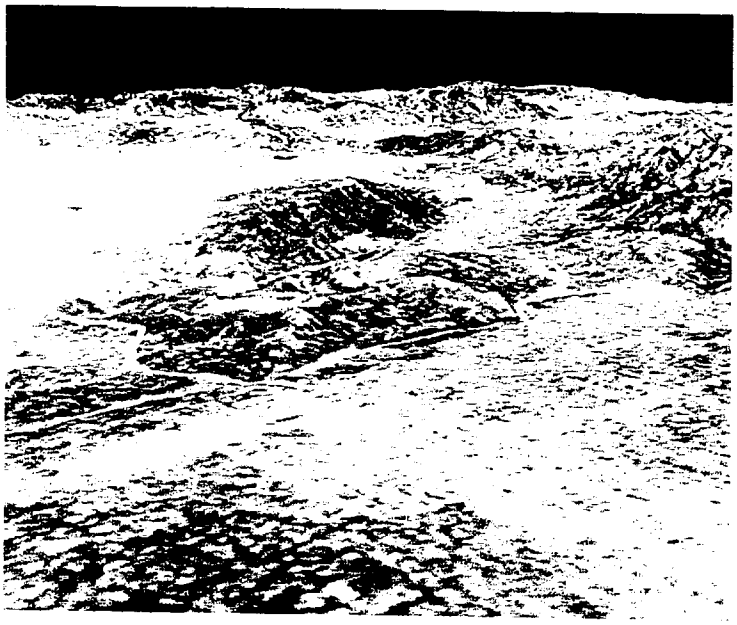
AHM	acutely hazardous materials
AMP	Advanced Microelectronics Program
AQMD	Air Quality Management District
AQMP	Air Quality Management Program
AST	aboveground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
AVR	average vehicle ridership
bgs	below ground surface
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltech	California Institute of Technology
CARB	California Air Resources Board
CATV	cable television
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
ClO_4	perchlorate
CMBC	Circle Mountain Biological Consultants
CO	carbon monoxide
Cr	chromium
CRWQCB	California Regional Water Quality Control Board
dBa	A-weighted decibels
1,2-DCA	1,2-dichloroethane
1,1-DCE	1,1-dichloroethene
DGMUP	Devil's Gate Multi-Use Projects
DTSC	Department of Toxic Substances Control
EAO	Jet Propulsion Laboratory Environmental Affairs Office
EPA	U.S. Environmental Protection Agency
ERD	Environmental Resources Document
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FFRDC	Federally Funded Research and Development Center
Freon 11	trichlorofluoromethane
Freon 113,	1,1,2-trichloro-1,2,2,-trifluorethane
FS	Feasibility Study
gpd	gallons per day
gpm	gallons per minute
HVAC	heating, ventilation and air conditioning
ILAN	Institutional local area network
JPL	Jet Propulsion Laboratory

KV	kilovolts
LACFD	Los Angeles County Fire Department
LOS	level of service
m	meter
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NDMA	n-nitrosodimethylamine
NEPA	National Environmental Policy Act
NMI	NASA Management Instruction
NOx	nitrous oxide(s)
NO_2	nitrogen dioxide
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
O_3	ozone
OSHA	U.S. Occupational Safety and Health Administration
OU	operable unit
PA/SI	Preliminary Assessment/Site Inspection
Pb	lead
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PM_{10}	particulate matter with an aerodynamic diameter < a nominal 10 microns
POTW	publicly owned treatment works
ppm	parts per million
psi	pounds per square inch
PST	Pacific Standard Time
RA	Remedial Action
RD	Remedial Design
RECLAIM	Regional Clean Air Incentive Market
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROG	reactive organic gases
SARA	Superfund Amendments and Reauthorization Act
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SDLAC	Sanitation Districts of Los Angeles County
SIP	State Implementation Plan
SIRTF	Space Infrared Telescope Facility
SOCAB	South Coast Air Basin
SO_2	sulfur dioxide
SO_4	sulfate
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board

TCE	trichloroethene
TSP	total suspended particulates
UCS	utility control system
µg	microgram
UST	underground storage tank
VOC	volatile organic compound

1.0 INTRODUCTION

This Environmental Resources Document (ERD) is specific to the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratory Oak Grove Facility (JPL) and is not required by NEPA or by CEQ regulations. ERD's are addressed in NASA regulations at 14 CFR 1216.319. The regulations require each NASA installation to have an Environmental Resources Document to serve as a succinct baseline description of all environmental aspects of the operations of the installation at the time of its preparation and, in effect, form a "baseline environmental" description against which the effects of subsequent proposed actions may be judged to determine significance.



Satellite Image of JPL

JPL Oak-Grove Facility, encompasses 176 acres, of which approximately 156 acres are federally owned. The remaining land is leased for parking from the City of Pasadena (Pasadena) and the Flintridge Riding Club. JPL is located between the city of La Canada-Flintridge and the unicorporated city of Altadena, near Pasadena, California. JPL comprises about 176 acres of land and more than 150 buildings and other structures. Most of the northern half of JPL is not developed because of steeply sloping terrain. The main developed area is the southern half of the site. This document meets the requirements found in NASA Procedures and Guidelines (NPG) 8580.1. NPG 8580.1 incorporates NASA's policy on Environmental Quality and Control (14 Code of Federal Regulations [CFR] Subpart 1216.1) and Procedures for Implementing the National Environmental Policy Act (NEPA) (14 CFR Subpart 1216.3), which establishes the requirement that all NASA installations prepare an Environmental Resources Document. This ERD for JPL supersedes the previous document, which was prepared in December 1994.

2.0 FACILITY DESCRIPTION

2.1 Location

The Jet Propulsion Laboratory is located on the northern edge of the metropolitan Los Angeles area between northwestern Pasadena and southeastern La Cañada-Flintridge. The laboratory is separated from residential neighborhoods by the foothills of the San Gabriel Mountains to the north and the Arroyo Seco Canyon to the east. The residential neighborhood of La Cañada-Flintridge borders JPL on the west. An equestrian club (Flintridge Riding Club) and a Los Angeles County Fire Department facility lie to the southwest. A U.S. Forest Service Ranger station, La Cañada High School, Hahamongna Watershed Park, and Devil's Gate Dam are farther south.

2.2 Site History

JPL is located within the San Gabriel Valley and is therefore associated with the lands of the Mission San Gabriel de Archangel and the Native American population known as the Gabrielenos. Prior to the Mission days, these Talik-speaking peoples of Shoshonean stock inhabited Southern California. In the 1770s, Spanish padres traversed the Mojave Desert and began establishing a series of missions throughout the area, the lands of which were later reissued by the Mexican government in hopes of establishing settlements. The JPL site extends onto lands that were once part of some of the largest land grants: the Rancho San Rafael (which was later subdivided into the 1876 Rancho La Cañada) and the Rancho San Pasqual, which was first granted by the fathers of the Mission San Gabriel to a housekeeper (1826). The tract of land associated with JPL is within the eastern most portion of the 1876 Rancho La Cañada, and a small portion of the facility extends to the east into the Rancho San Pasqual (McKenna et al. 1993).

La Cañada-Flintridge began with the Spanish land grant of Jose Maria Verdugo, also known as the Rancho San Rafael. After several land transfers, Rancho La Cañada (as it was then known) was sold to Colonel A.W. Williams and Dr. Jacob L. Lanterman in 1876. By 1892, this community had grown to over 50 families. On the other side of the La Cañada Valley, land was purchased by U.S. Senator Frank P. Flint. This land was subdivided and named "Flintridge." In 1976, the cities of La Cañada and Flintridge were incorporated as the city of La Cañada-Flintridge.

The majority of JPL is, however, located within lands not considered part of any rancho, but is situated on lands opened to settlement after the United States acquired California. In 1873 some of this land was sold to the San Gabriel Orange Grove Association, a wealthy colonizing group from Indiana. The sale of this land began the influx of wealthy people from the Midwest and East that resulted in the

affluent community of Pasadena. The area of what is now Altadena was purchased by the Woodbury brothers and P.J. Gano and S.P. Jewet in 1895.

The property now associated with JPL remained undeveloped until the late 1930s. Historic maps show no prior occupation of the JPL area with the exception of impacts of the Mount Lowe railway in 1893 (McKenna et al. 1993). Several years later, in 1940, the Army Air Corps provided funding for the first permanent structures in the area. In July 1940, Caltech and the U. S. Army Air Corps, entered into a contract under which Caltech agreed to study jet propulsion for airplanes. This contract was the first of a series of contracts between Caltech and the United States that span 62 years for research and development work at JPL by Caltech for various government agencies. By 1944, the facility became known as the Jet Propulsion Laboratory. Starting in 1945, the United States began purchasing the parcels of land comprising JPL. By the 1950s, with the exception of a small area leased from Pasadena, the United States owned JPL. In 1958, NASA became the executive agency with administrative responsibility for JPL Today Caltech performs research and development tasks at JPL under a prime contract with NASA.

2.3 Mission/Capabilities

JPL's primary mission is the planning, advocacy, and execution of unmanned exploratory scientific flight through the solar system. JPL has managed many successful projects for NASA: beginning with the Ranger and Surveyor missions to the moon; the Mariner exploration of Mars, Venus, and Mercury; the Viking Mars orbiters; and the Voyager mission to Jupiter, Saturn, Uranus, and Neptune. More recent missions include Galileo (a Jupiter probe/orbiter) and Magellan (a Venus orbiter). One of JPL's most recent missions was the management of the Cassini satellite project.

In 1996, NASA assigned JPL programmatic responsibility for the space agency's Origins program. The program ties together a variety of proposed instruments and spacecraft missions that will study the formation of galaxies, stars, and planets, and search for Earth-like planets around nearby stars. The Space Interferometry Mission is being developed for launch in 2009 to search for planets around other stars. Among other missions under study is the Terrestrial Planet Finder, being considered for launch in 2012. JPL is also developing the Space Infrared Telescope Facility (SIRTF), an innovative orbiting infrared telescope that takes a deeper and more detailed look into the infrared sky to study galaxy formation.

2.4 Site Description

Situated on the south-facing slope of the San Gabriel foothills, JPL is surrounded by natural settings on the northern, eastern, and southern boundaries. The northern foothills of the Angeles National Forest are covered with native chaparral, the Arroyo Seco to the east is atypically dry river bed and only contains water during periods of rainfall , ,and the adjacent western residential area has an abundance of

vegetation that contributes to the scenic vistas. A mesa ridge is the northern boundary of the site, and the majority of the site slopes moderately away from the steep hillside of the mesa.

JPL is situated above the surrounding community and is a prominent visual feature in the area. Built on sloping terrain, its buildings and roads are terraced into the hillside. Figure 1 illustrates the regional location of JPL, and Figure 2 presents the site plan. Information regarding various on-site facilities is presented in Table 1.

The JPL site is geographically broken into three distinct areas: the mesa ridge, the hillside, and the main development area. The mesa ridge contains small single- and double-story buildings widely separated by the topography and by the need for isolating sensitive transmitting and receiving equipment. The hillside, with slopes exceeding 50 percent, includes 68 acres of undeveloped land, except for several water storage facilities and a road up to the ridge. Access to both the hillside and mesa ridge is restricted to authorized personnel.

The main development area is located primarily south of Explorer Road where most major buildings and personnel are located. A distinct approach to land use for the main development area is apparent for each of JPL's periods of development. The U.S. Army was responsible for constructing single and double story structures in the northeastern section of the area between 1940 and 1957. NASA development (1958 to present) accounts for the higher density of facilities built in the southwestern portion of the main development area. As NASA took a new direction toward expanded research and development, larger facilities were constructed to house new projects. These larger facilities mainly consist of multi-story offices and laboratories. Today, JPL has a university campus appearance aided by the use of extensive landscaping and an enhanced central mall.

2.5 Future Expansion

Future expansion of the main development area is constrained by topography. The mesa on the northeast and residential development to the northwest inhibits further growth northward. The Arroyo Seco blocks expansion to the east, residential development blocks expansion to the west, and the public service facilities and park land block expansion to the south. While a number of construction projects are planned at the JPL Oak Grove facility in the next several years, these are primarily upgrades of infrastructure of or remodeling or replacement of existing buildings.

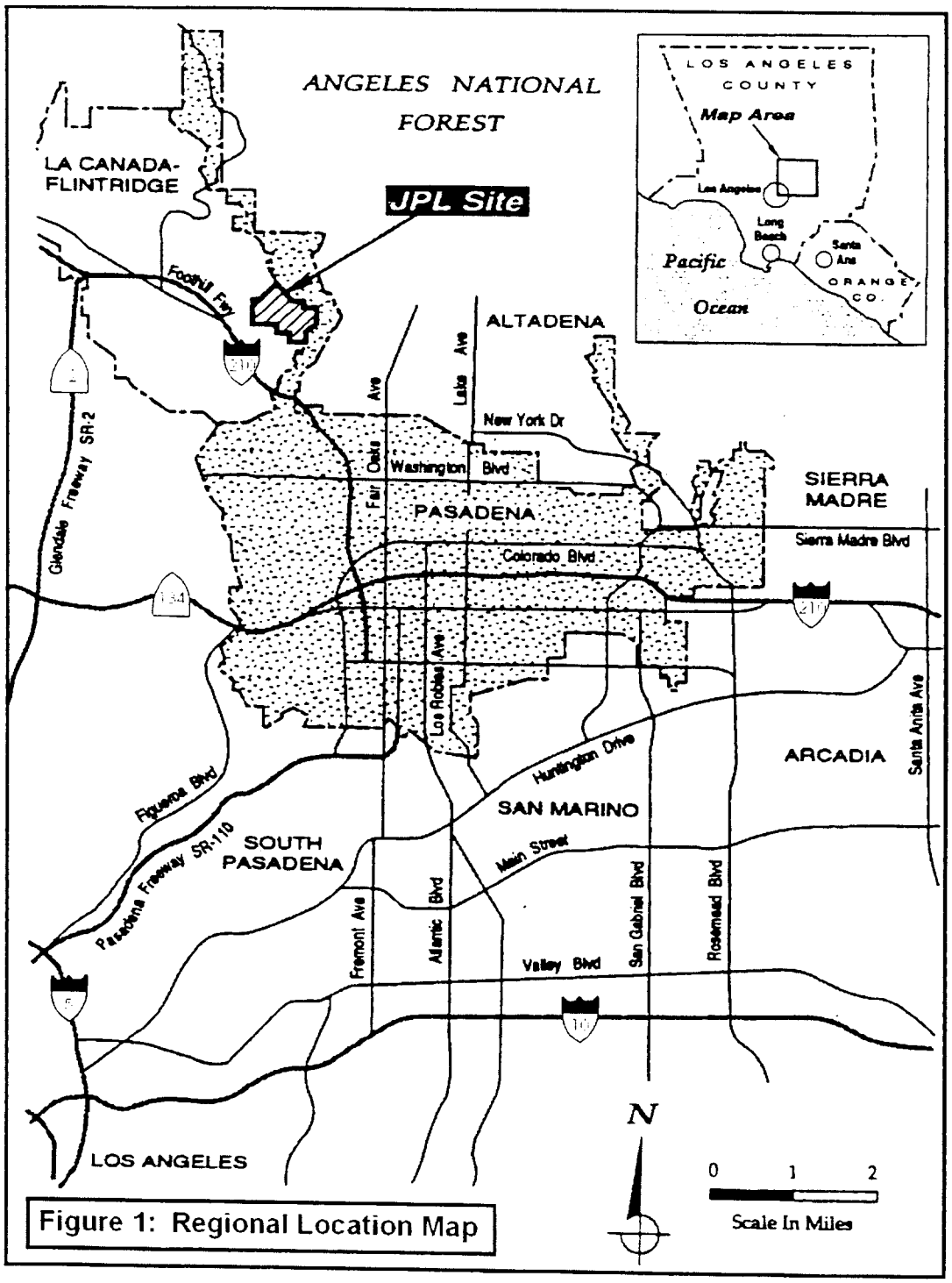


Figure 1: Regional Location Map

Facility Locations

No.	Facility Title	Location
101	Mars Yard	1621
102	Space Sciences Laboratory	1681
103	Structural Test Laboratory	1683
104	Radio/Radiometer Complex	1944
105	Materials Research	1684
106	Mars Terrain (20 Inch)	1684
107	High Vacuum Laboratory	1687
108	Quality Assurance	1682
109	Chemical Materials Laboratory	1686
110	Solid Dielectric Laboratory	1685
111	Propulsion and Combustion Laboratory	1688
112	Mining Laboratory	1689
113	Optics Laboratory	1973
114	Microelectronics Laboratory	1974
115	Communications Laboratory and Offices	1975
116	Solid Fuel Laboratory	1976
117	Fabrication Shop	1977
118	Optical Research Laboratory	1978
119	Terrestrial Information	1979
120	Electronics Development	1980
121	Liquid and Solid Propellant Laboratory	1981
122	Analytical Instruments Laboratory	1982
123	Energy Conversion Systems	1983
124	Combined Engineering Support	1984
125	Information Systems Development	1985
126	Communication Research Laboratory	1986
127	Motion Dynamics	1987
128	Propulsion Materials Storage	1988
129	Propulsion Materials Storage	1989
130	Solid Rocket Shed	1990
131	Environmental Laboratory	1991
132	Propulsion Propellants	1992
133	Energy Conversion Laboratory	1993
134	Energy Conversion Development	1994
135	Flight Systems Simulator	1995
136	Computer Program Offices	1996
137	Robotic Workshops	1997
138	Materials Research Processing Laboratory	1998
139	Public Relations (Center)	1999
140	Telecommunications Laboratory	2000
141	Computing Center	2001
142	Calibration	2002
143	Spacecraft System Laboratory	2003
144	Earth Space Science	2004
145	Precision Shops	2005
146	Test Support	2006
147	Test Station	2007
148	Motor Dynamics	2008
149	Telecommunications Complex	2009
150	Spacecraft Assembly Facility	2010
151	Antenna Shop	2011
152	Physical Science Laboratory	2012
153	Chemistry Shops	2013
154	Telecommunications Office	2014
155	Mechanical Systems and Engineering	2015
156	Electronics Laboratory Annex	2016
157	Telecommunications Offices	2017
158	Telecommunications Development Laboratory	2018
159	Chemistry Shops	2019
160	Mechanical Systems Engineering Laboratory	2020
161	General Purpose Laboratory	2021
162	Precision Shops	2022
163	Facilities Engineering and Services	2023
164	Computer Shop	2024
165	Telecommunications and Communications Support	2025
166	Research Laboratory	2026
167	Earth Lunar	2027
168	Goldstone Terminal	2028
169	Goldstone LAN Station	2029
170	Goldstone Facility Office	2030
171	Goldstone Facility Shops	2031
172	Goldstone Facility Shops	2032
173	Goldstone Facility Shops	2033
174	Goldstone Facility Shops	2034
175	Goldstone Facility Shops	2035
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190	Goldstone Facility Shops	2050
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194	Goldstone Facility Shops	2054
195	Goldstone Facility Shops	2055
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199	Goldstone Facility Shops	2059
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204	Goldstone Facility Shops	2064
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206	Goldstone Facility Shops	2066
207	Goldstone Facility Shops	2067
208	Goldstone Facility Shops	2068
209	Goldstone Facility Shops	2069
210	Goldstone Facility Shops	2070
211	Goldstone Facility Shops	2071
212	Goldstone Facility Shops	2072
213	Goldstone Facility Shops	2073
214	Goldstone Facility Shops	2074
215	Goldstone Facility Shops	2075
216	Goldstone Facility Shops	2076
217	Goldstone Facility Shops	2077

Trailer Locations

Trlr No.	Location
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Modulars

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1722	
1723	

1	R/R/R	SITE PLAN – FACILITY LOCATIONS		

Jet Propulsion Laboratory
California Institute Of Technology
Facilities Division

JPL SITE PLAN
FIGURE 2
SITE PLAN – FACILITY LOCATIONS

1:1500

JPL-SP-0100-F00

JPL-SP-0100-F00

Table 1
Summary of JPL Facilities

Building Number	Facility Title/Description	Usable Floor Area (ft2)	Use *
11	Space Sciences Laboratory	6,967	L
18	Structural Test Laboratory	11,546	T
35	Radio Repeater Complex	--	T
67	Material Research	10,284	L
79	Wind Tunnel Building	6,045	O
82	High Vacuum Laboratory	9,836	L, T, O
83	Quality Assurance	7,527	L, T, O
84	Chemical Materials Laboratory	1,170	L, T, O
86	Solid Oxidizer Laboratory	395	T, S, SP
87	Propellant Conditioning Laboratory	55	T, S
88	Mixing Laboratory	476	S
89	Laser Laboratory	1,332	L, T, O
90	Pyrotechnics Laboratory	1,231	T, S
97	Development Laboratory and Offices	1,945	L, T, O, SP
98	Soild Fuel Laboratory	1,329	L, O
103	Fabrication Shop	17,627	L, SP, S
107	Laser Research Laboratory	4,659	T, SP
111	Technical Information	30,250	L, T, O
114	Electronics Development	6,201	O
117	Liquid and Solid Propellant Laboratory	3,288	L
121	Employee Development Center	2,753	S
122	Energy Conservation Systems	4,895	L , O
125	Combined Engineering Support	43,955	L, O
126	Information Systems Development	33,606	L, T, O
129	Combustion Research Laboratory	774	T
138	Mission Operations	7,780	L, O, SP
140	Propulsion Materials Storage	126	S
141	Propulsion Materials Storage	155	S
143	Solid Rocket Dock	420	M
144	Environmental Laboratory	20,816	L, T, O
145	Magazine Propellant	130	S
148	Energy Conservation Laboratory	8,005	T
149	Energy Conservation Laboratory	4,458	T
150	25-Foot Space Simulator	16,069	L, T, SP
156	Computer Program Offices	16,094	L, O
157	Applied Mechanics	13,289	O
158	Material Research Processing Laboratory	20,768	L, O
159	Pump House (Water)	--	E
161	Telecommunications Laboratory	21,768	L, T, O
166	Cooling Tower	--	E
167	Cafeteria	15,021	Food Service

Continued

Table 1
Summary of JPL Facilities

Building Number	Facility Title/Description	Usable Floor Area (ft2)	Use *
168	Instrument Systems Laboratory	22,934	L, O, SP
169	Earth Space Science	25,261	L, O, C
170	Fabrication Shop	30,598	L, S, SP
171	Material Services	53,676	M, O, S
173	Test Shelter	269	M
175	Water Reservoir	--	Water Storage
177	Transportation Garage	4,406	SP, S
179	Spacecraft Assembly Facility	35,149	T, O
180	Administration	45,572	O, C
183	Physical Science Laboratory	50,842	L, O, T, SP
184	Electronic Stores	2,276	S, O
185	Programming Office	1,566	O, T
186	Science Exhibits and Engineering	13,005	C, O
189	Electronic Laboratory Annex	3,061	L, O
190	Procurement Offices	11,517	O, cafeteria
191	Materials Compatibility Laboratory	120	T
195	Guard Shelter	49	--
196	Guard Shelter	49	--
197	Solid Propellant Engineering Laboratory	3,174	L, T, O
198	Control Systems Laboratory	7,358	L, T, O
199	Celestial Simulator	3566	L, T, S, M
200	Facilities Engineering and Service	20,286	O, S, SP, M
201	Carpenter Shop	9,171	SP, O, S
202	Procurement and Communication Support	10,582	L,T,O,M
212	Antenna Laboratory	6,044	T,SP, O
218	Credit Union	2,096	O
220	ICS Terminal	--	E
224	Sewage Lift Station	--	E
225	Nitrogen Facility Office	49	O
226	Solvent Storage	100	S
227	Guard Shelter (Mesa)	49	--
228	Cooling Tower (A-B)	--	E
229	Shielded Room Building	390	T
230	Space Flight Operation Facility	66,552	T, O, M
231	Paint Shop	7,176	SP, S, O
233	Systems Development	24,826	L, T, O
234	Lumber Storage	2,691	S
237	Cooling Tower	--	E
238	Telecommunications	48,056	O, L, M
239	Propellant Conditioning Laboratory	544	T
241	Receiving and Shipping	20,191	O, M, L

Continued

Table 1
Summary of JPL Facilities

Building Number	Facility Title/Description	Usable Floor Area (ft2)	Use *
243	Remote Antenna Range Control	711	S
244	Chemical Engineering	1,507	T, L, S
245	Spectroscopy Laboratory	2,291	L
246	Soils Test Laboratory	704	L, O
248	10-Foot Space Simulator	7,541	T, L
250	Main Guard Shelter	200	--
251	Gyro Laboratory	2,734	L, S
252	Guard Shelter	49	--
253	Magnetics Laboratory	1,352	L, T
256	Model Range Control	346	T
257	Main Guard Island	26	--
258	Water Reservoir	--	Water Storage
259	Liquid Nitrogen Bottling Stoarge	567	T
260	Illuminator Equipment	260	T
261	Controlled Storage	1,445	S, O
262	Radiometer	81	L
264	Space Flight Support	73,718	T, O
267	Water Reservoir	--	Water Storage
268	Pump House	--	E
270	Sewage Metering Station	--	E
271	Oil Storage	161	Drum Storage
272	East Illuminator	88	T
273	Antenna Tower	110	T
275	Pyrotechnic Storage	192	S
276	Propellant Storage	256	S
277	Isotope Thermoelec. Sys. Appl. Lab.	13,443	L, T, O
278	Robotics Laboratory	2,233	T
279	Guard Island - Gate "E"	360	--
280	Static Test Tower	1,124	T
283	Metal Storage	3,427	S
284	Transportation Office	878	O
285	Arroyo Bridge	--	E, Access
286	Guard Shelter	101	--
287	Guard Island	26	--
288	Project Equipment Storage	3,000	S
289	Main Sewage Lift Trunk Shelter	--	E
290	Antenna Inspection	596	T
291	Procurement Services	4,918	O, C, S
292	Fire Trunk Shelter	1,460	S
293	Instrumentation Cable Amplifier Building	300	T
294	Guard Shelter (Visitor Lot)	--	--

Continued

Table 1
Summary of JPL Facilities

Building Number	Facility Title/Description	Usable Floor Area (ft2)	Use *
295	Antenna Test Facility	147	T, E
296	Central Cooling Tower Water System	3,178	E
297	Xenon Test Laboratory	909	L
298	Frequency Standard Laboratory	9,211	L
299	Assembly Handling and Shipping Equipment Facility	8,911 --	S
300	Earth and Space Science Laboratory	76,000	O, L
301	Central Engineering Building	104,434	O
302	Microdevices Laboratory	23,165	O, L
303	Engineering Support Building	66,800	O, L
304	Disintegrator	--	
305	Haz. Waste/Cryogenic Storage	3,805	S
306	Observation Inst. Lab.	42,056	O, L
308	Sewage Lift Station	--	E
309	Maintenance Storage Facility	4,000	S
310	Emergency Service Facility	11,749	
311	Ground Maintenance Facility	3,417	
312	Shelter Maintenance Facility	1,500	
313	Mirror Refurbishment	3,609	T
315	Cooling Tower Southern Sector	--	E
316	HazMat and Dist. Facility	1,449	
317	In-Situ Instrumentation Facility	8,033	

C = Conference
E = Equipment
F = Food Service
L = Laboratory
M = Miscellaneous
O = Office
S = Storage
SP = Shop
T = Technical

Continued

Source: JPL 2001

2.6 Utilities

The utility systems at JPL have been installed incrementally throughout the development of the facility. The majority of the newer utility systems are buried below grade in a relatively protected environment, and their condition is not expected to have changed since construction.

The Energy Policy Act of 1992 requires all federal agencies, including NASA, to engage in energy and water conservation in routine maintenance and capital projects. JPL, as a Federally Funded Research and Development Center (FFRDC), has shown good progress towards goals set through 2005 (JPL 1999). Table 2 provides a summary of resource usage.

Table 2
Resource Consumption at JPL

Year	Electricity (kWH)	Gas (ft^3)	Fuel Oil (Gal)	Water (Gal)	Sewage* (Gal)
2001**	79,766,523	104,927,500	8,546	95,650,500	30,835,000
2000	101,588,272	113,119,600	10,185	141,745,833	61,639,800
1999	99,831,343	120,578,500	8,720	127,748,580	61,100,800

* Sewage calculated at 48% of intake water and measured by meter.
** 2001 data through July 2001.

2.6.1 Electricity

Southern California Edison (SCE) provides most electrical power via its Arroyo Seco Substation, which is located near the southeast boundary of the facility. Power from the SCE power grid is supplied to the substation in primary voltage of 66 kV and reduced to 16.5 kV for distribution throughout the JPL grid. A JPL substation converts this 16.5 kV to 2.4 kV for distribution to the northeastern area (original facilities). Major buildings on site are metered separately.

The Space Flight Operations Building (Building 230) has a central plant that is the power control center for itself and its support building (Building 264). This central plant consists of diesel powered engine generators and uninterruptible power systems to provide clean, reliable power to mission critical activities. This can operate 24 hours per day, 7 days a week if necessary but is otherwise limited by permit to 200 hours per year for maintenance purposes.

JPL has an aggressive energy conservation plan. Conservation efforts have included installing ultrasonic and infrared motion sensors in individual work spaces, automatic tube cleaners on chiller condensers, electronic variable speed drives on large air handling units, high efficiency motors, and

window insulation. Current efforts include conversion to high efficiency lighting systems and installation of more efficient heating, ventilation and air conditioning (HVAC) systems.

2.6.2 Natural Gas

Natural gas is supplied to JPL by the Southern California Gas Company via a 30 pounds-per-square-inch (psi), high-pressure main located on the east side of Oak Grove Drive. Service is provided to standby generator engines in the Frequency Standard Laboratory (Building 298) and to three gas distribution lateral mains. Pressure reducing valves in the lateral mains reduce the pressure to 5 psi, which is the pressure provided to most on-site buildings. Two gas line branches feed into the main line and are located along Explorer Road and Mariner Road. The natural gas is generally used in boilers, water heaters, and in some research facilities.

2.6.3 Fuel Oil and Other Petroleum Products

Historically, JPL stored diesel fuel for emergency power generation, gasoline for fleet vehicle use, waste oil, and lubrication oil in single-walled underground storage tanks (UST) located at the 25-Foot Space Simulator (Building 150), the Transportation Garage (Building 177), and the Space Flight Operation Facility (Building 230), all of which were registered with the Los Angeles County Department of Public Works (DPW). Beginning in 1990, a program was started to replace these tanks with aboveground or -underground tanks. Those that remain in underground service have been upgraded to double-walled construction with continuous monitoring.

Currently there are three USTs and fourteen aboveground storage tanks (ASTs) in service. Of the USTs, one 10,000-gallon tank at Building 177 and one 15,000-gallon tank at Building 230 store diesel fuel. Plans for the other 10,000-gallon tank at Building 177 are to store unleaded gasoline fuel. The fourteen ASTs are used to store diesel fuel, lube oil, and waste oil. .

2.6.4 Water Distribution and Sewage Collection

Water is provided by the City of Pasadena via a 6-inch supply line at the east end of JPL. Water is pumped to two 750,000-gallon tanks and one 1,000,000-gallon tank on the mesa above JPL and distributed throughout the facility via gravity flow. The pump station is capable of bypassing the tanks in an emergency. A site-wide fire hydrant system is also available for providing water supplies in the event of an emergency, such as an earthquake or fire.

Historically, many of the tasks under JPL's purview required the use of various chemicals and materials, including a variety of solvents, solid and liquid rocket propellants, and cooling-tower chemicals. During the 1940s and 1950s, many buildings at JPL maintained a cesspool to dispose of liquid

and solid sanitary wastes collected from drains and sinks. These cesspools were designed to allow wastes to seep into the surrounding soils. The present day term for these subsurface disposal areas is "seepage pits." Some of the seepage pits may have received volatile organic compounds (VOCs) and other waste materials that are currently found in the groundwater. In the 1950s and 1960s, a sanitary sewer system was installed, and the use of the cesspools for waste disposal was discontinued. Non-sanitary chemical wastes are now disposed of at off-facility waste/recycling centers.

Currently, the sanitary sewer is the only means of disposal for sanitary waste. The sanitary sewer system at JPL connects with the City of Pasadena's sewer system at the southwestern corner of the facility. The Pasadena sewer system discharge flows into the Los Angeles County Sanitation District Collection system. Flows north of Mariner Road (between Oak Grove and Surveyor) are by gravity; flows south of Mariner Road are pumped. Maximum flow rate into the Pasadena system is limited by Los Angeles Sanitation District Permit #7024 to 240 gallons per minute. A retention basin at the main sewage lift trunk shelter (Building 289) holds excess flow for release to the city's system during off-peak hours. The JPL system has a flow rate into the retention basin of approximately 180,000 gallons per day (JPL 1994a).

Most buildings at JPL are connected to a cooling water tower as part of their air conditioning system. Cooling towers require makeup water, and blowdown streams are discharged to the sanitary sewer. All of these cooling towers are permitted by the South Coast Air Quality Management District (AQMD).

2.6.5 Nitrogen and Compressed Air Systems

JPL has a central, 28,000-gallon liquid nitrogen storage tank (Tank 10) located northeast of the 25-foot Space Simulator (Building 150) that is in the process of being decommissioned. A tank system (Tank 32) was installed adjacent to the 10-foot Space Simulator (Building 248) that serves the north end of the laboratory. A new tank will be installed during 2003 near the Physical Science Laboratory (Building 183) for the south end of the laboratory. Additionally, a number of smaller liquid nitrogen storage tanks are located at various buildings. High-pressure nitrogen cylinders (bullet trailers) are also used throughout the site to provide nitrogen to buildings not connected to a bulk source. Table 3 provides a listing of all liquid nitrogen storage tanks and their capacities located on the JPL Oak Grove facility.

Table 3
JPL Oak Grove Facility Liquid Nitrogen Tanks
Nominal Tank Capacities and Locations

Tank	Gallons	Location
1	13,000	225/259
2	1,300	183 – S/E
4	1,300	288 – S/W
5	1,300	83 South
6	5,200	144 North
8	1,300	233 North
9	1,300	129 North
10	28,000	150 – N/E
11	2,500	168 – N/E
15	2,500	149 West
16	1,300	168 – N/E
19	500	212 North (Mesa)
20	1,300	157 – S/W
23	1,300	302 East
24	1,600	300 East
25	1,300	300 East
26	900	302 East
27	3,000	302 East
28	400	298 S/W
30	2,500	79 – East
31	5,200	306 – S/E
32	11,000	248

A 100-psi, lab-wide compressed air system is supported by a 150-horsepower, oil-free, screw-type centrifugal compressor installed in the basement of the Combined Engineering Support building (Building 125). A smaller 100-horsepower backup screw compressor is in the Material Research Processing Laboratory (Building 158). This lab-wide system is also supported by over 50 small, individual compressors of 15 horsepower or less that are located in over 30 buildings throughout the JPL site.

2.6.6 Communications

The communications system at JPL comprises a diverse set of systems including telephone lines, the utility control system (UCS) for energy management, the institutional local area network (ILAN), the laboratory computer system, the cable television system (CATV) for the electronic bulletin board, instrumentation, a paging system, fire alarm, security, and irrigation control.

3.0 AIR RESOURCES

The following sections describe the local air resources in terms of climate, air quality standards, and air quality conditions. Air emission sources at JPL and the controls employed to minimize emissions are also discussed.

3.1 Climate

The Los Angeles Basin, including the area of the JPL site, has a Mediterranean climate that is characterized by mild, rainy winters and warm, dry summers. There are periodic incidences of drought throughout the southern California region. These cycles of relatively wet and dry weather can last anywhere from 5 to 12 years. Therefore, annual precipitation over the Los Angeles region is variable, but, overall, averages approximately 38.1 centimeters (15 inches) per year. Although summer rainfalls can occur due to tropical disturbances from Baja California, 80 percent of the annual precipitation occurs from November through April. Rainfall in the vicinity of JPL is higher than for the City of Los Angeles, averaging about 19 to 20 inches per year. This is a result of the orographic effects of the nearby San Gabriel Mountains.

Temperatures in the Los Angeles region are relatively mild. August is typically the warmest month while January is the coolest. The minimum recorded mean monthly temperature in the JPL area was 2.7 degrees C (32.5 F) in January 1937 and the maximum mean monthly temperature was 35.2 degrees C (95.5F) in August 1929 (Ebasco 1990).

With normal variations in pressure systems, wind patterns change seasonally in both strength and direction. Generally, however, winds are mild throughout the year, with breezes from the ocean (on-shore) during the day and land breezes (off-shore) at night. Summer is characterized by gentle westerlies, and autumn is punctuated by occasional storms and unseasonably strong, hot, northeasterly windy conditions. Occurring primarily in the fall, these Santa Ana winds are the result of strong high pressure systems moving into the Great Basin area of Nevada and Utah. Near the mouths of canyons oriented along the direction of airflow, like the Arroyo Seco, these winds can be particularly strong.

3.2 Air Quality Standards

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to establish three types of national standards: the National Ambient Air Quality Standards (NAAQS); the New Source Performance Standards (NSPS); and the National Emission Standards for Hazardous Air Pollutants (NESHAP). NAAQS apply to pollutant concentrations in ambient air and not to individual emission sources. Emission source compliance with NSPS and NESHAP is assured through compliance with South Coast Air Quality Management District (SCAQMD) rules and regulations.

JPL is located within the South Coast Air Basin (SOCAB). The EPA has classified SOCAB as a non-attainment area for achieving the National Ambient Air Quality Standards (NAAQS). A non-attainment area is an area that exceeded any NAAQS one or more discontinuous times during the previous three years. NAAQS establish allowable ambient concentrations for eight parameters: suspended particulates (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfates, ozone (O_3), and lead (Pb).

Sulfur dioxide and lead are the only two NAAQS parameters for which the South Coast Air Basin is in compliance. The SOCAB is in non-attainment for suspended particulates, nitrogen dioxide and sulfates; serious non-attainment for carbon monoxide; and extreme non-attainment for ozone.

State action in complying with CAA and EPA directives includes the California Ambient Air Quality Standards (CAAQS) promulgated by the California Air Resources Board (CARB); see Table 4 at the end of this section for a comparison with national standards.

3.3 Air Quality Conditions

Pollutant transport in the South Coast Air Basin generally follows the on- and off-shore air flow characteristic of coastal areas. Daytime transport is inland toward the San Gabriel Mountains where the flow divides westward through the San Fernando Valley and eastward toward the San Bernardino area. On some days, the flow is predominantly southward into Orange County and eastward toward Riverside County. Nighttime drainage flow is off shore. The actual blend of these flow patterns is complex, and different pollutant concentrations are observed at various inland locations on any given day.

Ambient air quality conditions are monitored at 39 different locations throughout the SOCAB. Each location operates a combination of gaseous, particulates, toxics, and/or meteorological monitoring stations. As shown in Figure 3, the stations are distributed throughout the basin to provide comprehensive coverage.

The nearest monitoring station to JPL is the West San Gabriel Valley station approximately 5 miles to the southeast of JPL at 752 Wilson Avenue, Pasadena (station number 088). Pollutants monitored at the station include ozone (O_3), carbon monoxide (CO), total suspended particulates (TSP), sulfates (SO_4) and, nitrogen dioxide (NO_2). The station is not equipped to monitor ambient PM_{10} or $PM_{2.5}$ levels or lead.

Ozone is an end product of complex reactions between reactive organic gases (ROG) and nitrous oxides (NOx) in the presence of ultraviolet radiation. In the SOCAB, emissions of NOx are heavily distributed in the western portion of the basin. Daytime wind flow patterns, mountain barriers, a persistent temperature inversion, and intense sunlight all contribute to high ozone concentrations in the downwind, inland valleys and coastal areas. Maximum ozone concentrations usually are recorded during

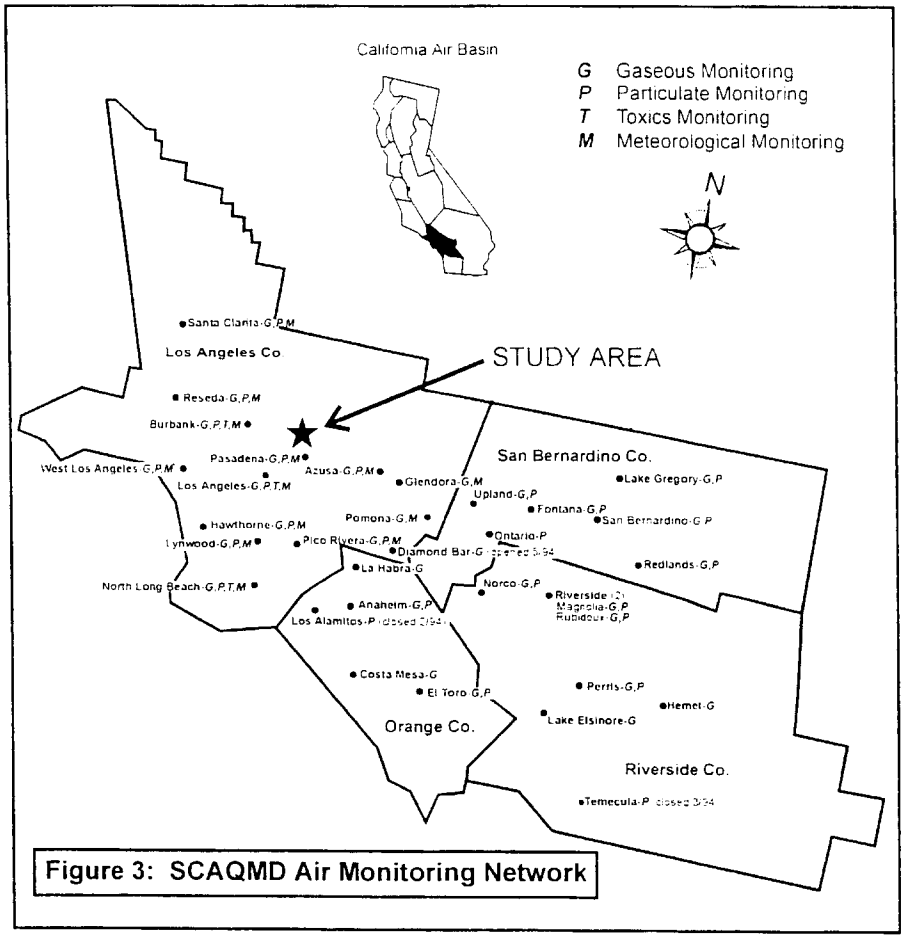

Figure 3: SCAQMD Air Monitoring Network

the summer months. Ozone is associated with eye irritation, reduced visibility, and adverse health effects at high concentrations.

In the year 2000, ozone levels at the West San Gabriel Valley station located in Pasadena exceeded the federal standard of 0.12 parts per million [ppm] for 7 out of 362 days and exceeded the state standard of 0.09 ppm for 19 days (SCAQMD 2000). The maximum 1-hour ozone concentration reported at the station in 2000 was 0.16 ppm. Basin-wide, the highest concentration of ozone was reported to be 0.18 ppm at the Central San Bernardino Mountain monitoring station.

Carbon monoxide (CO) concentrations are generally highest near heavily congested roadways. The monitoring station reported 0 days of violation of the federal and state 8-hour CO standards of 9.5 and 9.0 ppm, respectfully. The maximum 8-hour CO concentration recorded at the station during 2000 was 9.0 ppm, while the highest concentration recorded in Los Angeles County was 13 ppm at the two South Central stations.

The federal annual standard for NO_2 is 0.053 ppm, while the state 1-hour standard is 0.25 ppm. There were 0 days of violation of the state standard, with 0.17 ppm recorded as the highest 1-hour NO_2

concentration. The annual average ambient NO_2 concentration at the station for 2000 was 0.0296 ppm, which indicates compliance with the federal annual standard.

A summary of the maximum pollutant concentrations reported at the monitoring station (number 088) in 2000 and a comparison of the number of days the standards were exceeded at the monitoring station to all stations within the SOCAB is presented in Table 5 at the end of this section.

3.4 Air Pollution Sources, Control, and Reporting Requirements

The type of air emission sources that usually require SCAQMD permits to operate (Rule 201 and Rule 203) include boilers, internal combustion engines, emergency generators, painting operations, degreasers, fuel storage tanks, dispensers, and various other research and development processes. Various types of these sources currently operate under permit at JPL. JPL is permitted by the SCAQMD as a Regional Clean Air Incentives Market (RECLAIM) facility for NOx and received its Title V Facility Permit in September 2001. See Table 6 for a complete listing of permitted sources at the end of this section.

Although JPL has a substantial amount of research and development activities, there is only one facility that requires air pollution control equipment to be installed. The Microdevices Laboratory (Building 302) is the only facility that requires a wet scrubber to control emissions for clean room laboratory operations. Other potential sources are limited to small, isolated equipment that currently meet requirements by operating under permit. All of these sources of air pollutants and permit status are evaluated under a comprehensive air pollutant source identification and evaluation program, which includes an extensive equipment listing maintained by JPL's Environmental Affairs Office (EAO) as part of their air emissions and waste management database. Table 6 is adapted from this database and lists equipment with permits in place.

JPL is currently in compliance with all air quality permitting regulations. JPL submits annual emissions inventory reports to the SCAQMD, which includes emissions estimates from both permitted and unpermitted sources

3.5 Toxic Release Inventory

JPL also complies with other reporting requirements such as the Section 313 Reporting Requirements under the Emergency Planning and Community Right to Know Act (EPCRA) and toxic emission inventory reporting under California State Law AB 2588. JPL has submitted the required inventory data; however, JPL has not been required to submit a follow-up risk assessment of reported emissions due to the low facility priority ranking, which is based on both toxicity and quantity of emissions (JPL 1994b).

Table 4 State of California Air Resources Board Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,4,5]	Method[7]
Ozone	1 hr	0.09 ppm (180 µg/m³)	UV photometry	0.12 ppm (235 µg/m³)	Same as primary standard	Ethylene chemo-luminescence
Carbon Monoxide	8 hr	9.0 ppm (10 mg/m³)	Nondispersive infrared spectrometry (NDIR)	9 ppm (10 mg/m³)	—	Nondispersive infrared spectrometry (NDIR)
	1 hr	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
Nitrogen Dioxide	Annual average	—	Gas phase chemi-luminescence	0.053 ppm (100 µg/m³)	Same as primary standard	Gas phase chemi-luminescence
	1 hr	0.25 ppm (470 µg/m³)		—		
Sulfur Dioxide	Annual average	—	UV fluorescence	80 µg/m³ (0.03 ppm)	—	Pararosoaniline
	24 hr	0.04 ppm (105 µg/m³)		365 µg/m³ (0.14 ppm)	—	
	3 hr	—		—	1,300 µg/m³ (0.5 ppm)	
	1 hr	0.25 ppm (655 µg/m³)		—	—	
Suspended Particulate Matter (PM_{10})	Annual geometric mean	30 µg/m³	Size selective inlet high-volume sampler and gravimetric analysis	—	—	Inertial separation and gravimetric analysis
	24 hr	50 µg/m³		150 µg/m³	Same as primary standard	
	Annual arithmetic mean	—		50 µg/m³		
Sulfates	24 hr	25 µg/m³	Turbidimetric barium sulfate	—	—	—
Lead	30-day average	1.5 µg/m³	Atomic absorption	—	—	Atomic absorption
	Calendar quarter	—		1.5 µg/m³	Same as primary standard	
Hydrogen Sulfide	1 hr	0.03 ppm (42 µg/m³)	Cadmium hydroxide STRactan	—	—	—
Vinyl Chloride	24 hr	0.010 ppm (26 µg/m³)	Tedlar bag collection, gas chromatography	—	—	—
Visibility Reducing Particles[8]	8 hr (10 am – 6 pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V.		—	—	—

NOTES:

1. California standards for ozone, carbon monoxide, sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter (PM_{10}), and visibility reducing particulates, are values that are not to be exceeded. The standards for sulfates, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. Values applicable to the Lake Tahoe Air Basin are not shown.
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. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25° C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.
5. 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 3 years after that state's implementation plan is approved by the Environmental Protection Agency (EPA).
6. 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.
7. Reference methods as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

2000 AIR QUALITY
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

2000

Source/Receptor Area No	Location	Station No	Carbon Monoxide: No Days of Data	Max Conc in ppm 1-hour	Max Conc in ppm 8-hour	No. Days Standard Exceeded[a] Federal ≥ 9.5 ppm 8-hour	State > 9.0 ppm 8-hour	Ozone: No Days of Data	Max Conc in ppm 1-hour	Max Conc In ppm 8-hour	Fourth High Conc Ppm 8-hour	No. Days Standard Exceeded Federal > 0.12 ppm 1-hour	Federal > 0.08 ppm 8-hour	State > 0.09 ppm 1-hour	Nitrogen Dioxide: No Days of Data	Max Conc in ppm 1-hour	Average Compared to Federal Standard[b] AAM in ppm	No Days Standard Exceeded State > 0.25 ppm 1-hour	Sulfur Dioxide: No Days of Data	Max Conc in ppm 1-hour[c]	Max Conc in ppm 24-hour[c]	Average Compared to Federal Standard[d] AAM in ppm
Los Angeles County																						
1	Central LA	087	365	7	6.0	0	0	365	0.14	0.105	0.086	1	4	8	353	0 16	0.0404	0	305*	0 08*	0 010*	0 0009*
2	Northwest Coastal LA County	091	362	6	4 3	0	0	365	0.10	0.079	0.071	0	0	2	361	0 16	0 0273	0	--	-	-	-
3	Southwest Coastal LA County	094	365	9	7.0	0	0	359	0 10	0.075	0.065	0	0	1	364	0 13	0.0275	0	365	0 17	0 017	0 0017
4	South Coastal LA County	072	363	10	5.8	0	0	365	0.12	0.080	0.069	0	0	3	358	0 14	0 0313	0	365	0 05	0 014	0 0015
6	West San Fernando Valley	074	365	11	9.8	1	2	362	0.11	0.084	0.083	0	0	6	365	0 11	0 0285	0	--	--	--	--
7	East San Fernando Valley	069	365	8	6 1	0	0	363	0 15	0.119	0.098	3	11	16	365	0 17	0 0415	0	357	0.01	0 004	0 0001
8	West San Gabriel Valley	088	357	9	7 4	0	0	362	0 16	0 134	0 106	7	14	19	355	0 17	0 0296	0	--	--		-
9	East San Gabriel Valley 1	060	365	5	4 9	0	0	365	0 17	0.141	0.109	11	16	32	365	0 15	0.0366	0	--	-		--
9	East San Gabriel Valley 2	591	345	4	3 1	0	0	358	0.17	0 148	0.113	11	22	39	349	0.13	0.0290	0	--	--	--	-
10	Pomona/Walnut	075	360	7	4.9	0	0	363	0.15	0.124	0.089	3	5	18	358	0.14	0 0435	0	--	--	--	--
11	South San Gabriel Valley	085	365	7	5.3	0	0	365	0.14	0.114	0.086	2	4	11	365	0 14	0.0366	0	--	-	--	--
12	South Central LA County 1	084	365	13	10.0	2	6	365	0.09	0.064	0.051	0	0	0	360	0 14	0 0386	0	--	-		--
12	South Central LA County 2	801	222*	13*	9.5*	1*	3*	222*	0.12*	0.095*	0.085*	0*	4*	4*	221*	0 11*	0 0292*	0*		--		--
13	Santa Clarita Valley	089	345	6	4.9	0	0	360	0.13	0.111	0.099	1	16	31	360	0.10	0 0246	0	--	--	--	--
Orange County																						
16	North Orange County	3177	364	14	6 1	0	0	364	0.14	0.103	0.085	1	4	8	269*	0 12*	0.0304*	0*	-	--		-
17	Central Orange County	3176	360	8	6.8	0	0	364	0.13	0 101	0 075	1	1	9	364	0 13	0.0300	0	--	-	-	--
18	North Coastal Orange County	3195	339*	8*	6.3*	0*	0*	365	0.10	0.087	0.087	1	1	1	362	0 11	0.0205	0	363	0 02	0 008	0 0005
19	Saddleback Valley 1	3186	244*	5*	2.3*	0*	0*	244*	0.13*	0.110*	0.068*	1*	2*	3*	--	--	--	-	-			
19	Saddleback Valley 2	3812	305*	4*	3.3*	0*	0*	305*	0.15*	0.129*	0.089*	2*	8*	25*	--	--	--	--	--	--	--	--
Riverside County																						
22	Norco/Corona	4155	--	-	-	-	--	--	--	--	--	--	--	--	--	-	--	-	--	-		-
23	Metropolitan Riverside County 1	4144	365	5	4 3	0	0	365	0.14	0 113	0 106	3	29	41	298*	0 10*	0.0236*	0*	329*	0 11*	0.041*	0 0008*
23	Metropolitan Riverside County 2	4146	365	9	4.3	0	0	--	--	--	--	--	-	--	--	-	--	--	--	-		-
24	Perris Valley	4149	--	-	--	--	--	361	0.16	0.126	0.113	15	41	65	--	--	--	--	--	--	--	--
25	Lake Elsinore	4158	351	4	2.0	0	0	361	0.13	0 109	0.099	1	31	45	360	0.08	0.0175	0	--	--	--	--
29	Banning Airport	4164	--	--	-	--	--	363	0.14	0.111	0.103	4	39	52	365	0 21	0.0237	0	--	-		-
30	Coachella Valley 1**	4137	353	3	1.6	0	0	355	0.12	0.105	0.096	0	33	40	337	0 07	0.0178	0	--	-	--	-
30	Coachella Valley 2**	4157	87*	3*	2.1*	0*	0*	354	0.11	0.096	0 089	0	9	43	87*	0 06*	0.0099*	0*	--	--	--	--
San Bernardino County																						
32	Northwest San Bernardino Valley	5175	348	4	2.6	0	0	365	0.18	0.159	0.118	10	19	43	357	0 15	0.0380	0	--	--	--	
33	Southwest San Bernardino Valley	5817	--	-	-	--	--	--	--	--	--	--	--	--	--	-	--	--	--	--	-	-
34	Central San Bernardino Valley 1	5197	--	--	--	--	--	365	0 17	0.139	0.101	7	16	36	365	0 12	0 0364	0	274*	0 02*	0 010*	0 0018*
34	Central San Bernardino Valley 2	5203	304*	5*	4.3*	0*	0*	365	0.15	0.125	0.111	7	27	48	365	0 10	0.0325	0	--	-	--	-
35	East San Bernardino Valley	5204	--	--	-	--	--	365	0.15	0 133	0.113	11	51	78	--	-	--	--	--			--
37	Central San Bernardino Mountains	5181	--	--	--	--	--	354	0.18	0 149	0.123	17	73	85	--	--	--	--	--	--	--	-
38	East San Bernardino Mountains	5818	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-
District Maximum				14	10 0	2	6		0.18	0.159	0.123	17	73	85		0 21	0.0435	0		0 17	0 041	0 0018

ppm - Parts Per Million parts of air, by volume AAM = Annual Arithmetic Mean -- - Pollutant not monitored.

*Less than 12 full months of data May not be representative

**Salton Sea Air Basin

a) - The federal 1-hour standard (1-hour average CO > 35 ppm) and state 1-hour standard (1-hour average CO > 20 ppm) were not exceeded

b) - The federal standard is annual arithmetic mean NO_2 greater than 0.0534 ppm No location exceeded this standard.

c) - The state standards are 1-hour average > 0.25 ppm and 24-hour average > 0.045 ppm. No location exceeded state standards

d) - The federal standard is annual arithmetic mean SO_2 > 0.03 ppm. No location exceeded this standard

The other federal standards (3-hour average > 0.50 ppm, and 24-hour average > 0 14 ppm) were not exceeded either

South Coast
Air Quality Management District
21865 East Copley Drive
Diamond Bar, CA 91765-4182
http://www.aqmd.gov

The map showing the locations of source/receptor areas can be accessed via the Internet at http://www.aqmd.gov/smog/areamap.html. Locations of source/receptor areas are shown on the "South Coast Air Quality Management District Air Monitoring Areas" map available free of charge from SCAQMD Public Information.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

2000

Source/Receptor Area No	Location	Station No	Suspended Particulates PM10 [e] No. Days of Data	Max Conc in µg/m³ 24-hour	No. (%) Samples Exceeding Standard Federal > 150 µg/m³ 24-hour	No. (%) Samples Exceeding Standard State > 50 µg/m³ 24-hour	Annual Averages [h] AAM Conc µg/m³	Annual Averages [h] AGM Conc. µg/m³	Suspended Particulates PM2.5 [f] No. Days of Data	Max Conc in µg/m³ 24-hour	No. (%) Samples Exceeding Standard Federal > 65 µg/m³ 24-hour	Annual Averages [i] AAM Conc µg/m³	Particulates TSP [g] No. Days of Data	Max Conc in µg/m³ 24-hour	Annual Average AAM Conc µg/m³	Lead [g] Max Monthly Average Conc [j] µg/m³	Lead [g] Max Quarterly Average Conc [j] µg/m³	Sulfate [g] Max Conc in µg/m 24-hour	Sulfate [g] No. (%) Samples Exceeding Standard State ≥ 25 µg/m³ 24-hour
Los Angeles County																			
1	Central LA	087	60	80	0	15(25)	40.0	37.0	334	87.8	11(3.3)	22.0	60	127	72.0	0.06	0.05	16.4	0
2	Northwest Coastal LA County	091	-	-	--	--	--	--	--	--	--	--	60	87	48.2	-	--	14.1	0
3	Southwest Coastal LA County	094	57	74	0	9(16)	36.1	33.4	--	--	--	--	61	127	64.8	0.08	0.05	16.2	0
4	South Coastal LA County	072	57	105	0	12(21)	37.6	34.0	304*	81.5*	4(1.3)*	19.2*	61	164	68.2	0.05	0.04	26.7	1
6	West San Fernando Valley	074	--	--	--	--	--	--	108	67.5	2(1.9)	18.1	--	--	--	--	-	--	--
7	East San Fernando Valley	069	60	74	0	14(23)	39.1	36.1	70*	84.4*	3(4.3)*	23.8*	--	--	-	--	--	-	-
8	West San Gabriel Valley	088	--	--	-	-	-	--	110	66.3	1(0.9)	19.3	60	91	49.1	-		13.9	0
9	East San Gabriel Valley 1	060	57	94	0	24(42)	46.3	42.5	333	92.5	5(1.5)	20.1	59	157	85.3	--	-	17.2	0
9	East San Gabriel Valley 2	591	-	--	-	--	--	--	--	--	--	--	--	--	--	-	-	-	
10	Pomona/Walnut	075	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-	--	-
11	South San Gabriel Valley	085	--	--	--	--	--	--	116	89.5	4(3.4)	24.1	57	118	74.7	0.09	0.06	13.1	0
12	South Central LA County 1	084	-	-	--	--	--	--	121	82.1	2(1.7)	23.0	60	167	74.9	0.09	0.06	11.4	0
12	South Central LA County 2	801	-	-	--	-	--	--	--	--	--	--	--	--	--	-	-	-	
13	Santa Clarita Valley	089	61	64	0	4(7)	32.7	29.8	--	--	--	--	--	-	--	--	--	--	-
Orange County																			
16	North Orange County	3177	--	--	--	--	--	--	--	--	--	--	--	--	--	-	--		
17	Central Orange County	3176	61	126	0	8(13)	39.9	35.7	273*	113.9*	6(2.2)*	21.0*	--	--	--	-	--		
18	North Coastal Orange County	3195	--	--	--	--	--	--	--	--	--	--	--	--	--	-	--		
19	Saddleback Valley 1	3186	31*	60*	0*	1(3)*	28.9*	27.4*	--	--	--	--	--	--	--	--	-	--	-
19	Saddleback Valley 2	3812	60	98	0	2(3)	27.8	25.5	119	94.7	1(0.8)	14.7	--	--	--	--	-	-	--
Riverside County																			
22	Norco/Corona	4155	58	129	0	28(48)	49.3	43.4	--	--	--	--	--	--	--	--	--	--	--
23	Metropolitan Riverside County 1	4144	97	139	0	68(70)	60.1	54.7	304*	119.6*	11(3.6)*	28.2*	62	211	115.5	0.06	0.05	11.0	0
23	Metropolitan Riverside County 2	4146	--	--	--	--	--	--	111	79.3	5(4.5)	25.5	63	144	82.8	0.04	0.03	10.2	0
24	Perris Valley	4149	59	87	0	13(22)	41.1	36.8	--	--	--	--	--	--	--	--	--	-	--
25	Lake Elsinore	4158	--	-	-	--	--	--	--	--	--	--	--	-	-	--	-	--	-
29	Banning Airport	4164	59	69	0	5(8)	29.1	24.7	--	--	--	--	--	--	--	--	--	--	--
30	Coachella Valley 1**	4137	56	44	0	0	24.4	22.7	120	28.5	0	9.6	--	--	--	--	--	--	--
30	Coachella Valley 2**	4157	103[k]	114[k]	0[k]	52(50)[k]	51.9[k]	48.4[k]	115	28.6	0	11.2	--	--	--	--	--	--	--
San Bernardino County																			
32	Northwest San Bernardino Valley	5175	--	-	-	--	--	--	--	--	--	--	56	122	69.8	0.07	0.05	11.5	0
33	Southwest San Bernardino Valley	5817	58	124	0	26(45)	50.4	46.3	111	73.4	2(1.8)	24.2	--	--	--	--	--	--	-
34	Central San Bernardino Valley 1	5197	60	108	0	31(52)	52.6	47.1	111	72.9	2(1.8)	24.5	57	180	97.3	-	--	10.7	0
34	Central San Bernardino Valley 2	5203	60	108	0	32(53)	50.1	44.5	102*	89.8*	3(2.9)*	25.4*	59	168	95.4	0.06	0.05	12.4	0
35	East San Bernardino Valley	5204	61	109	0	27(44)	46.0	39.7	--	--	-	--	--	--	-	--	--	--	-
37	Central San Bernardino Mountains	5181	58	49	0	0	24.0	20.7	--	--	--	--	--	--	--	--	--	--	--
38	East San Bernardino Mountains	5818	--	--	--	--	--	--	58	29.0	0	10.6	--	--	--	--	--	-	
District Maximum				139	0	68	60.1	54.7		119.6	11	28.2		211	115.5	0.09	0.06	26.7	1

µg/m³ Micrograms per cubic meter of air AAM - Annual Arithmetic Mean AGM - Annual Geometric Mean -- - Pollutant not monitored

* Less than 12 full months of data May not be representative

** Salton Sea Air Basin

e) - PM10 samples were collected every 6 days (every 3 days at Station Numbers 4144 and 4157) using the size-selective inlet high volume sampler with quartz filter media

f) - PM2.5 federal standard was established effective September 16, 1997 PM2.5 samples were collected every 3 days at all sites except for the following sites. Station Numbers 060, 072, 087, 3176, and 4144 where samples were taken every day, and Station Number 5818 where samples were taken every 6 days.

g) - Total suspended particulates, lead, and sulfate were determined from samples collected every 6 days by the high volume sampler method, on glass fiber filter media

h) - Federal PM10 standard is AAM > 50 µg/m³; and state standard is AGM > 30 µg/m³

i) - Federal PM2.5 standard is AAM > 15 µg/m³

j) - Federal lead standard is quarterly average > 1.5 µg/m³ and state standard is monthly average ≥ 1.5 µg/m³ No location exceeded lead standards Special monitoring immediately downwind of stationary sources of lead was carried out at four locations in 2000 The maximum monthly average concentration was 0.46 µg/m³ and the maximum quarterly average concentration was 0.34 µg/m³, both recorded in Area 5, Southeast Los Angeles County

k) - The data for the samples collected on high-wind-days (190 µg/m³ on 4/21/00, 201 µg/m³ on 5/15/00 and 183 µg/m³ on 9/21/00) were excluded in accordance with EPA's Natural Events Policy

Table 6
SCAQMD Permitted Equipment List

Equipment ID	Equipment Name	Bldg No	Permit No	Appl No
M0072	Boiler	171	F5280	322821
M0098	Boiler	171	F5281	322825
M1373	Boiler	168	D86358	295382
M1825	Boiler	167	D93605	307165
M1942	Boiler	180	D88716	297842
M1943	Boiler	180	D88717	297843
M3050	Boiler	161	D86359	295383
M3051	Boiler	161	D86357	295375
M5377	Boiler	167	F5282	322823
M6631R	Boiler	238	D94750	R-291526
S6605	Boiler	230	D84287	293798
S6606	Boiler	230	D83706	293213
1209271	Cleaner	103	D89426	285416
1209272	Cleaner	103	D89425	285415
A103-4	Cleaner	103	375751	375751
367405	Degreaser	170	M50103	140040
367544	Degreaser	233	D80027	287901
JPL-A54	Degreaser	233	R-D60654	260350
JPL-A78R	Deposition System	302	F19446	346766
JPL-A79	Deposition System	302	F7042	324329
8116	Generator	150	D72508	279553
8139	Generator	249	381187	381187
8145	Generator	310	F19914	350183
8158	Generator	277	D83306	285412
8159	Generator	277	D41194	249455
8173	Generator	309	D83261	285222
8216	Generator	202	D83262	285226
8217	Generator	298	D83263	285413
8225	Generator	159	D89306	285410
8226	Generator	199	D89307	285411
8229	Generator	302	D89305	285219
8232	Generator	150	D89308	288576
8238	Generator	308	366520	366520
8241	Generator	MESA	F6219	323269
8242	Generator	150	D98627	314951
8247	Generator	301	F8629	329844
8886	Generator	268	D83305	285227
8984	Generator	311	D89575	289485
S2208	Generator	230	F10324	333459
S2209	Generator	230	F10325	333460
S2210	Generator	230	F6089	325571
JPL-A23	Open Process Tank	170	D89427	289486

Table 6
SCAQMD Permitted Equipment List

Equipment ID	Equipment Name	Bldg No	Permit No	Appl No
A231-1	Oven	231	D89327	299432
JPL-A76	Scrubbing System	302	R-D92595	279200
FWE981	Soil Vapor Extraction System	79	F21002	344402
1052527	Spray Booth	103	D89200	288585
JPL-A15	Spray Booth	168	D89159	288589
JPL-A2	Spray Booth	18.	F20748	354582
JPL-A37	Spray Booth	200	M54836	150469
JPL-A50R	Spray Booth	231	M48234	140039
9390	Storage Tank w Dispenser	288	N02337	302406
JPL-A65RG	Storage Tank w Dispenser	177	N01538	293409
JPL-A65RM	Storage Tank w Dispenser	177	368642	368642
1207852	Vapor Phase Reflow System	103	D89728	289489
JPL-A80R	Vertical Tube Cleaner	302	F13078	337789

Source: JPL 2001

4.0 WATER RESOURCES

JPL receives water from the City of Pasadena through a connection at the east side of the laboratory, near the JPL bridge (B-285), which is located in the northeast part of the facility and joins the laboratory with the east parking lot.. Water is then pumped into three steel reservoirs with a combined capacity of 2.2 million gallons. The reservoirs are located in the hillside area at the northern edge of JPL (JPL 1994a).

Water is distributed throughout JPL via several gravity loops that tie into 10- and 12-inch primary lateral lines located along Explorer Road. Average daily demand is approximately 360,000 gallons per day. JPL has replaced or upgraded some local segments of its primary water distribution system, which included installing seismically activated shut-off valves at the storage tanks.

Water conservation efforts are ongoing, as JPL works to maintain a 15 percent reduction in water usage compared to the baseline year of 1991. The JPL irrigation system is managed centrally from a computer based program to aid in water conservation. A weather station on top of Building 212 provides online weather conditions to automatically adjust water schedule and times. Past efforts have included the installation of no-flow urinals and increasing the cycles of concentration for cooling towers to reduce blow down to sewer.

On-site drainage is generally from north to south. Surface water from the hillsides is transmitted by an underground storm drain system located throughout the developed lower portion of the facility to one of nine points to the Arroyo Seco. Any new construction or paving at the site is not expected to increase stormwater runoff or drainage patterns because most construction is confined to the highly developed main area.

The following section describes water resources in the vicinity of the JPL in terms of surface water, groundwater, water quality standards, and water quality impacts.

4.1 Surface Water

Beyond the eastern boundary of JPL lies the Arroyo Seco, an intermittent stream that drains a portion of the northeastern section of the Los Angeles River Basin, cutting through the San Rafael Hills, and emptying into the Los Angeles River. Natural flow in the Arroyo Seco is dependent on rainfall and is essentially nonexistent during dry months. The average discharge for the Arroyo Seco for the past 74 years (1914 to 1988) at the U.S. Geological Survey stream gaging station located approximately 2 miles upstream of JPL has been 9.79 cubic feet per second (Ebasco 1990).

Devil's Gate Reservoir (used for flood control) is located in the Arroyo Seco Canyon approximately 1 mile downstream from JPL. A proposal by the City of Pasadena Department of Parks

and Recreation for a multi-use project known as the Hahamonga project at the Devil's Gate reservoir area is currently under review. Proposition A approved $1.7 million in funding for the Hahamonga project.The project is designed to capture and restore the natural resources of the area for use by the local community. It will include the development of hiking trails up the Arroyo, an interpretive nature center, complete restoration of native vegetation, and the revitalization of Hahamonga Watershed Park with new benches and lighting. The City of Pasadena Water and Power Department plans to increase spreading basin operations for the project. Some of the land proposed to be used as spreading basins is currently leased by JPL for parking (the East lot).

4.2 Groundwater

The Jet Propulsion Laboratory is located in the Monk Hill Sub-basin of the Raymond Basin, which provides part of the potable water supply for local communities including Pasadena, La Cañada-Flintridge, San Marino, Sierra Madre, Altadena, Alhambra, and Arcadia. The Raymond Basin is a small triangular groundwater basin bounded on the north by the San Gabriel Mountains, on the west by the San Rafael Hills and on the south by the Raymond Fault, which acts as an underground dam (Ebasco 1990). The Raymond Basin aquifer consists of unconsolidated alluvial sediments and is replenished by both natural rainfall and artificial recharge from several spreading basins on the eastern side of the Arroyo Seco downstream of JPL. These spreading basins are operated by the City of Pasadena.

The groundwater table below the site has been encountered during drilling of monitoring wells at depths from 100 to 240 feet, but averages approximately 220 feet below ground surface (bgs) (Ebasco 1990). The groundwater table is significantly influenced by City of Pasadena water supply wells located to the southeast. Groundwater moves typically from La Cañada-Flintridge to the southeast towards JPL then towards these water supply wells. The groundwater contains various chemicals, including some historically used at JPL. JPL was listed in the National Priority List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site in 1992. The local water purveyors constantly monitor the water being served to the public, and take the necessary actions, including blending and treatment, to assure water being provided to the public meets all applicable water quality standards for drinking water. See Section 5 for further information on CERCLA related issues.

4.3 Water Quality Standards

The EPA, in accordance with it's authority under the Clean Water Act, has delegated to California the responsibility for administering a water pollution program consistant with the requirements of the Clean Water Act (CWA). The California Porter-Cologne Water Quality Act establishes the State Water Resources Control Board (SWRCB) and the nine California Regional Water Quality Control

Boards (CRWQCBs), which are responsible for implementing the water pollution control program including the National Pollutant Discharge Elimination System (NPDES) program and the implementation of publicly owned treatment works (POTW) and pretreatment standards.

The Los Angeles Regional Water Quality Control Board revised the Los Angeles Basin Plan in 1993, which established beneficial uses for all water bodies and set water quality objectives to protect those uses. The basic water quality objectives were not changed in the revised plan; however, numerical water quality goals for specific chemicals were not implemented as part of the NPDES Phase I standards. Narrative objectives are present and will be used in turn to set effluent limits, policies, and other conditions that will become part of the individual permits issued by the board.

4.3.1 Storm Water Management

The JPL storm drainage system collects runoff from the site and discharges it to the Arroyo Seco. Several debris basins intercept runoff before it reaches the developed areas of the site. Four major storm drains (24 to 48 inches) and three minor storm drains extend from the northern slopes to the Arroyo, and branch lines (12 to 24 inches) collect the local surface drainage and carry it to the major drains.

California has established a General Industrial Stormwater Permit under NPDES for stormwater discharge. This permit required facilities to eliminate non-stormwater discharges to the storm water system; to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) by October 1, 1992; and to develop a stormwater monitoring program by January 1, 1993. JPL has developed a SWPPP and a storm drain monitoring system is in place (JPL 1994b).

JPL currently holds two NPDES permits; one for discharge of stormwater from the overall site and one for discharge of groundwater from an artesian well behind the 25-foot Space Simulator (Building 150) into the storm drain system.

4.3.2 Wastewater

In compliance with the CWA, the State of California has developed strategies to manage wastewater discharge in California. The CWA requires that pretreatment standards be developed, and makes these standards enforceable. Wastewater is composed of sanitary or industrial wastewater discharged to publicly owned treatment works (POTW) or federally owned treatment plants, or stormwater discharge associated with industrial activity to a receiving stream or water body. It is the pretreatment standards, established by local water quality control boards, that determine the allowable discharges to sanitary sewers. Wastewater discharge to sewers in the Los Angeles basin is regulated by

the wastewater ordinance of the Sanitation Districts of Los Angeles County (SDLAC). The wastewater ordinance regulates sewer construction, sewer use, and both direct and indirect industrial wastewater discharges. The EPA has enacted specific requirements, establishing the means for implementing the intentions of the CWA.

The Los Angeles Regional Water Quality Control Board regulates the discharge from the SDLAC Whittier Narrows POTW, which receives the wastewaters from the JPL Oak Grove facility. The SDLAC regulates industrial wastewater discharges through their Industrial Wastewater Discharge Permit Program with both the Federal pretreatment requirements and a set of local limits designated as Phase I discharge limits. Federal categorical pretreatment standards are based on the discharge flow rate from specific processes. The SDLAC discharge limits are, however, based on the total sewage flow from a facility.

The SDLAC issued Industrial Wastewater Permit No. 7024 to JPL on August 3, 1981. SDLAC issued an addendum to this permit on July 2, 1990 to include wastewater discharge from the Microdevices Laboratory (Building 302). JPL obtained another permit revision to accommodate temporary discharge from the mirror refabrication operation (Building 313). JPL completed this operation in 1995, and filed a revision to remove this source from the permit. This source was removed once the permit was approved.

The primary source of wastewater at JPL is sanitary waste, which is disposed of through the sanitary sewer. A number of relatively small industrial wastewater sources including laboratories and metal fabrication shops exist at JPL. However, the current JPL practice of intercepting and collecting all hazardous waste streams for disposal by the EAO precludes direct discharge of hazardous laboratory waste into the sanitary sewer. See Section 10 for more information on hazardous waste. The principal sources of industrial wastewater are summarized in Table 7.

Table 7
Industrial Wastewater Sources at JPL

Location		Discharge
Building Name and No.	Area	
Solid Fuel Lab (98)	Room 101	Rinse from dishwasher
Fabrication Shop (103)	Room 108C	Rinse from circuit board cleaning
Materials Research Processing Lab (158)	Room 106	Rinse from sample preparation (cutting and grinding)
Instrument Systems Lab (168)	Machine Shop	Rinse from parts cleaning
Fabrication Shop (170)	Machine Shop	Rinse from parts cleaning, waterjet machine tool
Transportation Garage (177)	Outside	Carwash overflow
Paint Shop (231)	Paint Shop	Rinse from brush cleaning
System Development (233)	Room 129	Rinse from parts cleaning
Earth & Space Science Lab (300)	Rooms 108 B, C, D	Rinse from Polaroid positive/negative processing
Microdevices Lab (302)	Outside	Reverse osmosis reject – DI water system
Cooling Towers		Cooling Tower blowdown
Boilers		Boiler blowdown

Source: JPL 2001

5.0 CERCLA

The JPL facility was placed on the National Priority List (NPL) in October 1992. Since being placed on the NPL, Remedial Investigations (RI) for the on-facility soil, on-facility groundwater, and off-facility groundwater have been completed. The Feasibility Study (FS) for the soil has also been completed and the issuance of the Record of Decision was completed in fall 2002.

5.1 Basis for NPL Listing

An estimated 100,000 people obtain drinking water from municipal wells within 4 miles of the JPL Oak Grove site. In the early 1980s, volatile organic compounds (VOCs) were detected in three City of Pasadena wells and two Lincoln Avenue Water Company wells. The five wells were shut down between 1985 and 1989. The City of Pasadena wells returned to service in October 1990 after NASA funded the installation of a water treatment system in the Arroyo Seco. The Lincoln Avenue Water Company also installed a water treatment plant and restarted production from one well in 1992. In June 1997, the City of Pasadena removed one well from service after perchlorate was detected. In January 2002, the City of Pasadena removed all wells in the Arroyo from service. A preliminary assessment/site inspection (PA/SI) was conducted in 1988. Groundwater samples were collected from beneath the facility, and certain VOCs were detected at levels above the drinking water standards (Ebasco 1990). During the expanded site inspection, 38 soil gas collectors were used to collect preliminary data on the extent of chemical components in the soil (Ebasco 1990). Potential source areas of greatest concern were identified in the northeast section of the facility.

When built in the 1940s and 1950s by the Army, many buildings at JPL relied upon cesspools for the disposal of wastes collected from sinks and drains. These cesspools, or seepage pits, were designed to allow liquid wastes to seep into the underlying soil where they would undergo natural biodegradation. In addition to the seepage pits, other potential sources included a settling chamber in the storm drain system, from which soil containing VOCs was excavated, and an area where waste solvents were reportedly disposed of in shallow pits. After NASA assumed control of JPL from the Army in 1958, a site-wide combined sewer system (i.e., sanitary and industrial) was installed and cesspool usage was discontinued.

5.2 Remedial Investigations

NASA is the lead Federal agency responsible for remedial actions at JPL-OGF and works in cooperation with California Department of Toxic Substances Control (DTSC), CRWQCB, and the EPA. NASA is currently in the remedial investigation feasibility study (RI/FS) phase of the cleanup process for groundwater. During this phase, the nature and extent of the chemicals in groundwater is being defined and an evaluation of how to execute the remediation project is being conducted.

To expedite the soil and groundwater investigation, NASA installed wells to monitor chemicals in groundwater, conducted a soil gas survey to detect VOCs in the soil, and drilled numerous soil borings to determine the nature and extent of the chemicals in the soil. Figure 4 details the locations of monitoring wells installed or under construction as of 2000.

To manage the RI, three designated operable units (OU) have been established: on-facility groundwater (OU 1), on-facility soil (OU 2), and off-facility groundwater (OU 3). OU 1 addresses the chemicals in groundwater directly under the JPL facility and in the Arroyo Seco directly to the east; OU 2 addresses the possible chemical sources in the soil beneath the facility; and OU 3 addresses potential chemicals in groundwater to the east and to the south of JPL.

The Final RI for OU 1 and OU 3 was completed in August 1999. Per the recommendations contained in the RI, groundwater quality has been monitored. The Final RI for OU 2 was completed in November 1999. The following sections discuss the findings of the Final RIs.

5.2.1 On-Facility and Off-Facility Groundwater

Ten groundwater sampling events were conducted between 1994 and 1998 by JPL. For each sampling event, groundwater from 18 on-facility and five off-facility wells was collected and analyzed for VOCs, metals, perchlorate, and other chemicals. Detected VOCs included carbon tetrachloride, chlorobenzene, 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), 1,1,2-trichloro-1,2,2,-trifluorethane (Freon 113), trichloroethene (TCE), tetrachloroethene (PCE), trichlorofluoromethane (Freon 11), toluene, total trihalomethanes, and xylene (Ebasco 1998). The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) reviewed the available data and determined that groundwater at the CERCLA site does not present a past, present, or future public health threat to employees or nearby residents (ATSDR 1999).

The RI concluded that past activities at JPL may have affected groundwater quality. The constituents of concern are certainVOCs, perchlorate, and metals (Pb, As, total and hexavalent chromium (Cr). Only five constituents were found above their respective drinking water standards or interim action evels: three VOCs (CCl_4, TCE, and 1,2-DCA), perchlorate (ClO_4^-), and total chromium (Cr). Hexavalent chromium was also detected, but no maximum contaminant levels (MCLs) have been established for this chemical. Of these, 1,2-DCA was detected in the on-facility wells only. Chromium was detected in a few of the on-facility wells but rarely in scattered off-facility wells and at levels below MCL's. Contaminants present in concentrations less than the relevant MCLs do not present a public health risk. Regulatory agencies involved in the JPL CERCLA decision-making process have reviewed the data and determined that the chromium levels do not pose a risk to the general public since there are no drinking water wells located within the boundaries of JPL. Based on this determination there is no remedial action that is

necessary at this time. Details of the chromium risk evaluation may be found in the Remedial Investigation Final Reports for JPL operable units 1 and 3.

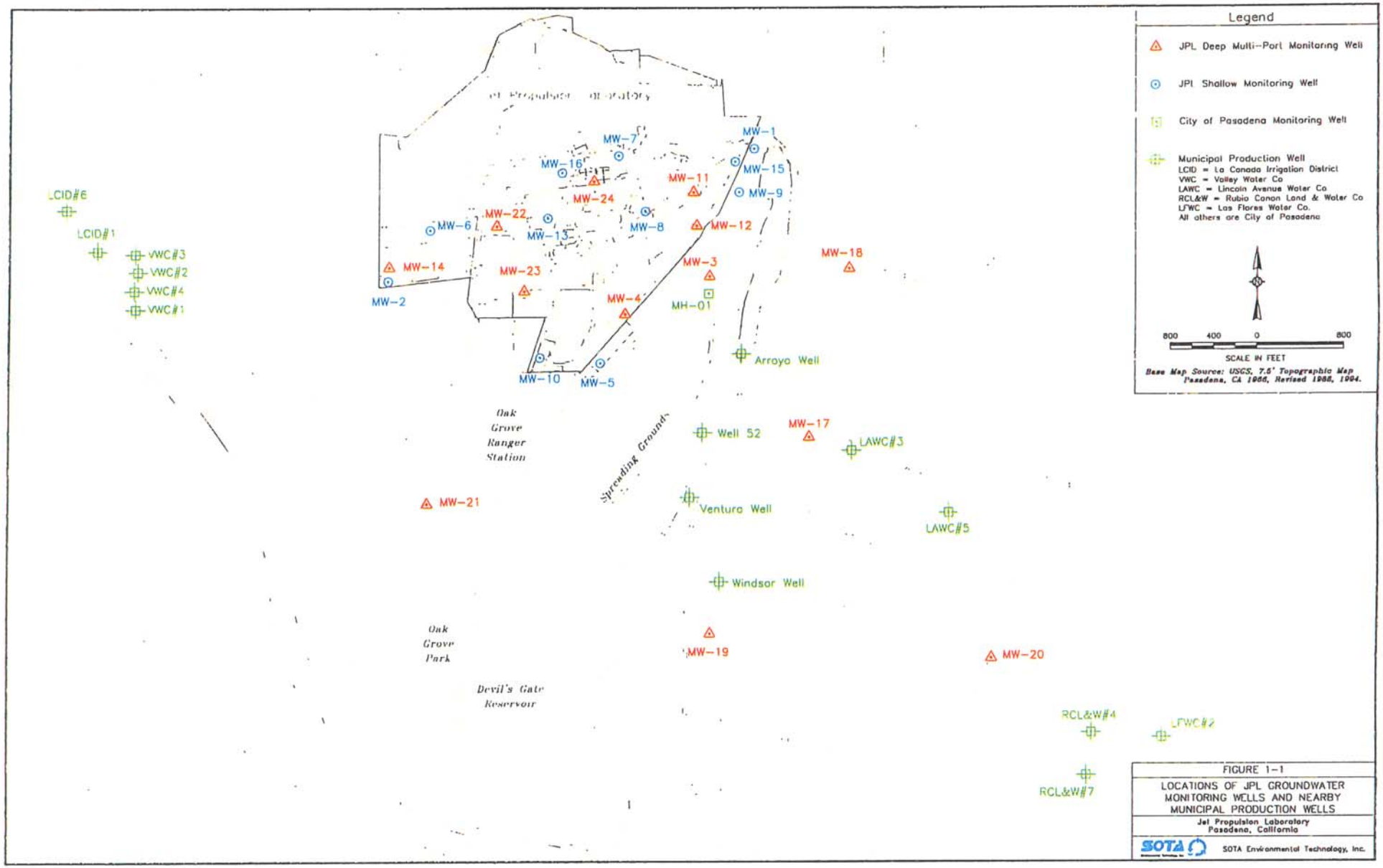

FIGURE 1-1

LOCATIONS OF JPL GROUNDWATER MONITORING WELLS AND NEARBY MUNICIPAL PRODUCTION WELLS

Jet Propulsion Laboratory
Pasadena, California

SOTA Environmental Technology, Inc.

Quarterly monitoring continues to date. The most recent groundwater monitoring found that the constituents of concern are well defined, and chemical plumes are predominately stable. Groundwater flow is primarily to the southeast towards the Arroyo, which is consistent with past years (Foster Wheeler 2001).

5.2.2 On-Facility Soil

The RI objectives for OU 2 included characterizing the types of chemicals in the soil and determining their lateral and vertical extent; determining if the chemicals present have reached groundwater beneath JPL-OGF; conducting risk assessments; and developing a potential remediation approach, if needed. Results of the RI indicate that the following compounds are present in soil: CCl_4, TCE, Freon 113, and 1,1-DCE. The VOCs are present from about 50 feet below ground surface down to groundwater (at 200 feet or more below ground surface). ATSDR determined that exposure to soils at the JPL facility and in the Arroyo Seco is unlikely to cause either short-term or long-term adverse health effects to employees or the public due to low levels of chemicals of concern, the depth of these chemicals, or infrequent or unlikely exposure (ATSDR 1999).

5.3 Feasibility Studies

The Draft Feasibility Study (FS) for OUs 1 and 3 considered the use of pump and treat as the preferred remedial approach. The pump and treat system may consist of air stripping to remove VOCs, followed by a system to remove perchlorate. Other new and innovative technologies are also being considered to remove chemicals from groundwater at the JPL-OGF CERCLA site. Several of these technologies are presently being pilot-tested at the JPL-OGF facility. The FS for OU 1 is expected in spring 2003, and an Engineering Evaluation/Cost Analysis is presently being developed for OU 3.

The FS for OU 2 was completed in July 2000 and recommended soil vapor extraction as the preferred remedial approach. The plan called for up to five extraction wells and five off-gas treatment systems as well as on-going soil vapor monitoring. Off-gas treatment may consist of granular activated carbon. The Proposed Plan for OU 2 was submitted for public comment in April 2001. The ROD is expected to be issued in fall 2002. Full-scale remediation of contaminated soils is set to begin in October 2002.

6.0 LAND USE

The following sections describe regional land use, site land use, and the land resources in and around the JPL site. Land resources are described in terms of topography, geology, and seismology. Future expansion at JPL is limited by local topography and surrounding regional land use.

6.1 Regional Land Use

The primary land use near JPL-OGF is residential, except for the relatively undeveloped areas of the Angeles National Forest to the north and the Arroyo Seco to the east. Low-density single-family residential areas of La Cañada-Flintridge and Pasadena surround JPL.

There are no industrial land uses near JPL. City of Pasadena groundwater replenishing spreading grounds are located in the Arroyo Seco adjacent to JPL. Other specialized land uses adjacent to JPL include equestrian riding clubs, a U.S. Forest Service facility ranger station, and a Los Angeles County Fire Department facility.

The closest commercial land use in the vicinity of JPL lies in the Foothill Boulevard corridor between Crown Avenue and Oak Grove Drive. Development in this area caters to the local residents, with commercial establishments including gas stations, grocery stores, and a dry cleaners, etc. Stores fronting on sidewalks have limited setbacks, moderate off-street parking, and limited landscaping.

6.2 Site Land Use

The majority of land surrounding JPL is within the City of La Cañada-Flintridge, and is zoned as single-family residential, with a 15,000 square foot minimum lot size. The remaining areas of JPL lie within the City of Pasadena (the parking lot east of Arroyo Road, the leased parking area east of the Arroyo Seco, and a small triangular section near the northeastern corner of the facility). These areas of JPL are zoned as single family residential, with a 12,000 sq. ft. minimum lot size and have an open space land use designation in the General Plan (Ebasco 1990). The Arroyo Seco adjacent to JPL, which is used as a flood control reservoir, is currently used for spreading basins and recreational facilities. There are plans to increase public use of the Devil's Gate Reservoir area by creating the Hahamonga Watershed Park, which is described in Sections 2.1 and 4.1.

6.3 Land Resources

6.3.1 Topography

JPL is located near the southwestern base of the San Gabriel Mountains. The northernmost portion of the site is mountainous and steep, and is topped by a narrow, level ridge. The remainder of the site slopes moderately and has been graded extensively throughout its development. The JPL facility varies in elevation from 327.6 meters (1,075 feet) to 139.5 meters (457.7 feet) above mean sea level (Ebasco 1990).

Periodic tectonic uplift of the San Gabriel Mountains has occurred during the past 1 to 2 million years producing the present topography of the area. Most of this uplift occurred along the north to northeast dipping reverse and thrust faults located along the southwestern edges of the San Gabriel Mountains.

6.3.2 Geology

JPL is situated on an alluvial plain of the San Gabriel Mountains. The San Gabriel Mountains north of JPL are of the Quaternary Pacoima Formation. This formation is composed of conglomeratic arkosic sandstones of stream channel and fanglomeratic origin (Ebasco 1990). Figure 5 illustrates the general geology of the Los Angeles basin and the JPL area. Alluvial deposits extend approximately 72 meters (236 feet) below ground surface (bgs) (Ebasco 1990). The soil consists primarily of 20 to 30 inches of fine sandy loam (Hanford Series). A similar subsoil extends to a depth of 6 feet and is underlain by a granitic basement. This crystalline basement is composed of rocks ranging from Precambrian to Tertiary and includes various types of diorites, granites, monzonites, and granodorites with a complex history of intrusion and metamorphism.

6.3.3 Seismology

The Los Angeles region occupies a junction between two major zones of intersection of strike-slip and thrust faults. Tectonic stresses are governed by regional north-south compression and northwest trending right-lateral strike-slip faulting. The San Andreas fault accommodates over half the strain produced by this motion, with the remaining strain variously distributed across nearly one hundred regional faults. The Santa Monica and San Gabriel Mountains are frontal thrust faults within this system. Figure 6 details the fault locations in the vicinity of JPL.

The Sierra Madre earthquake occurred on the morning of June 28, 1991 and was epicentered 7 miles beneath the San Gabriel Mountains. The earthquake was significant in that it confirmed the seismogenic potential of the central reach of the Sierra Madre fault zone. The earthquake caused

landsliding in the San Gabriel mountains and damaged numerous older homes and structures in the foothill communities (Pipkin and Proctor 1992).

The Sierra Madre fault system includes several faults and accompanying branches: Mt. Lukens thrust fault is west of JPL; the south branch of the San Gabriel thrust fault lies east of the Arroyo Seco and is the primary range-front fault; others occur along the southern edge of the San Gabriel Mountains

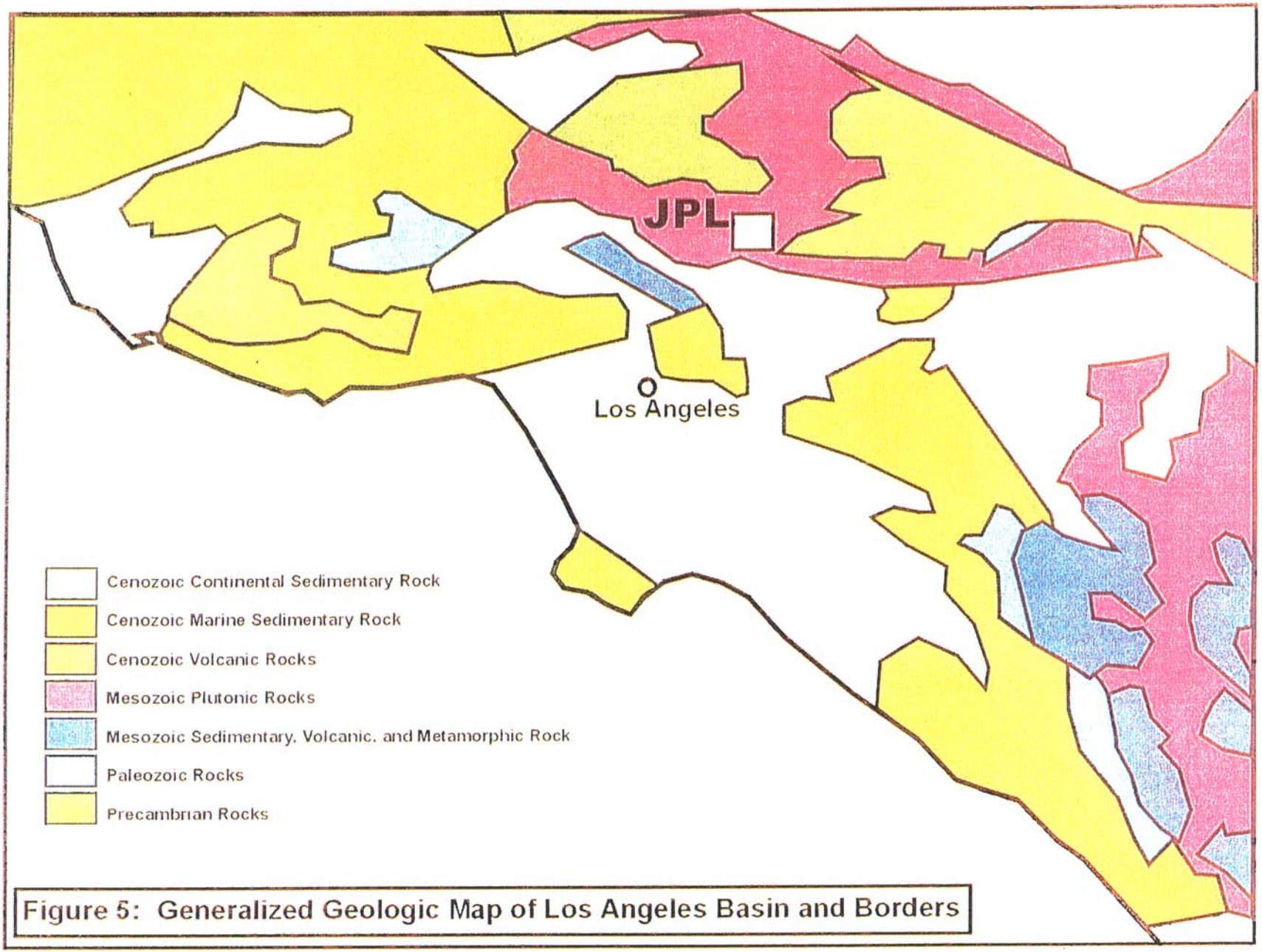

Figure 5: Generalized Geologic Map of Los Angeles Basin and Borders

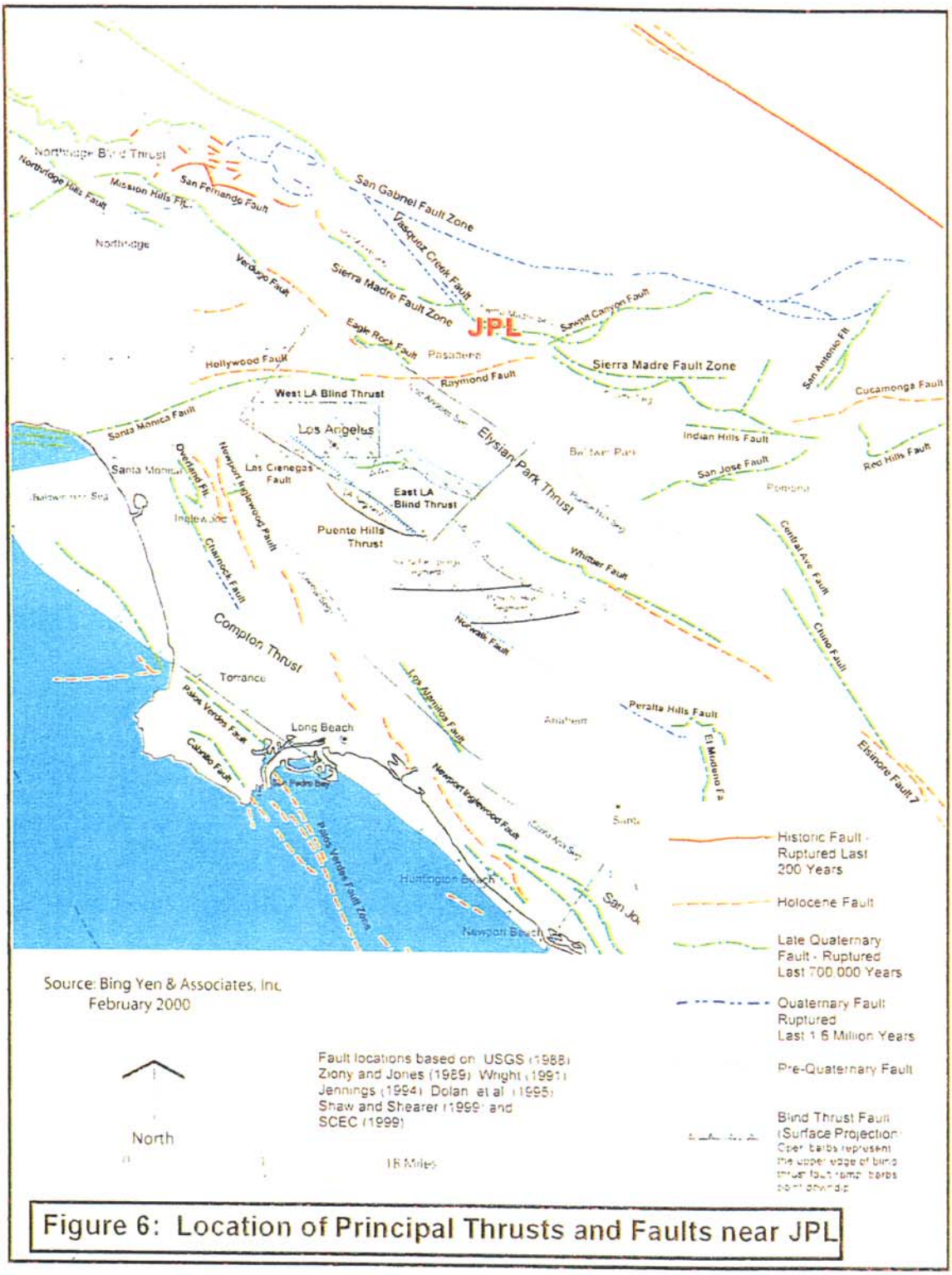

Figure 6: Location of Principal Thrusts and Faults near JPL

(see Figure 7). The San Gabriel fault has a potentially active slip rate of 2 inches (50.8 millimeters) per year. The designation of a fault's activity is based on geologic evidence of prior surface displacement within the last 11,000 years of Holocene time. By this definition, both the Sierra Madre and San Gabriel faults can be classified as active (Pipkin and Proctor 1992).

The JPL Bridge Fault, part of the Sierra Madre fault system, crosses the laboratory site (Figure 7). The main fault trace coincides with the southern edge of the San Gabriel Mountains. A field check conducted in 1990 confirmed the JPL Bridge Fault's location near the Solid Fuel Laboratory (Building 98), west of the present bridge across the Arroyo Seco. At this location the trace of the JPL Bridge fault can be found at the contact between granitic alluvium at the foot of the hill behind JPL and the crystalline basement (diorite at this location) above it. Along with the main fault trace, several potential rupture zones are present in the western half of the site (Ebasco 1990) (Figure 8).

In evaluating potential seismic hazard, it is important to note that these faults are active and the risk of a damaging earthquake to the Los Angeles Basin is approximately 5 percent per year (Pipkin and Proctor 1992). For facility seismic compliance, JPL has established stringent structural criteria and "setback zones" 50 metric feet from the main fault trace (Boyle 1988).

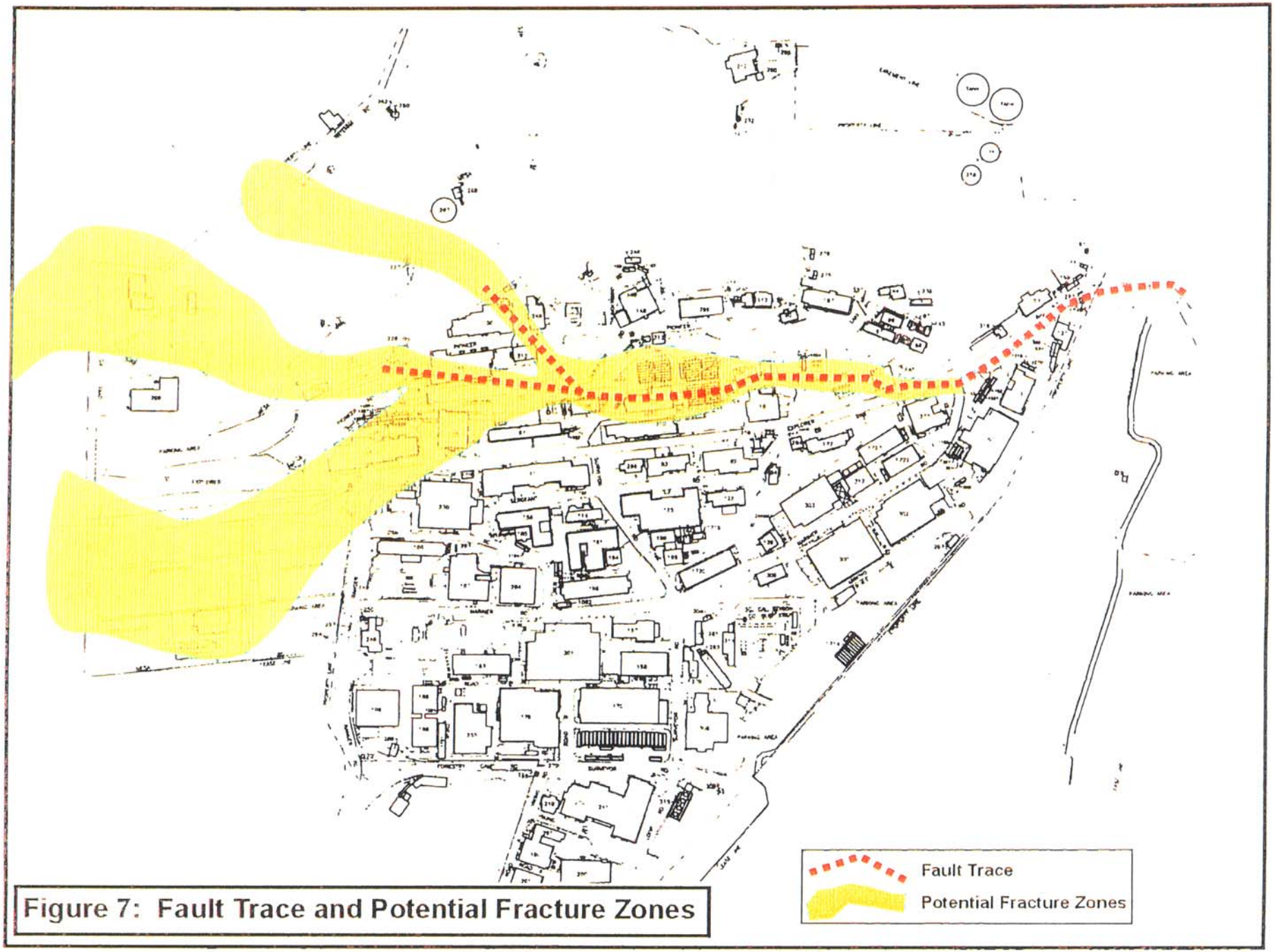

Figure 7: Fault Trace and Potential Fracture Zones

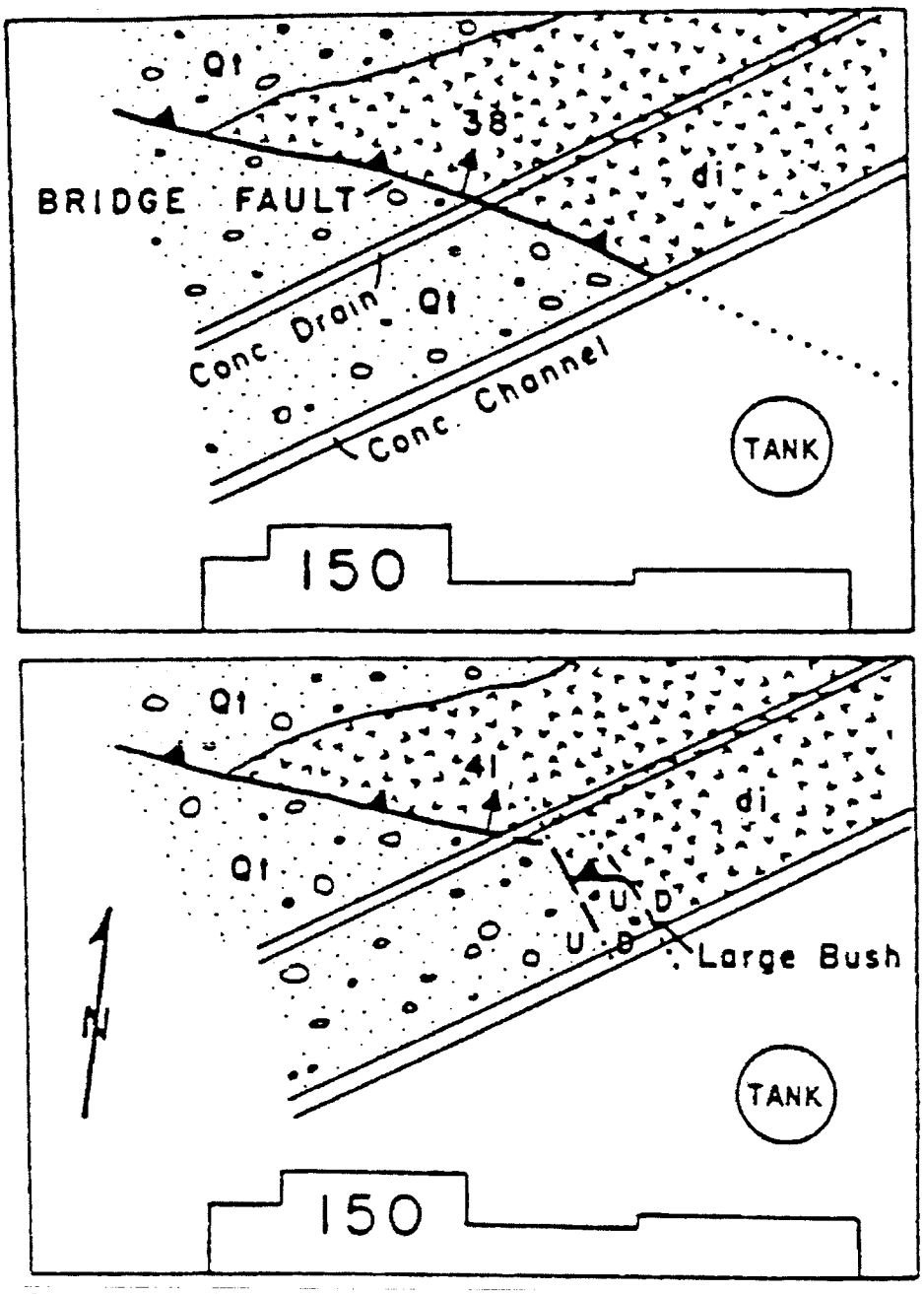

Figure 8: JLP Fault as Mapped Behind JPL Building 150

7.0 BIOTIC RESOURCES

This section summarizes the findings of Circle Mountain Biological Consultants, who prepared a Biological Resources Inventory for JPL (CMBC 2001). A general biological survey of the undeveloped 65 acres of hillside at the site was conducted to identify the habitats, plant species, and animal species present. The inventory also included an evaluation of the adjacent Arroyo Seco for the presence of the Southwestern Arroyo Toad, a federally listed species (see Appendix A).

Red Tailed Hawk

7.1 Inventory and Survey Methods

A literature search was conducted as the first step in the inventory. It included the California Natural Diversity Database, the U. S. Fish and Wildlife Service (USFWS) lists of species of federal status, and the City of Pasadena Database.

JPL consultants visited the site on five occasions to conduct surveys. Expert biologists, holding the necessary 10(a)(1)(a) scientific collecting permits, evaluated habitat on the facility for suitability for two federally listed species: 1) the Southwestern Arroyo Toad, an endangered species with designated critical habitat that includes the Arroyo Seco wash and portions of the JPL Oak Grove facility; and 2) the California gnatcatcher, a threatened species. See Section 8 for the discussion of endangered species.

7.2 Vegetation Map

JPL's Oak Grove Facility encompasses 176 acres of land, of which approximately 65 acres (approximately 37 percent) remain relatively undeveloped, primarily located on the slopes and canyons of the mesa area. Within these 65 acres, approximately 31 acres (± 48 percent) are vegetated by chaparral series, 13 acres (± 20 percent) by coastal scrub series, and about 8 acres (± 12 percent) by oak woodland. The remaining 12 acres (± 18 percent) consist of mowed firebreaks, disturbance-adapted native and exotic grasses and forbs, and areas with primarily non-native naturalized or landscape plants.

7.2.1 Hillsides

The hillsides and canyons support a mix of chaparral and coastal scrub communities, also with many exotic elements. These communities blend and intergrade with one another (hence the term

"series"), so that delineation of boundaries between vegetation types is only an approximation. The relatively undeveloped "mesa" portion of the facility consists of primarily south-facing hillsides and canyons below the ridgeline on the northern boundary of the facility. Plant communities in this area have been mapped in Figure 9.

Hillside Chaparral

Chaparral plant communities present include three series: chamise-white sage, chamise, and sumac. The chamise-white sage series occupies the largest area, extending over approximately 27.6 acres on several large slopes and hillsides from the northwestern edge of the mesa to the eastern portion. The chamise series covers about 3.0 acres on a southwest facing hillside on the northwestern edge of the facility, located above and east-northeast of the Gyro and Magnetics laboratories (Buildings 251 and 253). The sumac series is present on approximately 2.7 acres of sheltered, more northerly-facing hillsides and canyon bottoms, in wetter sites than the other chaparral series. Small, unmapped patches of this series may also occur within larger areas occupied by other chaparral types.

The coastal scrubs found on the facility also occur as intergrading series. These include the California sagebrush, mixed sage, and black sage series. The California sagebrush series occupies approximately 10.1 acres on the slopes of the mesa. The mixed sage series occurs on approximately 2.8 acres at the mouths of two canyons in the center of the mesa. A small patch (approximately 0.2 acre) of black sage plant community was identified in the eastern ridgeline of the mesa, where a large antenna has been installed.

7.2.2 Lower Facility

Vegetation on the lowest parts of the slopes is a mix of exotic landscaping plants and coast live oak woodland. Oleander and exotic weeds are well established or becoming established on the edges of Mesa Road. Star-thistle is in the early stages of establishment near the west end of the ridgeline of the mesa, along the fence line and near an antenna. The only native woodland habitat present on the facility is coast live oak woodland.

Fire prevention efforts, essential for the protection of buildings and other structures on the facility, consist of strips of mowed vegetation approximately 30 feet wide, established as a fuel-break

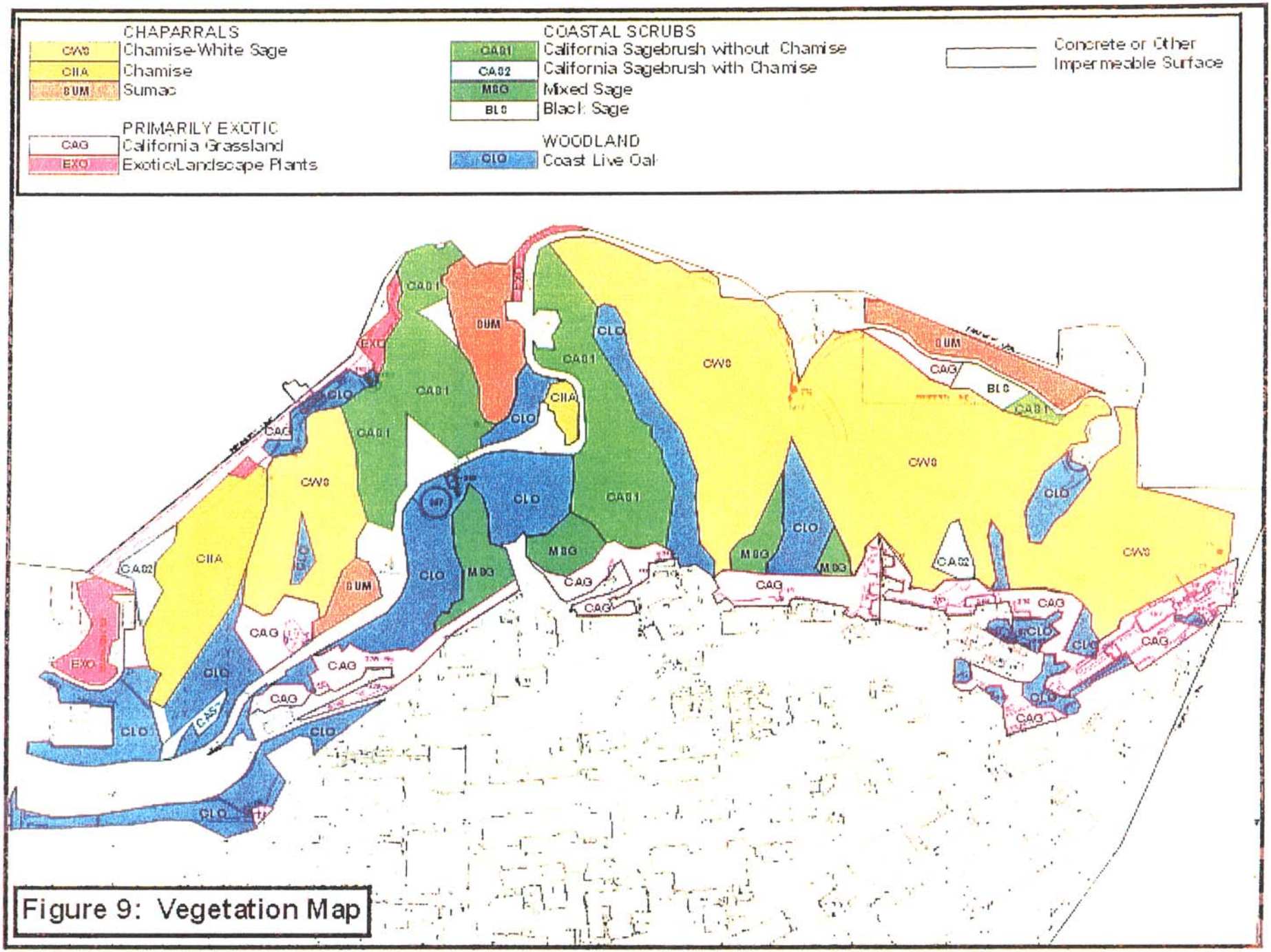

Figure 9: Vegetation Map

between the brushy hillsides and the buildings at the bottom of the slope. Long-term fire suppression on the hillsides has also contributed to older, very dense, more woody, and thus, less productive chaparral communities.

On the more developed portions of the facility, a mix of exotic landscaping, weeds, and native plants is found throughout. Some of the exotic plants include fountain grass, slender-leaved iceplant, and pampas grass. An exotic tree, carrotwood (*Cupaniopsis anacardioides*), appears to be naturalizing in the canyon bottoms, apparently a recent phenomenon in southern California.

Coast Live Oak

A significant number of mature coast live oak trees (approximately 70) are present, sometimes isolated in planters as specimen trees (for example, near the Physical Science Laboratory and the Microdevices Laboratory [Buildings 183 and 302]), or retained within a landscaped area as along Explorer Boulevard. Some areas have over a dozen trees retained in groups, as near the transportation garage (Building 177) and as shade trees in the parking lots on the east part of the facility. Los Angeles County and the cities of Pasadena and La Cañada Flintridge have statutes that call for the protection of mature oaks and other heritage trees to the extent possible. JPL complies with all such statutes.

7.3 Wildlife

The Oak Grove facility supports a variety of wildlife, including reptiles, birds, and mammals. Three common reptile species typically associated with chaparral, oak, and coastal scrub habitats were observed during field studies: side-blotched lizard, western fence lizard, and California whipsnake. Other reptile species are likely present, such as alligator lizard, western skink, gopher snake, western rattlesnake, etc.

Very diverse assemblages of birds use habitats on the facility, as year-round, summer, and some winter residents or migrants. More than 60 bird species were noted during field surveys conducted in 2001 (CMBC 2001). Typical species observed in native habitats include western scrub jay, California towhee, spotted towhee, wrentit, red-tailed hawk, oak titmouse, acorn woodpecker, band-tailed pigeon, Bewick's wren, and others. A number of native and exotic species closely associated with human habitation were also observed, such as northern mockingbird, common raven, American crow, rock dove,

and European starling. Several nutmeg mannikins (an exotic finch that has recently established wild populations in southern California, presumably from escaped cage birds) were observed.

Six mammal species were observed during field surveys: rabbits, squirrels, wood rats, coyote, skunks and mule deer. Raccoons, bobcats, gray foxes, deer mice, pocket gophers, California ground squirrels, gray squirrels, and other mammals of the southern California foothills are all likely present at times on the facility. The mule deer are abundant and acclimated to human presence. These animals often bed and forage in areas immediately adjacent to roads and buildings. Mountain lions have been observed occasionally on the facility.

Mule Deer

7.4 Impacts

Impacts on biotic resources are generally limited to the developed, southern region of JPL. In this area, the development and level of activity limits the resources to those species that are tolerant of disturbed, improved areas. Additionally, noise, traffic, and other factors discourage animals in this area.

The current stock of ornamental vegetation is fairly stable at JPL. Vegetation is maintained on site through the landscape management program. Part of the management program is the pesticides/herbicides/insecticides program. This program targets common weeds and insects, in addition to the California ground squirrel and gophers (see Section 11). There is minimal facility impact on the native chaparral habitat due to the restricted access.

8.0 ENDANGERED SPECIES

There are no federally designated threatened or endangered species, or California-designated rare or endangered species known to occur in the JPL area. JPL consultants surveyed the site on five occasions and did not find evidence of species listed by either the state of California or federal government (CMBC 2001). No special-status plants were detected during surveys of the site. Only two special-status animals, the Cooper's hawk and a sharp shinned hawk, both California Species of Special Concern, have been observed on the facility.

8.1 Vegetation

Nevin's barberry and Braunton's milk-vetch, two federally endangered plants, and San Fernando spineflower, a candidate for both federal and state listing as threatened or endangered, have potential to occur on the facility. However, none of these species was detected during project surveys.

Two rare and endangered plant species, Nevin's barberry (Berberis nevinii) and the Los Angeles sunflower (Helianthus nuttalli), occur in habitats such as the Arroyo Seco (sandy, gravelly habitats). These species are currently Category 4 candidates, which make them eligible for listing in the future.

Though they were not detected during site surveys, the facility provides the proper habitat of chaparral, coastal scrub, or woodland for seven special-status plant species: Plummer's mariposa lily, Parry's spineflower, San Gabriel bedstraw, Robinson's peppergrass, Brand's phacelia, Davidson's bush mallow, and southern skullcap.

8.2 Reptiles and Amphibians

Although the Oak Grove facility falls within designated critical habitat for the arroyo southwestern toad (Bufo californicus) a federal endangered species and California species of special concern, the species was not detected during site surveys and is unlikely to occur on the facility, based on terrain and habitat requirements. JPL has consulted with the USFWS regarding the arroyo southwestern toad. Critical Habitat designation and its impact on presently occurring and reasonably foreseeable on-site activities. The USFWS determined that no further consultation is required for activities undertaken in the developed portions of the facility (south of Pioneer Road). However, any activities proposed for the native chaparral north of Pioneer road would require USFWS consultation.

A permitted biologist, with expertise on the arroyo southwestern toad evaluated habitat on site and in the adjacent Arroyo Seco for the species. The biologist concluded that "land development and uses within the JPL boundaries south of the East Entrance Bridge preclude significant use by arroyo toads, and can no longer be considered as viable arroyo toad habitat" (Sandberg 2001); thus focused surveys for

arroyo southwestern toad on the facility were not considered necessary. Other special-status reptiles and amphibian species are not likely to occur.

8.3 Birds

Six special status birds may occur on the facility: the coastal California gnatcatcher (Polioptila californica californica), the golden eagle, the Cooper's hawk, sharp-shinned hawk, Bell's sage sparrow, and the American peregrine falcon. Out of these six, the first five are listed as California species of special concern. The American peregrine falcon is listed by California as endangered. Only two of these species, the Cooper's hawk and the sharp-skinned hawk, were observed on the facility. No others were sighted at JPL.

Cooper's Hawk

The coastal California gnatcatcher is also federally listed as a threatened species. A focused survey for the California gnatcatcher, a federal threatened species and California species of special concern, was recently conducted. The suitability of habitat for the coastal California gnatcatcherwas evaluated, and the JPL consultant determined that about four acres of suitable habitat is present on the facility. Because the coastal California gnatcatcher utilizes several types of coastal scrub, but appears to avoid scrubs where chamise is present, the California sagebrush series was further subdivided for mapping purposes. This series is present without a chamise component on approximately 1.1 acres, on the lower slopes of the mesa, generally down slope from a chaparral series or interspersed with coast live oak woodland. California sagebrush series with a chamise component occupies about nine acres on slopes in the central part of the mesa. No California gnatcatchers were observed during any of the nine days of the survey. Results of these surveys are included in Appendix B.

8.4 Mammals

Six special-status bat species have potential to occur in the vicinity of the facility (pallid bat, fringed myotis, long-eared myotis, small-footed myotis, spotted bat, Townsend's big-eared bat). These species may forage or roost on the facility and nearby areas, especially the Arroyo Seco. The Los Angeles pocket mouse, a California species of concern, could be affected by loss or degradation of native plant communities. None were observed

9.0 WETLANDS AND FLOOD PLAINS

9.1 Wetlands

The U.S. Fish and Wildlife Service defines wetlands as lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year. (USFWS web page, August 2001)

JPL is near the base of the San Gabriel Mountains at elevations between 1,075 and 1,550 feet. The water table beneath the site averages 220 feet below ground surface. Therefore, JPL does not meet the definition of a wetland. The closest wetland is Seal Beach in Orange County.

9.2 Flood Plains

As defined by the USGS, a flood plain is a portion of a river valley, adjacent to the channel that is built of sediments deposited during the present regimen of the stream and is covered with water when the river overflows its banks at flood stages. The dynamic floodplain of the Arroyo Seco supports a classic assemblage of Southern California plant and animal communities.

The County of Los Angeles Department of Public Works owns and operates Devil's Gate Dam and the dam facilities, including a flood control easement to the top of dam parapet wall that is at elevation 1075. The County operates the flood control channel from the outlet of Devil's Gate Dam through the Arroyo Seco to its confluence with the Los Angeles River (Pasadena 2000). The County Department of Public Works Flood Maintenance Division is responsible for maintaining everything within the 1075 easement (the top of the parapet wall) related to flood control and debris removal.

10.0 WASTE GENERATION AND MANAGEMENT

JPL uses various chemicals in research and development activities and for overall laboratory maintenance. As a result, JPL generates a variety of chemical wastes in small quantities. Typical wastes include mixed solvents, contaminated laboratory glassware, reaction products, and out-of-date or excess chemical reagents. Large amounts of non-hazardous waste are also generated (e.g., paper and plastic).

10.1 Hazardous Wastes

JPL generates 1,000 kilograms or more of a variety of hazardous waste per month and is therefore classified as a large quantity generator. Research and development activities generate many different types of laboratory chemical wastes, which are generated in small quantities and are commonly chemicals that have either exceeded their shelf life, are excess after completion of a project, or are spent after being used in a given project. An inventory of hazardous chemical wastes in storage for disposal at any given time may include over 150 different substances. In most cases, the quantity of any one laboratory waste is less than a gallon of liquid or kilogram of solid material. These are typically lab-packed for disposal. Table 8 lists the 1999 total of hazardous wastes from JPL shipped off site.

Hazardous wastes are moved from the point of generation to the Hazardous Waste Accumulation Facility (Building 305) for temporary storage prior to transport for recycling/disposal off site. The facility includes four separate areas for storage of compatible materials and a fenced outside area with sloped, epoxy-coated floors for packing laboratory wastes. The facility is designed to contain spills. Inspections of the hazardous waste accumulation facility are conducted weekly per state and federal regulations, and a hazardous waste inventory is updated continuously.

Per JPL policy, up to 55 gallons of hazardous waste or 1 quart of extremely hazardous waste may be accumulated for up to 9 months at the point of generation. Materials then must be moved to Building 305, and may remain there for up to 90 days. Before the end of the 90-day period, materials are removed from Building 305 by a licensed hazardous waste hauler and transported to permitted hazardous waste disposal or recycling facilities. The actual type and quantity can vary daily.

Before any material is accepted for storage, it must be properly contained and labeled with a Hazardous Materials Disposal Form. This form provides the chemical name, associated hazards, quantity, physical state, and other specific information. Decisions about whether a particular material is hazardous or non-hazardous are made by JPL in accordance with applicable state and federal hazardous waste regulations. This system is designed to maintain a complete and precise waste inventory.

Table 8
1999 Totals of Generated Hazardous Waste

Waste Stream	Waste Code	Pounds
Ignitable non-halogenated solvents from cleaning and degreasing: acetone, alcohol, methanol and methyl ethyl ketone	212	9,351
Halogenated solvents from cleaning and degreasing:1,1,1-trichloroethane, methylene chloride and trichloroethene	221	1,913
Halogenated solvent: Freon	211	134
Waste Oil with Freon	221	1,281
Gasoline and water	212	546
Paint waste	291	3,448
Ignitable non-halogenated solvents from laser operations: methanol	214	677
Toxic activated carbon from soil vapor wells: tetrachloride and 1,1-dichloroethylene	211	12,750
Toxic waste photographic silver	541	1,586
Corrosive waste acids from surface cleaning: nitric, sulfuric, chromic and hydrochloric acids	791	2,213.
Corrosive waste acids from silicon chip etching and cleaning: hydrofluoric acid	791	729
Ignitable, corrosive waste caustic solutions from silicon chip etching: ethylenediamine and pyrocatechol	214	1,153
Corrosive waste caustics from surface cleaning: sodium hydroxide, potassium hydroxide and ammonium hydroxide	791/123	1,671
Corrosive waste acids from metal surface preparation: hydrochloric acid	791	1,122
Mercury compounds	171	166
Arsenic compounds	171	223.
Toxic, corrosive alkaline batteries: cadmium and mercury	121	158
Toxic, corrosive lead batteries.	792	1,298
Ignitable waste: magnesium turnings and shavings from machine operations	141	448
Ignitable waste: adhesives and epoxies	281	2,993
Ignitable non-halogenated solvents: acetone and alcohol	212	9,288
Ignitable waste from solder dross and flux: lead	171	250
Corrosive waste acids containing arsenic from computer chip etching and cleaning: hydrochloric and nitric acids	792	76
Toxic waste from electroplating: potassium cyanide and potassium iodide	711	142
Toxic waste from lapping and polishing: gallium arsenide, indium phosphide, silicon and quartz semiconductors wafers	171	854
Corrosive toxic solutions from chemical scrubbers: sodium, bromate, sodium hydroxide, sulfuric acid, with arsenic and phosphorus	132	3,028
Lab packs of small quantities of out-of-date and off-spec chemicals – organic	331	4,683
Lab packs of small quantities of out-of-date and off-spec chemicals – lab waste chemicals	551	15,590
Lab packs of small quantities of out-of-date and off-spec chemicals – inorganic	141	3,123
Lab packs of small quantities of out-of-date and off-spec chemicals – unspecified oil waste	223	4,066

10.2 Waste Minimization and Pollution Prevention

The Hazardous Waste Minimization Plan identified all routinely generated waste streams that result from ongoing processes and set the goal of a 50 percent waste source reduction from the 1990 volumes by the end of 1994. This plan was developed by JPL in response to the Hazardous Waste Source Reduction and Management Review Act (SB 14). All key waste minimization measures in the plan have been implemented and include:

1) Program Management to make hazardous waste reduction a JPL policy and to set specific waste minimization goals including waste stream characterization and source reduction;
2) Materials Management to computerize tracking systems, to centralize purchasing of chemicals, and to integrate waste surplus and chemical exchange with vendors; and
3) Laboratory Operations to set specific chemical and material management goals for individual laboratories and introduce hazardous waste source reduction awareness in experiment planning and design to use less toxic reagents, materials and cleaning solutions.

JPL has an established strategy to provide a systematic approach to pollution prevention as presented in our Pollution Prevention Plan. The objectives of the plan are to develop a program for preventing, reducing, reusing, and recycling waste and emissions. The plan builds on existing programs and activities that currently meet compliance requirements as well as identifying additional activities while trying to reduce costs associated with pollution prevention programs. The plan also encourages pollution prevention concepts to be implemented in the day-to-day business processes to aid employees in understanding pollution prevention and environmentally related activities.

An objective of the plan is to measure performance of facility-wide activities in reducing chemical use, increasing efficiency of raw materials, energy, water, waste, and other resources and conserving natural resources. NASA set a goal of 50 percent reduction of targeted releases by 2000 and 70 percent by 2001 from the baseline year. Included in the targeted releases are ozone depleting substances, toxic release inventory chemicals, irrigation water, purchased bark, landscape chemicals, landscape fertilizers and hazardous wastes. As shown in Figure 10, substantial reduction of 79 percent in most of the targeted releases has occurred.

10.3 Non-Hazardous Wastes

Non-hazardous solid waste such as garbage and trash generated on the JPL site is collected in containers and barrels and is disposed of daily by a disposal contractor. About once every 2 weeks, a large construction materials container is also removed. Certain non-hazardous waste materials such as scrap metal, metal drums, scrap paper, and precious metals are periodically recovered and recycled.

JPL has an aggressive recycling program with recycling bins distributed throughout the facility for white paper, toner cartridges, and cardboard. Newspaper recycling bins are in all cafeterias. Books, other bound materials, scrap metal and wooden pallets are recycled also. Recycling has increased, with 47 percent of materials diverted from landfills. In 2000, over 1,000 tons of non-hazardous materials were recycled. All monies saved from recycling go into supporting environmental compliance.

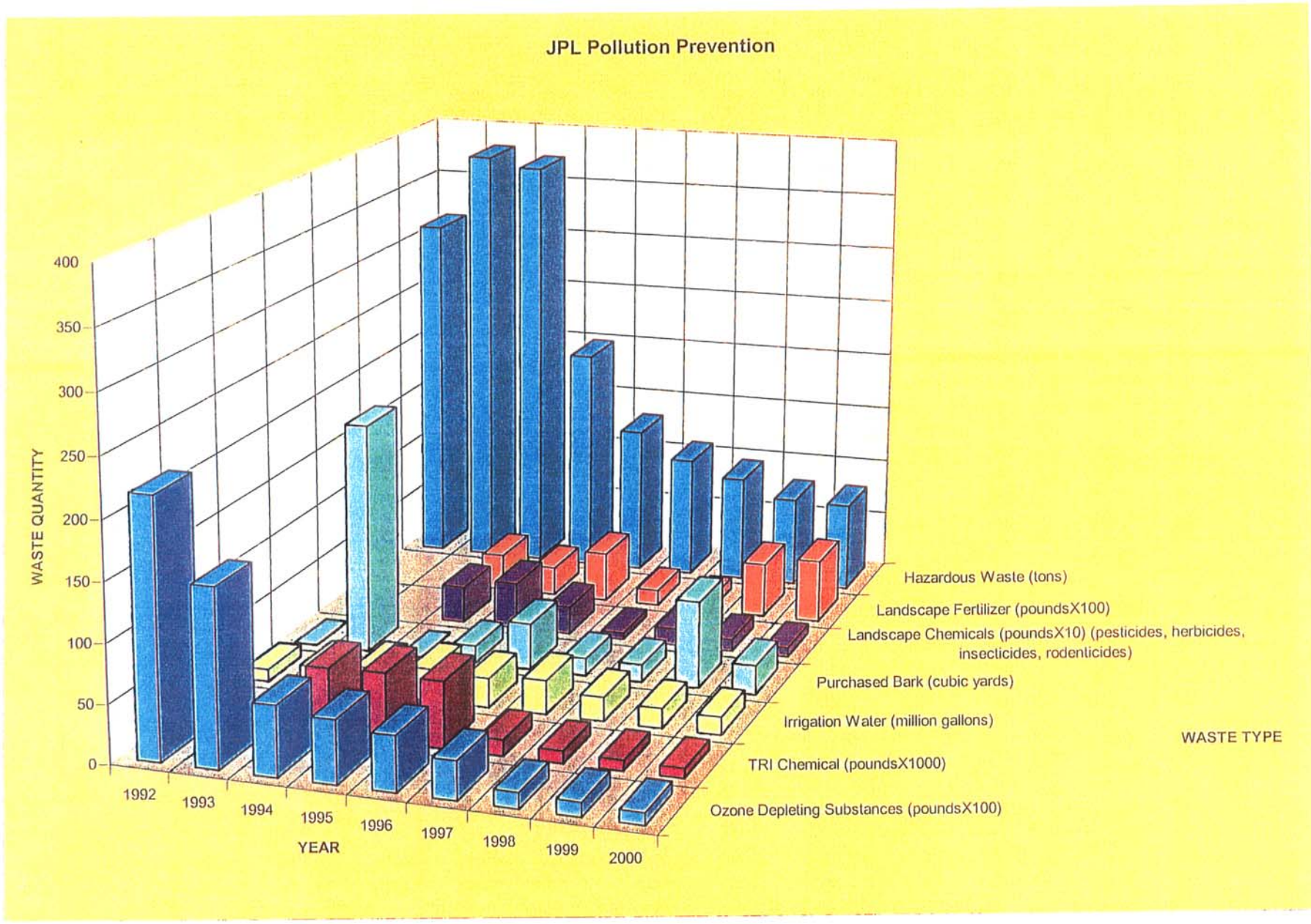

Figure 10: Pollution Prevention Progress 2000

11.0 TOXIC SUBSTANCES

Excluding laboratory chemicals, other toxic or hazardous substances that are present, or were present, at JPL include polychlorinated biphenyls (PCBs), asbestos, pesticides, and radiation sources. The status of these, as well as information regarding chemical safety and reporting requirements, is discussed below.

11.1 PCBs

Through the 1980s up to 1993, JPL initiated and proceeded with a lab-wide program to identify and remove all PCB transformers and capacitors from the site. A PCB transformer or capacitor is defined as an item containing more than 500 ppm PCBs. A PCB-contaminated item contains 50 to 500 ppm PCB. Items may contain up to 50 ppm PCB per federal definition and be classified as a non-PCB item.

As part of the program, PCB transformers were either removed from the site and disposed of or reclassified as non-PCB transformers. In both cases, the PCB oil removed from the transformers and sent off site for disposal was incinerated. Regarding PCB capacitors, all were taken out of service and removed from the site. Currently, there are no PCB transformers or capacitors remaining on site. Two PCB-contaminated transformers remain in service.

11.2 Asbestos

Asbestos is the only substance currently in use on the JPL site that is regulated by the federal government under the Toxic Substances Control Act. Asbestos removal or abatement is dictated by the renovation or remodeling needs of JPL; however, quantities of asbestos material sent out for disposal are expected to remain constant throughout the ongoing abatement program. Asbestos is found in spray-applied fireproofing and piping insulation. Non-friable asbestos may be contained in flooring tile and adhesive. Asbestos is removed by a licensed contractor in accordance with the asbestos standard of OSHA, 29 C.F.R., 1926-58. All asbestos containing materials are handled and disposed of off site consistent with the Toxic Substances Control Act.

11.3 Pesticides

Use of insecticides, fungicides, herbicides, and rodenticides is regulated by the California Department of Food and Agriculture and the Federal Insecticide, Fungicide, and Rodenticide Act, (FIFRA). A range of pesticides is used on JPL for rodent control and grounds maintenance. Pesticides are usually applied by licensed contractors and only occasionally by the grounds maintenance workers, which are both overseen by certified advisors and applicators. JPL reduces potential environmental impacts of pesticides in use by controlled applications, inventory inspection, and monitoring. All

insecticides, fungicides, herbicides, and rodenticides are handled, applied, and disposed of consistent with the California Department of Food and Agriculture requirements and FIFRA. Pesticides are stored in a secure, ventilated building reserved exclusively for storage of these materials (Building 311). Table 9 identifies the type of pesticides typically in use or stored on the site.

Table 9
Quantity of Pesticides Stored at JPL for 2001

Common Name	Quantity
Fungicides:	
Bayleton	1.75 lbs.
Daconil 2787	5 lbs.
Subdue 2E S	1.75 gal.
Chipco 26019	2.5 gal.
Terraclor	14 lbs.
Bordeaux	29 lbs.
Insecticides:	
Tempo	1990 grams
Dursban Pro	1 qt.
Mavik	3.5 qt.
Morestan 4	6 qt.
Whitmire PT 515	31 @ 175 oz. ea.
Whitmire PT 265	2 @ 16 oz. ea
Whitmire PT 1300	1 @ 16 oz. ea.
Safer Insectsoap	2.5 gal.
Ultrafine Spray Oil	5 gal
Wasp Freeze	31 @ 17.5 oz. ea.
Morestan 4	6 qt.
TKO	2 @ 16 oz. ea.
MaxForce Ant Bait Stations	264
MaxForce Roach Bait Stations	136
Herbicides:	
Roundup	2.75 gal.
Ronstar	100 lbs.
Turflon	1 qt.
Fusilade 2000	1 qt.
Killer	10 gal.
Poast	1 gal.
Blazon	2.5 lbs.
15A Dye Pattern Indicator	2.5 gal.
Surflan	2.5 gals.
Rodenticides:	
Wilco Gopher	27 @ 685 g ea.
Metaldehyde	100 lbs.
Talon-g	145 @ 5 oz. ea.
Razol	36 lbs.
Plant Growth Regulators	
Atrimmel	1 gal.
Florel Fruit Eliminator	4 gal.

Source: JRT 2001

Disposal of these materials is through licensed contractors for off-site disposal. Pesticides are bought in concentrate and mixed with water before application. Empty containers are disposed of as normal rubbish.

11.4 Radiation

The possession and use of radioactive materials is licensed by the State of California. A radiation safety committee, composed of staff members experienced in handling and safeguarding radiation sources and radioactive materials, administers JPL's responsibilities under these licenses. The committee authorizes use, prepares hazard analyses, establishes safety practices, approves facilities in which radiation sources will be used, and generally supervises and monitors all activities in which radiation hazards may be a factor. A radiation safety officer appointed by the laboratory deputy director supervises and directs JPL personnel in performing duties as they pertain to radiation safety. All ionizing radiation sources are licensed or registered as required.

JPL produces both ionizing and non-ionizing radiation (e.g., x-rays, gamma rays, alpha and beta particles, neutrons, protons, high-speed electrons, other nuclear particles, lasers, and radio frequency). Major ionizing radiation sources are few, but minor sources are widely dispersed throughout the site. Overall, there are approximately 300 sources of ionizing radiation, most of which are used in equipment calibration. Table 10 lists the common types and sources of radiation present at JPL.

The largest source of ionizing radiation is a cobalt-60 irradiator, containing about seven kilocuries. Tracer experiments are conducted periodically by astrobiologists in the chemical engineering building (Building 244). Sources of non-ionizing radiation at JPL include visible and near-visible infrared lasers, electromagnetic radiation (microwave and radio frequency transmitters) and ultraviolet radiation from ultraviolet lamps. Control of these sources includes occupational safety evaluations of new sources and checks for correct operation and adherence to established safety procedures.

All radioactive waste are sealed sources have decayed beyond their useful life. Common nuclides include tritium, carbon-14, manganese-54, iodine-131, iron-55, zinc-65, cadmium-109, barium-133, and mercury-203. Most quantities in use can be measured in microcuries and millicuries. Radioactive waste is disposed of by a licensed contractor, who removes the waste material to an authorized off-site disposal facility. Storage and disposal is consistent with JPL's radioactive waste permits.

Table 10
Types and Sources of Radiation at JPL

TYPE	Potential Population Exposed	Source	Nature of Control Techniques
Ionizing			
Radioactive Materials	60*	280 Sources: major radionuclides are: Cobalt - 60, Cesium - 137, Tritium, Nickel - 63, Carbon - 14	Training sessions
Radiation Machines**	20**	14 Machines	RAM machine includes provisions for experimental design, exposure limits, area surveys, and area and personnel dosimetry
Non-Ionizing			
Microwaves	200	Microwave Transmitters	Operational Safety Review (OSR) of new operations
Ultraviolet Waves	200	Ultraviolet Lamps	Exposure Limits Safety Manual
Infrared Light Waves	200	Lasers	Annual Eye Exam,
Electromagnetic	General Laboratory Population	Radio Transmitters; Antennas	Periodic Inspections and Monitoring

Source: JPL Occupational Safety Office, 2001

* An estimated 60 people at JPL normally work with radiation but only 20 people are authorized to work directly with the machines.
** Following the California Department of Health Services definition of "registered radiation machine".

11.5 Chemical Safety and Reporting Requirements

JPL complies with the Emergency Planning and Community Right-to-Know Act (EPCRA) and the more strict State of California community right-to-know requirements JPL is in compliance with Title 19 of the California Code of Regulations (CCR) and California Business Plan requirements.

JPL provides a California Business Plan annually to the local administering agency, the Los Angeles County Fire Department (LACFD). As part of the plan, JPL submits separate hazardous materials inventories for each building facility that contains reportable quantities of materials. JPL has

prepared and submitted acutely hazardous materials (AHM) registration for those locations, like the semiconductor Microdevices Laboratory, which require AHM registrations. AHM usage on site is presented in Table 11. All AHM stored at JPL are below reportable quantities (JPL 2001).

Table 11
Acutely Hazardous Materials
Stored at JPL

Ammonia, NH_3 (100%)
Arsine, AsH_3 (10% + 90% H_2)
Boron Trichloride, BCl_3 (100%)
Phosphine, PH_3 (4% + 96% H_2)
Phosphine, PH_3 (0.5% + 99.5% Ar)
Hydrogen Chloride, HCl (100%)
Diborane, B_2H_6 (2% + 98% H_2)
Fluorine, F (5% + 95% Ar)
Hydrogen Selenide, (0.02% + 99.98%)
Hydrogen Sulfide (0.02% + 99.98%)

Source: JPL EAO/SOS, 2001

12.0 NOISE, SONIC BOOM, AND VIBRATION

Isolated by the mesa ridge to the north and the Arroyo Seco to the east, the JPL site minimizes the impacts of on-site noise-producing sources to nearby residential receptors. JPL is surrounded by medium-density residential areas to the west, low-density residential areas to the southwest and northwest, and open space along most of the north, east, and south boundaries. The nearest residential dwellings are located along Viro Road west of JPL. These are adjacent to the west parking lots and are approximately 1,000 feet away from noise-generating sources on site.

Employee traffic during peak periods is the major noise-generating source affecting these receptors. Other sensitive residential receptors include dwellings along Starlight Crest Drive on the northwest boundary of JPL and dwellings on the bluff across the arroyo to the east. Potential sensitive receptors also include the schools further south along Oak Grove Drive and Foothill Blvd. (La Cañada High School, Flintridge Preparatory School, Oak Grove School, St. Bede School, and St. Francis High School). Oak Grove Park, further south along the Arroyo, is also considered a noise-sensitive location (Crain 1992). Figure 11 presents the location of noise sensitive receptors.

Additional noise producing sources at JPL are generally located inside buildings to minimize their impact and ensure a pleasant environment in the common areas on site. The sources include diesel backup generators in Space Flight Operations (Building 230) and various experimental tests. The generators are muffled so that the noise level at 50 feet from the exhaust is about 60 dBA[1], which results in the units being inaudible at any of the potential receptors. All experimental tests are conducted in acoustically designed rooms and test cells to reduce any off- or on-site noise impacts.

Other noise sources at JPL include cooling towers, smaller emergency backup generators, individual building air conditioners units, maintenance operations (again conducted indoors), fans, pumping stations, and vehicles. A noise characterization of some of these sources is included in Table 12 (JPL 1994a).

Ambient noise levels were measured by Ebasco Environmental in October 1989 at various locations on and near the site to characterize the background levels and note any discernible contributions from JPL operations. Measurements at the west parking lot (the western boundary of JPL) indicate daytime background levels between 43 and 60 dBA (small aircraft flyover), while readings taken along Viro Road (further west) were even lower at 40 to 55 dBA.

[1] dBA is the sound pressure level in decibels measured using the A-weighting filter. The A-weighting filter deemphasizes the very low and very high components of the sound in a manner similar to the frequency response of the ear and gives good correlation with subjective reactions to noise.

Table 12
Noise Generated from Various Sources

Noise Source	Noise Level (dBA)
Emergency Diesel Generators	Approx. 60 dBA at 50 feet
Cooling Tower (e.g. near Building 166)	Approx. 68 dBA at 25 feet
Small Building Air Conditioner at Ground Level (e.g. Building 234)	Approx. 70 dBA at 5 feet
Small Building Air Conditioner at Ground Level (e.g. Building 248)	Approx. 78 dBA at 20 feet
Cooling Fans Adjacent to Building 300	Approx. 68 dBA at 15 feet

Source: JPL Occupational Safety Office

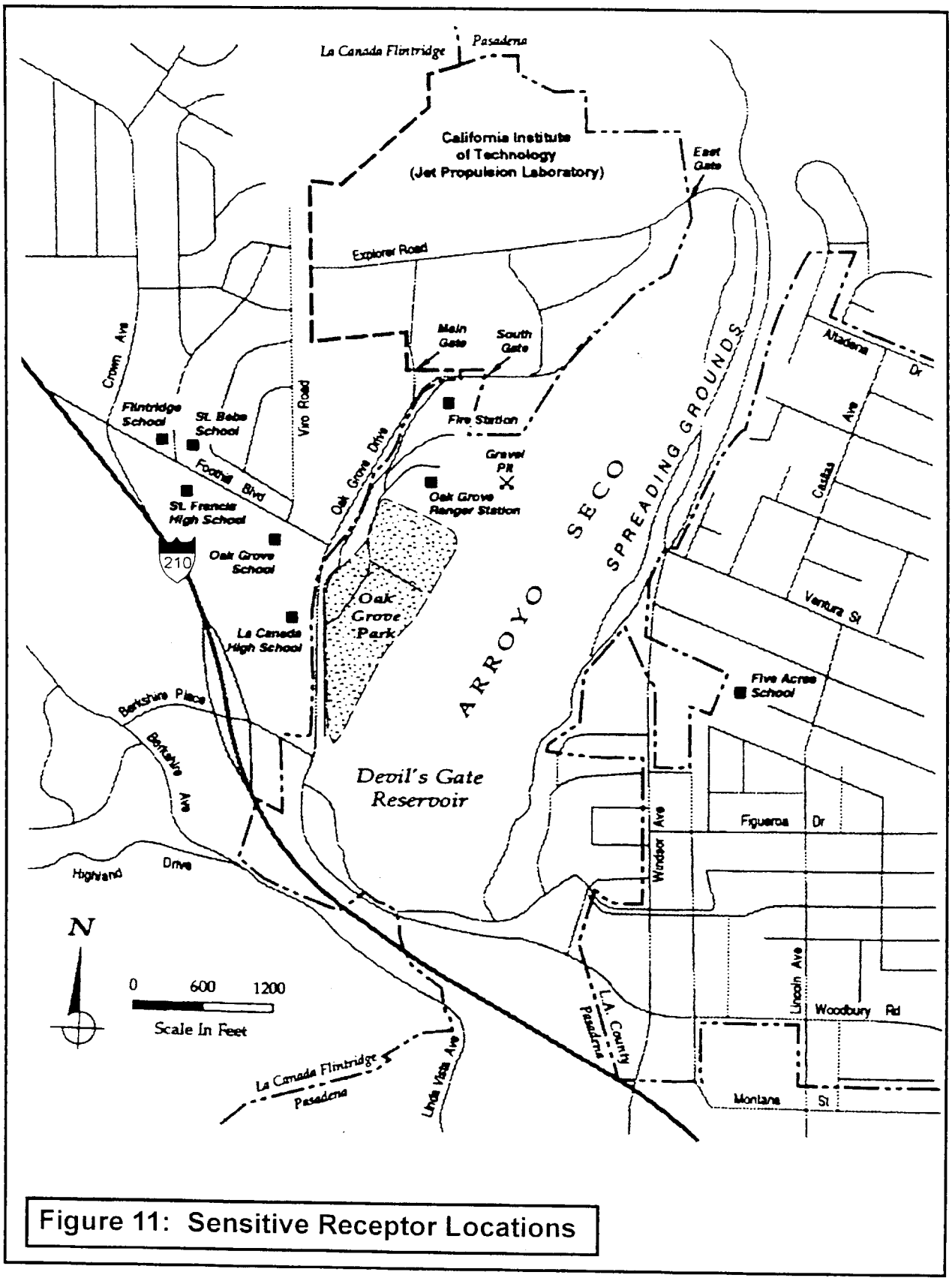

Figure 11: Sensitive Receptor Locations

13.0 CULTURAL AND HISTORICAL RESOURCES

This section includes a discussion of JPL and local archaeological resources, historic development and cultural facilities.

13.1 Archaeological Resources

The Gabrieleno Indians (so referenced by their association with the San Gabriel Valley and Mission San Gabriel) inhabited the Pasadena region until the early twentieth century. The Tongva (the Gabrieleno name for their people) displaced the prehistoric Hokan-speakers of Southern California. The area around JPL was occupied by pre-Gabrieleno populations as early as 2000 B.C.

No known or recorded archaeological resources are located within the boundaries of JPL (McKenna et al. 1993). However, several sites are located in the vicinity: CA-LAN-26 situated along the Arroyo Seco (about 1.5 miles south of JPL) is described as a prehistoric village and cemetery complex of undetermined age. This site was reportedly destroyed by bulldozing prior to 1962. CA-LAN-342 is situated in Millard Canyon, approximately 1 mile northeast of JPL. This site was a Middle Horizon Village site (circa 1500 B.C. to A.D. 500) characterized by numerous grinding implements and other prehistoric stone artifacts.

Several large habitation sites, possibly of the Hahamongna peoples have been identified in the vicinity (Singer, Atwood, and Gomes 1992). Historical documents identify this Hahamongna prehistoric community as occupying the upper reaches of Arroyo Seco, Verdugo Wash, and the San Rafael hills (Johnston 1962). Mission register data indicate that the Hahamongna were a large community that undoubtedly helped construct the mission at San Gabriel where 70 Hahamongna baptisms were recorded between 1707 and 1805 (McKenna et al. 1993). Semi-autonomous communities like and including the Hahamongna occupied sites in the vicinity but disappeared soon after the arrival of the Spanish.

The JPL facility is well developed with few undisturbed areas available for archaeological inspection. The only undisturbed area, the hillside to the north, is considered too steep to be inhabitable and archaeologically sensitive. The area adjacent to the Arroyo Seco, however, can be considered potentially sensitive due to the occurrence of archaeological sites to the north and south of JPL.

A complete Cultural Resources Survey of alternative locations for a proposed parking structure at JPL near the Arroyo Seco was completed in 1993 (McKenna et al. 1993) that characterized the archaeological and historical background of the site. Based on the survey, the proposed site was considered to be clear of any known cultural resources, but the study emphasized that there is potential for buried deposits indicative of either prehistoric or historic activities in the area.

13.2 Historic Properties and Structures

Many historic places and landmarks exist in the area surrounding JPL. One of the more famous landmarks is Christmas Tree Lane (Santa Rosa Avenue) located in Altadena. This road was planted with 150 Deodar trees over 100 years ago and lined the entrance to the Woodbury Ranch. Near the Woodbury Ranch was the Rubio Canyon Terminal of the Mount Lowe Railway. This station was located near the current intersection of Lake and Calaveras Avenues.

Two historic resources are located within the boundaries of JPL. The Space Flight Operations Facility (Building 230) and the 25-foot Space Simulator (Building 150) at JPL are listed in the National Register of Historic Places, with a designation date of October 3, 1985 (Ebasco 1990). Existing operations and activities on site are not expected to have discernible impacts on historic resources.

13.3 Cultural Facilities

JPL lies within or near several jurisdictional entities including La Cañada-Flintridge, Pasadena, Altadena (unincorporated, Los Angeles County), and Glendale. The majority of JPL lies within La Cañada-Flintridge, with some leased land within Pasadena.

JPL has a substantial impact on the local communities within a 10-mile radius. Within this distance lie the communities of Pasadena, Altadena, La Cañada-Flintridge, La Crescenta, Montrose, Tujunga, Sunland, Burbank, Glendale, South Pasadena, San Marino, Alhambra, San Gabriel, Arcadia, Sierra Madre, Temple City, and Monrovia.

The communities near JPL offer a diversity of facilities and activities providing a wide range of educational facilities, hospitals, churches, and cultural and recreational facilities. The prominent educational facility in the region is the California Institute of Technology. Cultural and entertainment resources include the Rose Bowl, the Norton Simon Museum, the Huntington Library, Descanso Gardens, and the Los Angeles Arboretum.

14.0 POPULATION AND EMPLOYMENT

The following sections describe the population and employment of the Jet Propulsion Laboratory within the context of population resources of Los Angeles County.

14.1 Regional Population and Employment

JPL lies within the boundaries of La Cañada-Flintridge and Pasadena, in Los Angeles County, California. Los Angeles County is one of six counties that make up the Southern California Association of Governments (SCAG). These include Imperial, Los Angeles, Riverside, San Bernardino, Orange, and Ventura counties. According to the most recent SCAG count (2000), there were 16.5 million inhabitants in this region. This represents 2 million more than in 1990 or a 12.81 percent increase. During the 1990s, the Los Angeles population increased by more than 656,000, which was a 7.4 percent increase and the largest increase in the state.

SCAG's Growth Management Plan (SCAG 1994) estimated that by 2015 there would be 22 million people living in Southern California and 10.3 million jobs available to workers. In the past, migration played a dominant role in population increase; in the future, births will constitute the major portion of growth. The ethnic makeup of this population will continue to evolve toward higher proportions of people of Hispanic and Asian descent. Figure 12 illustrates the distribution of population by ethnicity (SCAG 2001). Forecasts of regional population, housing, and employment (SCAG 1994) are displayed by county in Table 13.

Figure 12
Ethnicity by Population in Los Angeles County

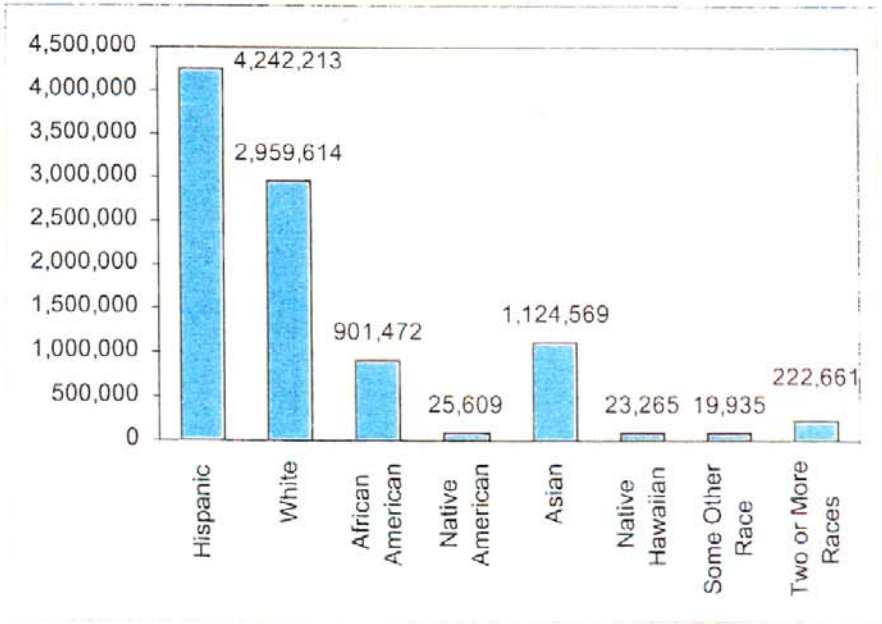

Table 13
County Forecast of Population, Housing, and Employment

COUNTY	1990			2000			2010			2015		
	Population	Housing	Employment	Population	Housing	Employment	Population	Housing	Employment	Population	Housing	Employment
LOS ANGELES	8,860,000	3,161,000	4,610,000	9,950,000	3,472,000	5,084,000	11,286,000	3,872,000	5,670,000	11,943,000	4,098,000	5,912,000
ORANGE	2,411,0	875,000	1,301,000	2,868,000	1,005,000	1,558,000	3,108,000	1,092,000	1,886,000	3,182,000	1,130,000	2,006,000
RIVERSIDE	1,170,000	484,000	356,000	1,851,000	699,000	527,000	2,556,000	986,000	762,000	2,939,000	1,146,000	840,000
SAN BERNARDINO	1,418,000	542,000	488,000	1,904,000	690,000	639,000	2,469,000	916,000	888,000	2,758,000	1,032,000	978,000
VENTURA	669,000	228,000	275,000	774,000	272,000	337,000	872,000	314,000	410,000	930,000	337,000	444,000
IMPERIAL	109,000	37,000	46,000	167,000	52,000	60,000	226,000	69,000	74,000	247,000	77,000	77,000
SCAG TOTAL	14,637,000	5,327,000	7,076,000	17,514,000	6,190,000	8,205,000	20,517,000	7,249,000	9,690,000	21,999,000	7,820,000	10,257,000

14.2 JPL Population and Employment

As of September 30, 2001, total JPL employment was 4,937. In addition, 2,842 non-JPL, service and contract personnel are assigned to the JPL work site, which brings the total number of persons at the site to 7,779 (JPL 2001).

A large portion of the JPL work force lives in the Pasadena-La Canada-Flintridge-Glendale area. Nearly all employees reside in Los Angeles County, with a number residing in Orange, San Bernardino and Riverside counties. The composition of JPL staff is diverse: 1,368 minorities represent 27.7 percent of the labor force, while female employment makes up about 28.8 percent of the population. Professional and technical staff account for approximately 93 percent of the JPL staff. Figure 13 presents a more detailed profile of JPL employment by labor category and education.

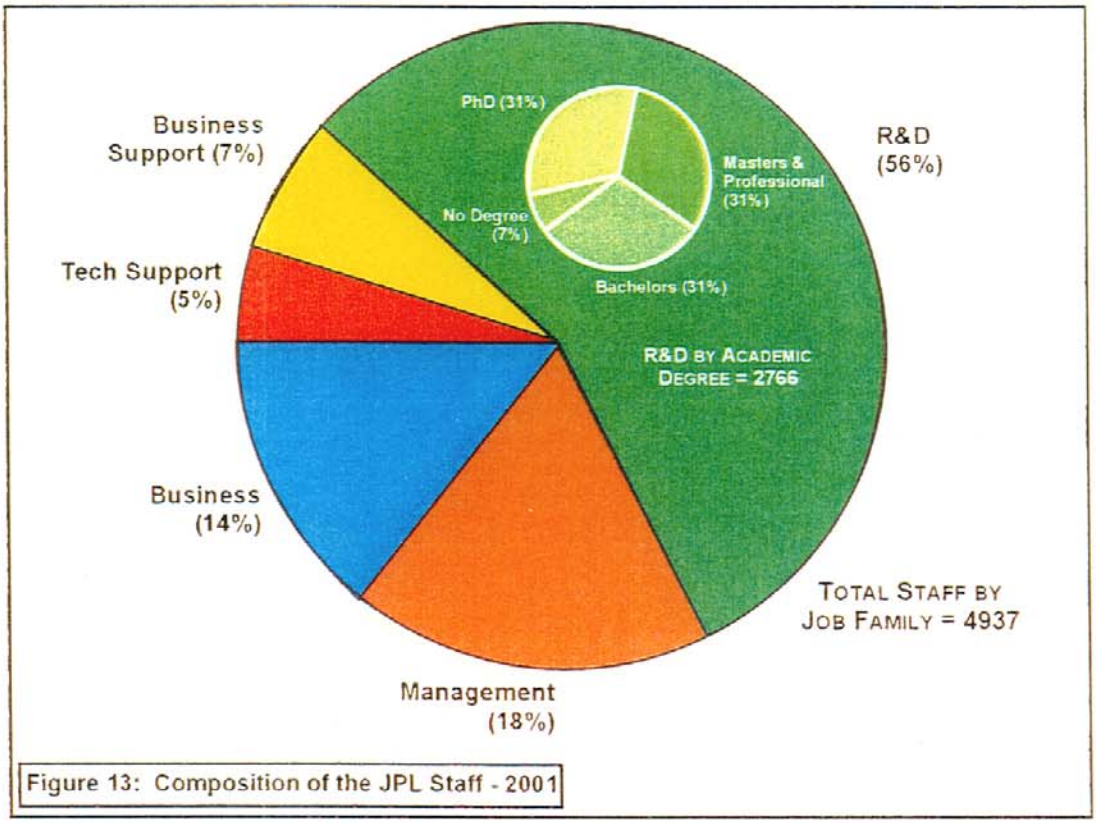

Figure 13: Composition of the JPL Staff - 2001

14.3 Transportation, Traffic, and Parking

Transportation to and from JPL is mainly by automobile, but direct bus service is available through the Metropolitan Transit Authority. The MTA travels via Oak Grove Drive to from JPL at 30-minute intervals on weekdays, during commuting hours only. Otherwise, several other bus lines are

within walking distance of JPL. A bikeway runs from South Pasadena to Oak Grove Park and connects to bicycle lanes on Oak Grove Drive.

There are three major vehicular routes to JPL: 1) Foothill Freeway (I-210) to Berkshire Place Avenue/Oak Grove Drive interchange to the Oak Grove Drive entrance; 2) Foothill Boulevard to the Oak Grove Drive entrance; 3) Foothill Freeway (I-210) to Windsor Avenue Interchange to Windsor Avenue, to the east gate entrance. These main traffic routes and their connecting routes are shown in Figure 14.

Traffic congestion is common in the morning on Foothill Boulevard between Crown Avenue and Oak Grove Drive. Much of this congestion is a result of two private high schools, a public high school, an elementary school, and JPL being in the same general vicinity. A traffic study conducted in May 1992 (Crain 1992) calculated the level of service (LOS) of the major intersections on the vicinity of JPL (see Table 14). LOS classifications rate traffic as follows:

A-C	Operate quite well; light congestion and backups on critical approaches
D	Typical level for which metropolitan street system is designed; congestion on critical approaches, but intersection functional with no long-standing lines
E	Severe congestion with some long-standing lines on critical approaches, blockage of intersection if traffic signal does not provide for protected turning movement
F	Forced flow with stoppage of long duration

The traffic study found that the intersections of Oak Grove Drive/Foothill Boulevard and the 210 Freeway westbound ramp/Berkshire Avenue were operating at LOS D during morning rush hour. All other intersections in the JPL area were operating at LOS A to C under both morning and afternoon peaks.

The three entrances to JPL are: the main gate on Oak Grove Drive for visitors, employees; and deliveries; the south gate from Forestry Camp Road primarily for service vehicles; and the east gate that crosses the JPL Bridge used mostly by employees.

Some traffic congestion occurs at the gates, especially when visitors and deliveries mix with personnel entering the site (Boyle 1988), during high security, and during high-profile media events. On-site traffic is limited at JPL because of the limited parking and site access.

The route to the entrance (Oak Grove Drive) is a four-lane road with no parking, limited sidewalks, and a bicycle lane. Similar conditions hold for other routes in the area. Berkshire Place is a four-lane road with no parking. Windsor Avenue is a two-lane road and Foothill Boulevard is a four-lane road, both with limited parking.

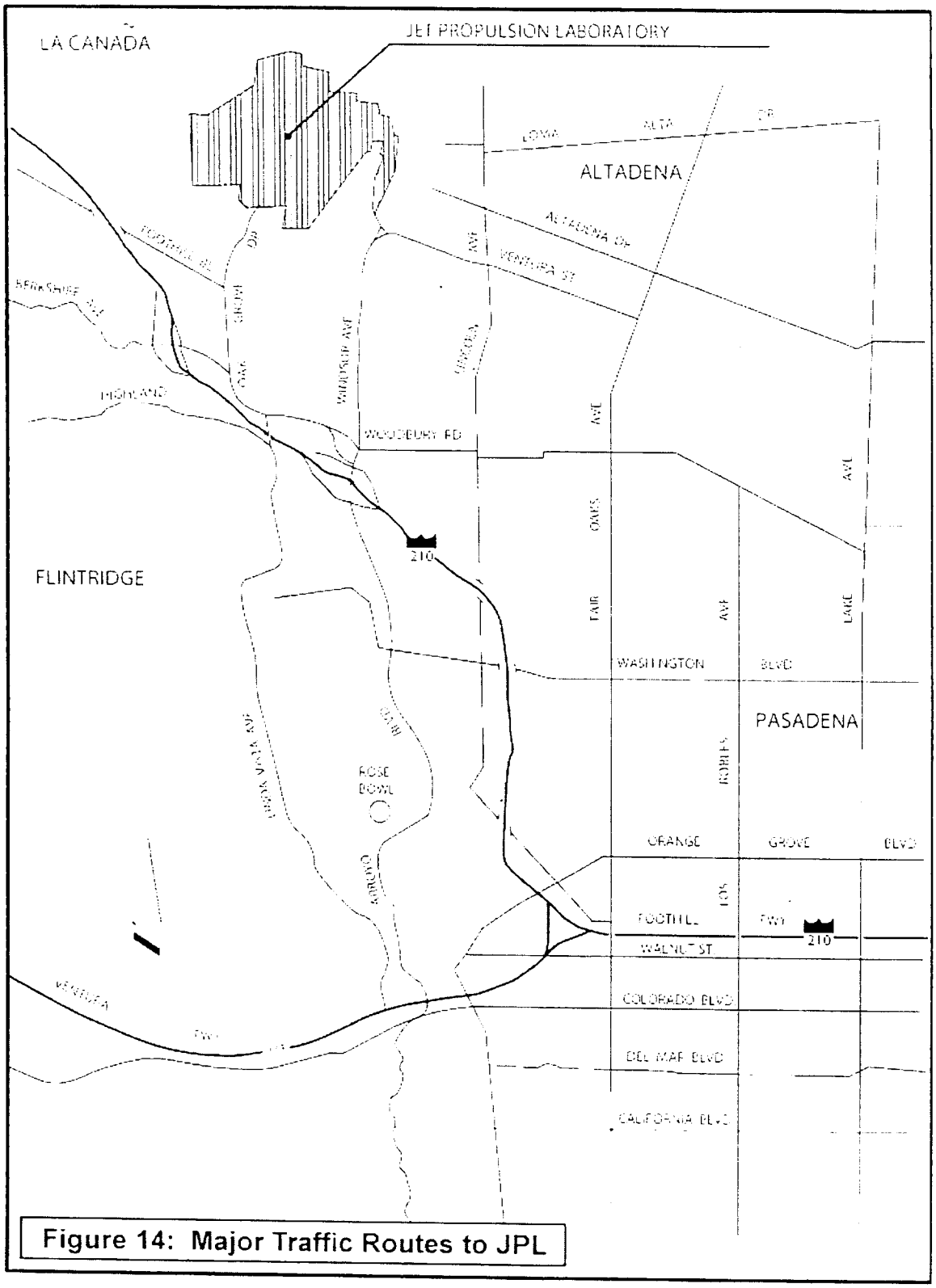

Figure 14: Major Traffic Routes to JPL

Table 14
Existing Level of Service Summary

No.	Intersection	Peak Hour	Existing (1992)	
			CMA	LOS
1	Gould Ave.	AM	0.52	A
	& 210 Fwy. WB On-Ramp	PM	0.37	A
2	Gould Ave.	AM	0.50	A
	& 210 Fwy. EB Off-Ramp	PM	0.44	A
3	Gould Ave.	AM	0.75	C
	& Foothill Blvd.	PM	0.63	B
4	210 Fwy. EB On-Ramp	AM	0.58	A
	& Foothill Blvd.	PM	0.37	A
5	210 Fwy. WB Off-Ramp	AM	0.59	A
	Crown Ave. & Foothill Blvd.	PM	0.48	A
6	Oak Grove Dr.	AM	0.82	D
	& Foothill Blvd. Park Access Rd.	PM	0.64	B
7	Oak Grove Dr.	AM	0.64	B
	& Berkshire Ave.	PM	0.72	C
8	210 Fwy. WB Ramps	AM	0.80	D
	& Berkshire Ave.*	PM	0.47	A
9	210 Fwy. EB Ramps	AM	0.48	A
	& Berkshire Ave.*	PM	0.29	A
10	Arroyo Blvd. Windsor Ave.	AM	0.38	A
	& 210 Fwy. EB Ramps	PM	0.39	A
11	Arroyo Blvd. Windsor Ave.	AM	0.76	C
	& 210 Fwy. WB Ramps	PM	0.49	A
12	Windsor Ave.	AM	0.54	A
	& Woodbury Rd.	PM	0.52	A

*Adjusted using four-way stop sign capacity (2,850 vehicles per hour) vs total intersection volume.
Source: Traffic Analysis-Crain 1992

The shuttle bus system at JPL is a direct interface between regional public transportation, publicly used facilities, and on-site transit. The buses run continuously every 20 minutes from 7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 5:30 p.m. Two buses remain in use throughout the day, one for on-lab and one for off-lab use.

Parking at JPL is limited due to the high density of buildings in the main development area and lack of adequate planning in the early stages of the site's history. A parking study conducted for JPL in 1992 (Crain 1992) concluded that parking was at and slightly above capacity during peak demand. Currently, any new construction of office space must include parking.

JPL employees and visitors park in one of the three main lots, in limited street spaces on site, or in nearby residential neighborhoods. Alternative off-site parking is limited because there is no parking allowed on Oak Grove Drive, and very limited parking on Foothill Boulevard. Three off-site lots provide a major portion of the parking at JPL. The West Lot (approximately 1,195 spaces) and the East Arroyo Lot (1,134 spaces) are located on leased land. The West Arroyo Lot is on land owned by JPL.

15.0 SPECIAL LAND USES NEAR JPL

15.1 Wildlife Refuges, National Sea Shores, and Wild and Scenic Rivers

JPL is not part of a wildlife refuge nor near a national seashore or wild and scenic river.

15.2 National and State Forests and Parks

North of JPL is the Angeles National Forest, which remains undeveloped except for hiking and equestrian trails and service roads. The corporate boundary of the Angeles National Forest is located approximately ¼ mile to the north, although due to private inholdings, the closest National Forest lands are located about ¾ mile to the north. There are no state forests or parks in the region.

Hahamongna Watershed Park is a City of Pasadena park, previously named Oak Grove Park. It consists of approximately 300 acres bounded on the north by the Angeles National Forest, to the east by Altadena, to the west by La Cañada-Flintridge, and to the south by Devil's Gate Dam and the Foothill freeway (210). Major landowners within the park basin watershed include the Metropolitan Water District and federal government.

15.3 Hospitals

There are three hospitals in the vicinity of JPL. Verdugo Hills Hospital in Glendale is 3.6 miles west from the site. In Pasadena, Huntington Memorial Hospital is 5.4 miles to the southeast and St Luke Memorial Center is 8.9 miles to the east.

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APPENDIX C

Biological Assessment and Nesting Bird Survey

There have been no significant changes in the environment or ecology at the JPL or in the surrounding area that would cause significant changes in species present or biodiversification since 2001 Biological Assessment and Nesting Bird Survey was written. Therefore, this report was considered appropriate for inclusion in the Environmental Assessment report without further update.

BIOLOGICAL ASSESSMENT AND NESTING BIRD SURVEY

On June 7, 2001, Donna Eto from HDR Engineering, Inc. conducted a biological assessment and focused nesting bird survey at the National Aeronautics and Space Administration (NASA)/Jet Propulsion Laboratory (JPL) in Los Angeles County. JPL requested the survey in order to determine if the proposed development could result in loss of nests or active nesting habitat. The proposed action would include relocation of the existing Recycling Center and construction of the Flight Projects Center within a portion of the site.

Migratory songbirds and all raptors (predatory birds) are protected under various state and federal regulations, including the Migratory Bird Act, the Bald and Golden Eagle Protection Act, and various California Department of Fish and Game codes.

The site is located within the existing JPL facilities at Surveyor and Mariner Roads in a developed area below the grade of both roads. Buildings 261, 278, 304 and a portion of Building 283 currently occupy the site of the proposed action. Approximately ___acres of vegetated slopes are located between Buildings 278, 261, and 304 and a concrete walkway and street at the top of the slope. The area south of the buildings is paved and there is a Southern California Edison facility that occupies the remainder of the site.

The vegetated area includes eleven pine trees (*Pinus sp.)*, three cedars (*Cedrus sp.)*, one coast live oak (*Quercus agrifolia*), ten sweet gum trees (*Liquidamber sp.*) and two eucalyptus trees (*Eucapytus sp.*). Also present are various species of ornamental trees (loquat, palm tree), shrubs and ground cover (including lantana).

Remnants of a single (possibly raptor) nest were observed in one of the mature eucalyptus trees located in the southeastern portion of the site up the slope from Building 304. The nest was located near the middle of the tree where the main trunk splits into multiple, larger branches. The tree had recently been trimmed so direct visual inspection was possible. Most of the nest was gone. It is not known if the nest was in use earlier in the year. No birds were observed visiting the location of the nest during the survey period. Anecdotal information from the on-site Recycling Coordinator (Taenha Goodrich) suggests that a pair of red-tailed hawks (*Buteo jamaicensis*) had previously used the nest. The female of the pair has been seen this year in the vicinity of the site by Ms. Goodrich.

Two nests were observed in the native oak immediately adjacent to Building 304. Both nests were located at nearly the top of the tree. Direct visual inspection may be possible from the top of Building 304, but no immediate access was noted. The nests were approximately 40 centimeters across at the top. They were bowl-shaped and are constructed of twigs and oak leaves. No birds were observed visiting the nests during the survey period. An owl pellet was observed on the ground underneath the canopy of the oak. Ms. Goodrich indicated she believes that owls occupy the nests, although JPL staff

have not observed birds using the nest. Other JPL staff also indicated that there are resident great-horned owl(s) elsewhere within the JPL facilities.

Near the top of the landscaped slope where Surveyor Road intersects with Mariner Road, a nest was observed in a liquidamber tree. The nest was located at nearly the top of the tree and direct visual inspection was not possible. No birds were observed visiting the nests during the survey. Additional anecdotal information from Ms. Goodrich suggests that a pair of kestrels (*Falco sp.*) use the nest.

Approximately twelve feet to the east of the above-mentioned tree, a nest was observed in another liquidamber tree. The nest was also located near the top of the tree and was obscured by the dense foliage of the tree. No birds were observed visiting the nest.

No other trees yielded any signs or current or recent nesting activities.

The vegetated slope on the site of the proposed action is an irrigated, landscaped area. It is located within a moderate pedestrian and vehicular traffic area. No natural or native vegetation areas are immediately adjacent to the site. Arroyo Seco Canyon is located approximately 1,500 meters to the east. With the exception of one native oak, the vegetation on the site is composed of exotic landscaping species. The large, mature trees on the site appear to provide nesting habitat for birds possibly including predatory birds.

Four of the five nests observed are potentially active nests. In order to ensure that no nestlings or fledglings that may be present in the nests are lost, tree removal should only occur during the non-breeding season from the late summer through the fall. Predatory birds resume nesting activities in the winter through early spring therefore tree removal during that time period is not recommended.

APPENDIX D

Biological Resource Inventory

At the time that the Biological Resource Inventory was written, the JPL was within one of several areas proposed as critical habitat for the Southwestern Arroyo Toad. In April 2005, when the critical habitat was finalized by the U.S. Fish and Wildlife Service, the area that had been proposed which included the JPL was no longer on the list of critical habitat sites. Other than this change, there have been no significant changes in the environment or ecology at the JPL or in the surrounding area that would cause significant change in species present or biodiversification since the 2001 Biological Resources Inventory was written. Therefore, this report was considered appropriate for inclusion in the Environmental Assessment report without further update.

Biological Resources Inventory,
in Support of the Environmental Resources Document for
Jet Propulsion Laboratory,
Pasadena, Los Angeles County, California

Job # 01-014

Prepared by:
Circle Mountain Biological Consultants
P.O. Box 3197
Wrightwood, CA 92397-3197
PH/FAX: (760) 249-4948
Contacts: Sharon Dougherty and Edward LaRue

Prepared for:
Jacobs Engineering
1401 E. Willow St.
Signal Hill, CA 90806
PH:(626) 568-7047
FAX:(626) 568-7135
Contact: Hector Ortiz

On behalf of:
Jet Propulsion Laboratories
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91109-8099
Contact: Faustino Chirino

September 2001
(Revised November 2001)

Table of Contents

1.0. Introduction

Circle Mountain Biological Consultants (CMBC) has been contracted by Jacobs Engineering (Jacobs) on behalf of Jet Propulsion Laboratory (JPL) to prepare a Biological Resources Inventory in support of an updated and revised version of the Environmental Resources Document for its Oak Grove facility, located primarily in the City of La Canada Flintridge, Los Angeles County, California (T.1 N, R.12 W, Section 6 and unsectioned). JPL's central Oak Grove facility occupies 176 acres of government-owned land with over 150 structures. Approximately 65 acres of land on the northern part of the facility remains in native vegetation. This acreage is located primarily on steep slopes above the flatter terraces where most of JPL buildings are located. Elevations on the facility range from 340 to 475 m (1,120 to 1,560 feet.) The Arroyo Seco wash flows south through lands owned by the City of Pasadena, immediately east of the facility. An area of the arroyo, north of spreading basins and the Devil's Gate flood reservoir, is occupied by parking lots used by JPL, leased from the City of Pasadena. The boundary of the Angeles National Forest is located approximately 1/4 mile to the north, although due to private inholdings, the closest National Forest lands are located about 3/4 mile to the north.

This document is intended to provide information on the biological resources present on the Oak Grove facility, particularly special-status species and plant communities, for use in planning for potential future development. Areas of native plant communities and wildlife are emphasized, although more developed portions of the facility are discussed as well.

2.0. Methods.

2.1. Literature Search. A three-tiered approach was used in the preparation of this Biological Resource Inventory. First, a literature search was conducted to identify any special-status species that have potential to occur on the facility. The California Natural Diversity Data Base (records for Pasadena and the surrounding eight quadrangles), the previous Environmental Resource Document (Jacobs 1994), and other environmental documentation for projects in the vicinity were consulted. The U.S. Fish and Wildlife Service provided a list of species with federal status to be considered in the Environmental Resource Document (See Appendix E). Ms. Rosa LaVeaga of the City of Pasadena was also consulted to identify special-status species of concern, and provided access to the City's technical library, and copies of pertinent environmental documents and plans for the area (e.g., Parsons Engineering Science, Inc. 1999, L & L Environmental 1997, Tataka and Associates 1992, Cotton/Beland/Associates. Inc. 1993, Cotton/Beland/Associates, Inc. 1988, and others). (See Section 5.0.)

2.2. General Biological Survey. Second, a general biological survey of the undeveloped 65 acres of the site was conducted by CMBC staff to identify the habitats, plant species, and animal species present. Sharon Dougherty and Edward LaRue of CMBC visited the site on five occasions (June 26, July 3, 11, and 26, September 9, 2001). Surveys were carried out using a "saturation" approach; that is, meandering surveys were carried out, with all plant and animal species encountered recorded in field notes until no new species were observed.

Plants that could not be identified in the field were collected and later identified using standard botanical keys (Hickman 1993), or by Andrew Sanders, herbarium curator at the University of California, Riverside. Plant communities present on the site were mapped using a combination of aerial photos, maps, and ground truthing. Coast live oaks on the more developed parts of the site were tallied and mapped. Records of bird species observed during the course of other field surveys were supplied by Michael San Miguel, and are included in Appendix B.

2.3. Focused Surveys and Habitat Evaluations for Listed Species. Third, expert biologists holding the necessary 10(a)(1)(a) scientific collecting permits evaluated habitat on the facility for suitability for two federally listed species: 1) the arroyo southwestern toad, an endangered species with designated critical habitat that includes the Arroyo Seco wash and the JPL Oak Grove facility; and 2) the California gnatcatcher, a threatened species.

Nancy Sandberg, a permitted biologist with expertise on the arroyo southwestern toad, evaluated habitat on-site and in the adjacent Arroyo Seco for the species. Her report is included as Appendix C of this document. Sandberg concluded that "land development and uses within the JPL boundaries south of the East Entrance Bridge preclude significant use by arroyo toads, and can no longer be considered as viable arroyo toad habitat" (Sandberg 2001); thus focused surveys for arroyo toad on the facility were not considered necessary. Michael San Miguel, of Western Field Ornithologists, evaluated suitability of habitat on the site for the California gnatcatcher and completed focused surveys for the species in November of 2001. Results of these surveys will be included as a supplement to the Environmental Resource Document.

2.4. Survey Limitations. Certain wildlife and plant species were not detectable due to the season of survey (midsummer) or due to the methodology employed. Many annual plant species were detectable only during the early spring months. Similarly, migratory or winter resident birds were absent at the time of CMBC's surveys, but may be detected during San Miguel's surveys later in the year. Small mammals may be detectable or identifiable to species only with trapping surveys; bats are detectable only by experts using a number of special survey techniques. Some locations were not surveyed in depth due to the difficulty of moving through and sampling areas of extremely dense brush and steep terrain. None of these limitations is considered to have seriously affected the results of this survey.

3.0. Results.

3.1. Literature Search. The following special-status species were initially considered due to their presence in reports from the California Natural Diversity Data Base (California Department of Fish and Game 2000), or other sources, but were removed from consideration based on a lack of appropriate habitat, distance from the species' known geographic or elevational range, etc.

Plant Communities and Habitats
Southern cottonwood willow riparian forest
Southern mixed riparian forest
Southern sycamore alder riparian woodland
Open engelmann oak woodland
California walnut woodland
Walnut forest
Southern California arroyo chub/Santa Ana sucker stream

Plants	
Coastal dunes milk-vetch	*Astragalus tener* var. *titi*
Parish's brittlescale	*Atriplex parishii*
Davidon's saltscale	*Atriplex serenata* var. *davidsonii*
Slender-horned spineflower	*Dodecahema leptoceras*
Los Angeles sunflower	*Helianthus nuttallii* ssp. *Parishii*
Palmer's mariposa lily	*Calochortus palmneri* var. *palmeri*
Alkali mariposa lily	*Calochortus striatus*
Santa Barbara morning glory	*Calystegia sepium* var. *binghamiae*
Mount Gleason Indian paintbrush	*Castilleja gleasonii*
Southern tarplant	*Hemizonia (Centromedia) parryi var. australis*
San Gabriel linathus	*Linathus concinnus*
Parish's gooseberry	*Ribes divaricatum* var. *parishii*
Sonoran maidenhair fern	*Thelypturis puberula* var. *sonorensis*
Insects	
San Gabriel Elfin Butterfly	*Incisalia mossi hidakupa*
Fish	
Santa Ana speckled dace	*Rhinichthys osculus* ssp. 3
Santa Ana sucker	*Catostomus santaanae*
Amphibians and Reptiles	
Southwestern pond turtle	*Clemmys marmorata pallida*
Mountain yellow-legged frog	*Rana muscosa*
Two-striped garter snake	*Thamnophis hammondii*
Birds	
Black swift	*Cypseloides niger*
Least Bell's vireo	*Vireo bellii pusillus*
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*

Tables 1-4, below, list the special-status elements with potential to occur in the vicinity of Jet Propulsion Laboratory's Oak Grove facility, along with information on their regulatory status, life history, range, records of occurrence, and CMBC's assessment of their likelihood of occurrence on the facility.

Table1. Special-status Plants

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	CNPS[2] List/ R-E-D code	Likelihood of Occurrence, Range, Life History, Records[3]
Nevin's Barberry *Berberis nevinii*	FE/ CE	1B/3-3-3	Low, due to rarity; not detected. Evergreen shrub. Blooms March-April. Chaparral, cismontane woodland, coastal scrub, riparian scrub, on steep, north-facing slopes or in low gradient, sandy washes. 290-1575m. Suitable habitat present and four records from Pasadena quad. in the California Natural Diversity Data Base (CNDDB). Two records in Arroyo Seco near JPL, dated 1927 and 1951, but now apparently extirpated (Tataka and Associates 1992). (California Department of Fish and Game 2000).
Braunton's Milk-vetch *Astragalus brauntonii*	FE/ ND	1B/3-3-3	Moderate; not detected. Perennial herb. Blooms March-July. Closed cone coniferous forest, chaparral, coastal scrub, grassland, especially in recent burns or disturbed areas; gravelly clay soils overlying granite or limestone. 4-640m. Five records in CNDDB; closest are ± 6 mi. West-nothwest in foothills near Monrovia in 1991, 1997, 1998. (California Department of Fish and Game 2000).
Plummer's Mariposa Lily *Calochortus plummerae*	SOC/ ND	1B/2-2-3	Moderate; not detected. Perennial herb. Blooms May-July. Coastal scrub, chaparral, grassland, cismontane woodland, lower montane coniferous forest, rocky and sandy sites, usually granitic or alluvial material. 90-1610m. Nine records in CNDDB. Closest are ± 3-6 mi., north, east, southwest, west, in 1921, 1918, 1913, 1906 respectively. (California Dept. of Fish and Game 2000).
Parry's Spineflower *Chorizanthe parryi* var. *parryi*	SOC/ ND	3/?-2-3	Moderate; not detected. Annual herb. Blooms April-June. Coastal scrub, chaparral, on dry slopes and flats; sometimes at interface of two vegetation types, such as chaparral and oak woodland; dry, sandy soils. 40-1705m. Four records in CNDDB. Closest is ± 0.25 miles north, in Arroyo Seco at 1250 feet. 1920. (California Department of Fish and Game 2000).

Table 1. Special-status Plants (continued)

Common Name/ *Scientific Name*	Federal[1] /State[1] Status	CNPS[2] List/ R-E-D code	Likelihood of Occurrence, Range, Life History, Records[3]
San Fernando Spineflower *Chorizanthe parryi* var. *fernandina*	CAN/ CCE	1B/3-3-3	Low due to rarity; not detected. Annual herb. Blooms April-June. Coastal scrub, sandy soils. 1000-1700 m. Endemic to southern California; possibly extinct. Three records in CNDDB. All in currently heavily developed areas. 1890, 1920. Closest ± 10 mi. west. (California Department of Fish and Game 2000).
San Gabriel Bedstraw *Galium grande*	SOC/ ND	1B/3-1-3	Moderate. Deciduous shrub. Endemic to Los Angeles Co. Open chaparral and low, open oak forest; on rocky slopes; probably undercollected due to inaccessible habitat. 425-1200m. Three records in CNDDB, 1910, 1979, 1986. Closest is ± 3.5 mi. north on Mt. Wilson. (California Department of Fish and Game 2000).
Robinson's Pepper Grass *Lepidium virginicum* var. *robinsonii*	ND/ ND	1B/3-2-2	Moderate; not detected. Annual herb. Blooms January-July. Chaparral, coastal scrub, dry soils, 1-945m. One record in CNDDB, ± 7 miles west, 1928. (California Dept. of Fish and Game 2000).
Davidson's Bush Mallow *Malacothamnus davidsonii*	SOC/ ND	1B/2-2-3	Low; not detected. Deciduous shrub. Blooms June-Sept. Coastal scrub, riparian woodland, chaparral, especially in sandy washes. 180-855m. Five records in CNDDB. Closest ± 10 mi. west, 1945. (California Dept. of Fish and Game 2000).
Brand's Phacelia *Phacelia stellaris*	ND/ ND	1B/3-3-2	Moderate; not detected. Annual herb. Blooms March-June. Coastal scrub, coastal dunes, open areas. 5-1515m. Southern California and Baja, Mexico. One record in CNDDB, ± 6 mi. south (California Dept. of Fish and Game 2000).
Southern Skullcap *Scutellaria bolanderi* ssp. *austromontana*	ND/ ND	1B/2-2-3	Low; not detected. Perennial herb. Blooms June-August. Chaparral, cismontane woodland, lower montane coniferous forest, in gravelly soils on streambanks or in mesic sites in oak or pine woodland. 425-2000m. One record in CNDDB, near El Monte, considered "questionable." (California Dept. of Fish and Game 2000).

Table 2. Special-status Amphibians and Reptiles

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	Likelihood of Occurrence, Range, Life History, Records[3]
Arroyo Toad *Bufo californicus*	FE/ CSC, SA	Low. Found in washes, streams, and arroyos and adjacent upland habitats in semiarid southern California and Baja, Mexico. Frequents sandy streambanks with willow, cottonwood, and sycamore vegetation. Breeds from March to July. Adults feed on snails, Jerusalem crickets, beetles, ants, caterpillars, and moths. Primarily nocturnal, except during the breeding season. Adults are active at temperatures between 72 and 95°F (22-35°C). Young can tolerate higher temperatures. See the supplemental report in Appendix C on habitat at JPL for more information (Sandberg 2001).
Yellow-blotched Ensatina *Ensatina escholtziii croceater*	SOC/ CSC, SA	Low. Ponderosa pine, Douglas fir, mixed conifer, montane hardwood, hardwood-conifer, and chaparral, in moist, but not saturated soils. Cover and nest sites in decaying logs, bark, rock fissures, and leaf litter. Sea level to 3050 m. (Zeiner et al. 1988). This subspecies is not the typical one found in the San Gabriels *(E. e. escholtzii)*, but it has been reported by a reliable observer at Coldbrook Campground in the North Fork of the San Gabriel River (Schoenherr 1976).
Western Spadefoot Toad *Scaphiuopus hammondii*	ND/ CSC, SA	Moderate. Found in southern California from the coast to the inland valleys. Typically found at elevations below about 1000m (3,000 feet). Preferred habitats are coastal sage scrub, chaparral, and valley-foothill hardwood, especially wash areas and areas with sandy soils and scattered brush are favored. Feed on small arthropods, especially termites. Rocks, logs, decaying vegetation, rock crevices, and other surface objects are used as cover. Diurnal. Adults active from early spring to mid- or late summer. Juveniles active through the fall, even to mid-winter, depending on temperatures. Breeding occurs April to mid-July. Average clutch size is only 2.3 eggs, but more than one clutch per year may be produced. (Stebbins 1985, Zeiner et al. 1988).

Table 2. Special-status Amphibians and Reptiles (continued)

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	Likelihood of Occurrence, Range, Life History, Records[3]
San Diego Horned Lizard *Phrynosoma coronatum blainvillei*	ND/ CSC, SA	High. Open habitats with sandy substrates, below 1900 m. in so. CA. Feeds primarily on ants; also small beetles, wasps, grass-hoppers, flies, caterpillars. Low shrubs and loose soil used for cover. 6-16 eggs laid in loose soil May-June. Eggs hatch after approx. 2 mos. (Stebbins 1985, Zeiner et al. 1988). Threats include habitat loss to development, collection. (Schoenherr 1976). Sixteen records from CNDDB, closest in Millard Canyon (1911). Also reported from Eaton Canyon approx. 1.5 mi. W in 1987 (LaPré 1987).
Coastal Western Whiptail *Cnemidophorus tigris multiscutatus*	SOC/ ND	High. Relatively open coastal scrub and chaparral. Feeds on insects and spiders. Diurnal. Adults become inactive usually in early fall, but juveniles remain active through late fall or early winter depending upon temperatures. Reported from Millard Canyon in 1999 (Parsons Engineering Science, Inc. 1999)
Silvery Legless Lizard *Anniella pulchra pulchra*	ND/ CSC	Low. Chaparral, pine-oak woodland, riparian. Burrows in loose, moist soil. May be associated with wood rat nests. Live bearing, 1-4 young born Sept.-Nov. Sea level-1550 m. (Stebbins 1985)
Coastal Rosy Boa *Lichanura trivirgata rosafusca*	SOC/ SA	Moderate. In the San Gabriels, found in chaparral and coastal scrub (Schoenherr 1976). Prefer areas with rocky cover, e.g., boulder piles, rock outcrops, and canyon walls. Prey includes small rodents and birds, and possibly lizards. Most active late spring to mid-summer. Young are live-born. (Zeiner et al. 1988).
San Diego Mountain Kingsnake *Lampropeltis zonata pulchra*	ND/ CSC	Low. Moist habitats with rocks or boulders, yellow pine forests, oak woodland, chaparral, meadow, and riparian communities, sea level-2,450 m. Feed on lizards, smaller snakes, birds and bird eggs, small mammals. Active mid-March to mid-October. Breeding season is March-May, and ave. 5-6 eggs are laid. Young hatch late June to early Oct. Predators include birds of prey, and mammals, such as skunks and raccoons. (Schoenherr 1976, Zeiner et al. 1988).
Coast Patch-nosed Snake *Salvadora hexalepis virgultea*	ND/ CSC	High. Found in chaparral and coastal sage scrub communities in the San Gabriel Mountains (Schoenherr 1976). Feed on lizards, small mammals, eggs of lizards and snakes, and other animals small enough to capture (Zeiner et al. 1988). Diurnal and most active in spring and early summer. Eggs probably laid during the late spring and summer months, and clutches ave. 5-6 eggs. Predators include roadrunners, birds of prey, kingsnakes, many diurnal mammals, etc.

Table 3. Special-status Birds

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	Likelihood of Occurrence, Range, Life History, Records[3]
Golden Eagle *Aquila crysaetos*	ND/ CSC, SA	High, foraging. No nesting habitat present on site, but available nearby. Inhabits open habitats including chaparral and coastal scrub. Prey includes rabbits, hares, and rodents. Nests on cliffs of all heights and in large trees in open areas. In southern California territories may be up to 6,638 hectares (36 square miles) (Dixon 1937). Breed from late January to August, especially March to July. Clutch sizes 1 to 3, average 2. Incubation is 43-45 days, and eggs generally laid from February to mid-May. Young typically fledge at 65-70 days. (Zeiner et al. 1990a). Threats to the species are primarily related to habitat loss to development, and disturbance at nest sites leading to nest failure or abandonment. Egg shell thinning due to pesticide (DDE) poisoning has affected this species. (Zeiner et al. 1990a).
Cooper's Hawk *Accipiter cooperi*	ND/ CSC	Present on site. Breeding residents of woodlands throughout California. Dense riparian areas, live oak stands, and other forested habitats near water are preferred, although Cooper's hawks may be observed in residential areas, even hunting at backyard bird feeders. Feeds primarily on small birds, also small mammals, reptiles, and amphibians. Nests in deciduous trees or conifers, usually in riparian areas or in second-growth conifer forests near streams. Breeds March to August, especially May to July. Female incubates the eggs for 35-65 days. Males defend territories with a radius of about 100 m centered on the nest site during pair formation. Home ranges have been measured at 7-215 hectares. (Zeiner et al. 1990a).
Sharp-shinned Hawk *Accipiter striatus*	ND/ CSC	High. A winter resident in all California habitats except those with deep snow, open prairie, and bare desert. Breeds in forested areas, including mixed conifer, ponderosa and Jeffrey pines, black oak, and especially riparian woodlands. Feeds primarily on small birds, and occasional reptiles, amphibians, small mammals, and insects. Home range including foraging area has been reported at approx. 2,670 hectares. (Zeiner et al. 1990a).
Bell's Sage Sparrow *Amphispiza belli*	ND/ CSC (nesting)	High. Found year-round in the coastal areas and mountains of southern California. Prefers low, dense stands of shrubs in chaparral and scrub habitats. Breeds from late March to mid-August, and lays a clutch of 3-5 eggs in a twig nest located on the ground beneath a shrub or 6 to 39 inches above ground in a shrub. Eggs incubated 13-16 days, and young fledge at ± 10 days. (Zeiner et al. 1990a).

Table 3. Special-status Birds (continued)

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	Likelihood of Occurrence, Range, Life History, Records[3]
American Peregrine Falcon *Falco peregrinatus anatum*	FD/ CE (nesting)	Moderate, foraging. Nesting could occur on building ledges, but no cliffs are present on the site. Found in woodland, forest, and coastal habitats during breeding season, and in riparian areas, and coastal and inland wetlands year-round. Usually nests in canyons and on high cliffs with ledges, though buildings, bridges, and other structures with ledges may be used. Breeds and feeds near water; predators of birds as large as ducks. Occasionally feeds on mammals, fish, and insects. Breeds early March to late Aug. Predators include golden eagles, great horned owls, foxes, raccoons, other mammals. Threats include collecting for falconry, disturbance at nesting cliffs, pesticide (DDE) poisoning. (Zeiner et al. 1990a).
California Condor *Gymnops californianus*	FE/ CE, SA	Low. Few California condors have been released to the wild from captivity, but the species formerly inhabited many of the rugged mountain ranges of so. CA. Feeds only on carrion, including carcasses of deer, cattle, sheep, and ground squirrels. Nests in sheltered sites on cliffs. One egg is laid. Incubation takes ± 59 days; fledging period is 5 mos. Young fed by parents for several months after fledging. Reasons for decline incl. habitat loss, reduced availability of suitable carcasses, DDE poisoning and eggshell thinning. (Zeiner et al. 1990a).
California Gnatcatcher *Polioptila californica californica*	FT/ CSC	Absent as of 11-14-01. Focused surveys completed by M. San Miguel November 2001. Obligate, permanent resident of coastal sage scrub below 760 m (2500 ft) in arid washes, on mesas & slopes, in southern California. Not all areas classified as coastal sage scrub are occupied. (California Dept. of Fish and Game 2000). Shorter, less dense shrubs, without a chamise component are generally used (M. San Miguel pers. comm. July 2001) 5 records in CNDDB, closest ± 10 mi. WSW, and ± 10 mi. ESE (1928, 1991). (California Department of Fish and Game 2000).

Table 4. Special-status Mammals

Common Name/ *Scientific Name*	Federal[1]/ State[1] Status	Likelihood of Occurrence, Range, Life History, Records[3]
Pallid Bat *Antrozous pallidus*	SOC/ CSC	Within range. Wide variety of open, dry habitats. Rock outcrops, cliffs, crevices needed for roosting. Needs access to water. (Zeiner et al. 1990b).
Fringed Myotis *Myotis thysanodes*	SOC/ ND	Within range. Year-round in coastal and mountain areas of so. CA. Prefer pinyon-juniper woodland, hardwood, and hardwood-conifer woodlands, between 1220 and 2135m. Also chaparral, yellow pine forests and other habitats. Feeds on beetles, moths, arachnids, crickets, grasshoppers, and locusts. Roosts in mines, caves, buildings and crevices. Separate day and night roosts may be used. Maternity colonies of ≥ 200 occupied from April to Sept. Mating in fall, but fertilization delayed. Gestation 50-60 days; Most young born May-July. Usually only 1 young per female per year; young bats fly within 20 days. Sensitive to disturbance at roost sites. (Arizona Game and Fish 1991, Zeiner et al. 1990b).
Long-eared Myotis *Myotis evotis*	SOC/ ND	Within range. Brush, woodland, and forest habitats below 2,740 m in California. Prefer coniferous woodlands and forests. Feeds on arthropods incl. beetles, moths, flies, and spiders. Feeds near trees or water. Roosts in buildings, crevices, under bark, and in snags. Nursery colonies of ± 30. Winter habits and range not well understood, but probably hibernates. (Arizona Game and Fish 1991, Zeiner et al. 1990b).
Small-footed Myotis *Myotis ciliolabrum*	SOC/ ND	Within range. Arid upland habitats near water. Feeds on moths, beetles, flies, and other flying insects. Roost sites in caves, crevices, buildings, under bridges, or under bark. Maternity colonies of 12-20 usu. in caves, mines, or buildings. Hibernation sites with ≥50 animals found in cold, dry sites. Mates in the fall. One to two young per female, born May-June. Most young fly by mid-August. (Arizona Game and Fish 1991, Zeiner et al. 1990b).
Spotted Bat *Euderma maculatum*	SOC/ CSC	Within range. One of the rarest mammals in No. America. Desert to mixed conifer forests. Solitary, crevice-roosting. Feeds primarily on moths and forages over water and along washes. Cliffs are preferred roosting sites. (Zeiner et al. 1990b).
Townsend's Big-eared Bat *Plecotus townsendii townsendii*	SOC/ CSC	Within range. Once common in all habitats in CA except alpine and subalpine. Most abundant in mesic habitats. Caves, mines, tunnels, buildings used for roost sites. Maternity roosts usually located in warm sites; hibernacula cold, but not below freezing. (Zeiner et al. 1990b).
Los Angeles Pocket Mouse *Perognathus longimembris brevinasus*	ND/ CSC	Moderate to low, due to rarity. Coastal scrub habitats, from sea level to 1700 m. Feeds on grass and forb seeds, found beneath shrub canopy. Rarely found in rocky areas. Inactive from fall to spring, depending on food reserves and nightly low temperatures. Breeds between January and August, esp. March to May. Litter size from 2-8, ave. 4.3. Predators include snakes, owls, and predatory mammals. (Zeiner et al. 1990b).

1 *Federal Register* (February 28, 1996), 50 CFR Part 17. "Endangered and Threatened Species, Plant and Animal Taxa; Proposed Rule;" *Federal Register* (November 15, 1994), 50 CFR 17.11 & 17.12. "Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species; Proposed Rule;" State of California, The Resources Agency, Department of Fish and Game, Habitat Conservation Division, Wildlife & Habitat Analysis Division, California Natural Diversity Data Base. April 2000. "State and Federally Listed Endangered, Threatened, and Rare Plants of California." California Department of Fish and Game, Natural Diversity Data Base. 1996. Endangered and Threatened Wildlife and Plants; "Special Plants List;" State of California, The Resources Agency, Department of Fish and Game, Habitat Conservation Division, Wildlife & Habitat Analysis Division, California Natural Diversity Data Base. January 2000. "Special Animals;" USDA. Undated. "Angeles National Forest Threatened, Endangered, and Sensitive Plant and Animal List."

State and federal status definitions

Federal

FE Listed endangered by the U.S. Fish and Wildlife Service.

FT Listed threatened by the U.S. Fish and Wildlife Service.

FPE Species that have either been proposed by the U.S. Fish and Wildlife Service or petitioned by the public for federal listing as endangered.

FPT Species that have either been proposed by the U.S. Fish and Wildlife Service or petitioned by the public for federal listing as threatened

CAN Candidate for listing as threatened or endangered.

SOC Federal Special Concern species ; a "term-of-art" designation coined by the CDFG (California Department of Fish and Game 1998), although not recognized by the USFWS. Designation given to former Category 2 candidate species, which were species for which additional threat and/or distribution data were being collected to see if the species should be federally listed. The Category 2 designation was eliminated in a *Federal Register* notice on 28 February 1996.

FD Delisted ; formally removed from the USFWS list of endangered or threatened species due to sufficient recovery of the species.

ND Not designated by the USFWS, but included because of the CDFG's current or past designation.

State

CE Listed endangered by Fish and Game Commission.

CT Listed threatened by Fish and Game Commission.

CCE State candidate for listing as Endangered.

CSC California Species of Special Concern, which when encountered, should be reported to the Department of Fish and Game, and for which impacts may be considered significant under the California Environmental Quality Act, depending on the specific situation.

SA Special Animal, which is an animal protected or fully protected by the State.

ND Not designated by the CDFG, but included because of USFWS or Forest Service's current or past designation.

2 California Native Plant Society status definitions: CNPS status is assigned only to plants by the California Native Plant Society (CNPS) (1994).

List 1B Plants rare, threatened, or endangered in California and elsewhere.

List 2 Plants rare, threatened, or endangered in California but more common elsewhere.

List 3 Plants about which more information is needed, a review list.

List 4 Plants of limited distribution, a watch list.

R - 1 (R = Rarity) Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time.

R - 2 Distributed in a limited number of occurrences, occasionally more if each occurrence is small.

R - 3 Distributed in one to several highly restricted occurrences, or present in such small numbers that it is seldom reported.

E - 1 (E = Endangerment) Not endangered.

E - 2 Endangered in a portion of its range.

E - 3 Endangered throughout its range.

D - 1 (D = Distribution) More or less widespread outside California.

D - 2 Rare outside California.

D - 3 Endemic to California.

3 Sources for plants are usually the *California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994), and *The Jepson Manual. Higher Plants of California* (Hickman 1993). Sources for animals are usually *California's Wildlife. Volumes I-III.* Zeiner et. al. 1988, 1990a, 1990b. State of California, The Resources Agency, California Department of Fish and Game.

3.2. General Biological Surveys.

3.2.1. Plant Communities. The relatively undeveloped "mesa" portion of the facility consists of primarily south-facing hillsides and canyons below the ridgeline on the northern boundary of the facility. Plant communities in this area have been mapped in Figure 1, and are listed in Table 5. They are described in more detail following the table. A complete list of the plant species identified in the mesa area is given in Appendix A.

Table 5. Plant Communities within Open Space Areas at Jet Propulsion Laboratory's Oak Grove Facility

Community Type	Plant Community or Series	Approx. Acreage
Chaparrals	Chamise - White Sage Series	27.6
	Chamise Series	3.0
	Sumac Series	0.7
Coastal Scrubs	California Sagebrush Series, with chamise element	9.0
	California Sagebrush Series, w/o chamise element	1.1
	Mixed Sage Series	2.8
	Black Sage Series	0.2
Woodland	Coast Live Oak Series	7.6
Primarily Exotic	California Grassland Series	9.6
	Exotic/Landscape Plants	1.5
TOTAL		± 65

The hillsides and canyons support a mix of chaparral and coastal scrub communities, also with many exotic elements. These communities blend and intergrade with one another (hence the term "series"), so that delineation of boundaries between vegetation types is necessarily approximate.

Chaparral plant communities present include "chamise-white sage series," "chamise series," and "sumac series" (Sawyer and Keeler-Wolf 1995).

Chamise-white sage series is dominated by chamise (*Adenostoma fasciculatum*) and white sage (*Salvia apiana*), with other characteristic species including California sagebrush (*Artemesia californica*), black sage (*Salvia mellifera*), holly-leaf redberry (*Rhamnus ilicifolia*), California buckwheat (*Eriogonum fasciculatum*), etc. (Sawyer and Keeler-Wolf 1995). This series occupies the largest area of any plant community present, extending over approximately 27.6 acres on several large slopes and hillsides from the northwestern edge of the mesa to the eastern portion. (See Figure 1).

Chamise series is characterized by chamise, as the dominant shrub species, with California buckwheat, black sage, California buckwheat, chaparral yucca (*Yucca whipplei*), etc. This series covers about 3.0 acres on a south-west facing hillside on the northwestern edge of the facility, located above and east-northeast of buildings 251 and 253. (See Figure 1).

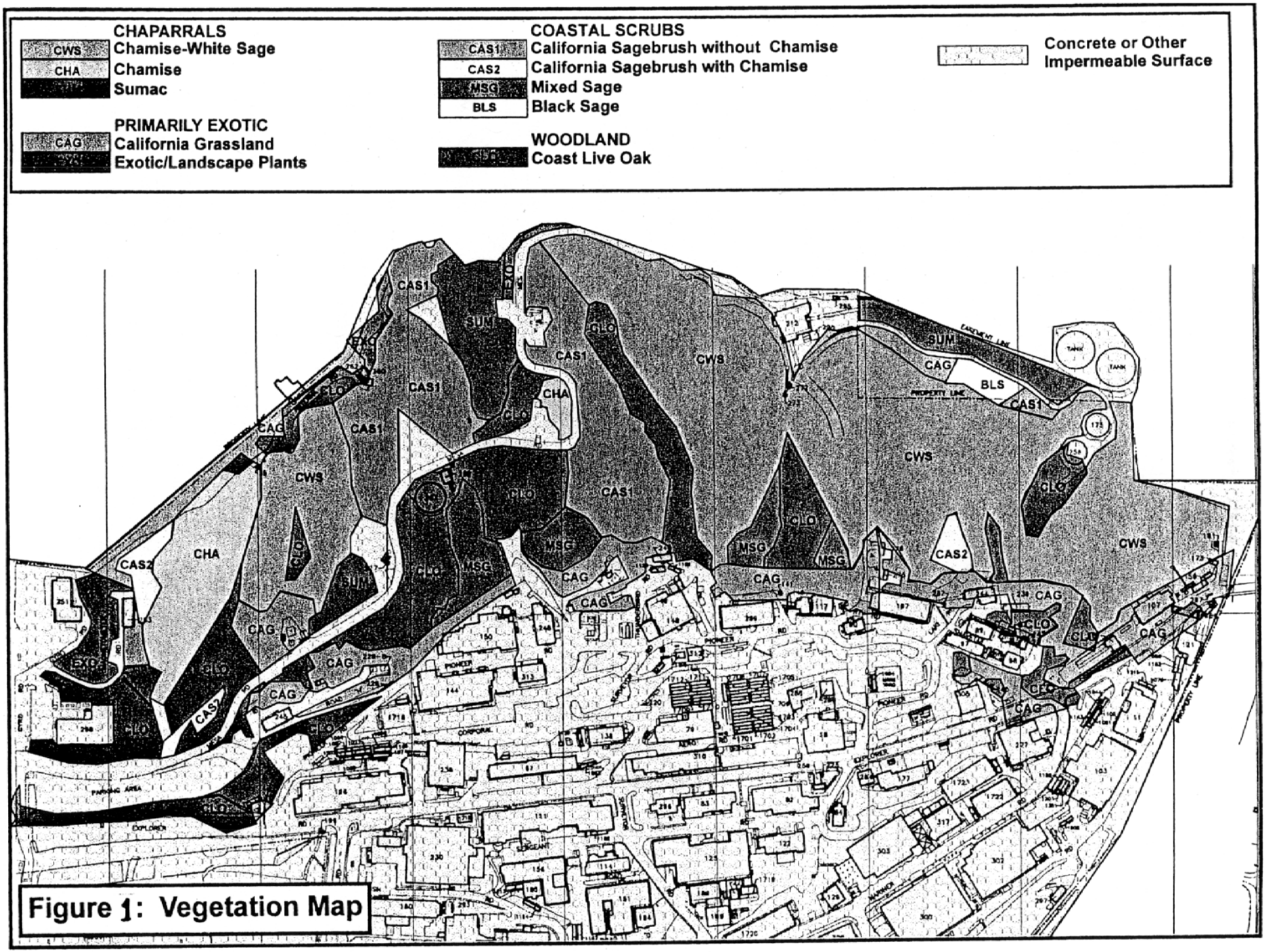

Figure 1: Vegetation Map

Sumac series is typically dominated by either lemonade berry *(Rhus integrifolia)* or laurel sumac (*Malosma laurina*). Other species present may include chamise, California sagebrush, Mexican elderberry (*Sambucus mexicana*), bush monkeyflower (*Mimulus aurantiacus*), etc. (Sawyer and Keeler-Wolf 1995). This series is present on approximately 2.7 acres of sheltered, more northerly-facing hillsides and canyon bottoms, in wetter sites than the other chaparral series. Small, unmapped patches of this series may also occur within larger areas occupied by other chaparral types.

The coastal scrubs found on the facility also occur as intergrading series. While these are subdivided here according to Sawyer and Keeler-Wolf's (1995) classification system, Holland (1986) considers them as variations of "Diegan Coastal Sage Scrub." These include the "California sagebrush series," "mixed sage series," and "black sage series." The California gnatcatcher, a federally threatened species and California species of special concern, utilizes several types of coastal scrub, but appears to avoid scrubs where chamise is present (M. San Miguel, pers. comm. July 2001). For this reason, the California sagebrush series has been further subdivided for mapping purposes into that including a chamise component vs. that where a chamise component is absent.

California sagebrush is the dominant shrub in the **California sagebrush series**. Other perennial species present may include chamise, California buckwheat, white sage, black sage, bush monkeyflower, Mexican elderberry, lemonade berry, and others (Sawyer and Keeler-Wolf 1995). This series is present without a chamise component on approximately 1.1 acres, on the lower slopes of the mesa, generally downslope from a chaparral series or interspersed with coast live oak woodland. (See Figure 1, "CSS2.") California sagebrush series with a chamise component occupies about 9.0 acres on slopes in the central part of the mesa. (See Figure 1, "CSS1.")

Mixed sage series is a coastal scrub in which no single species or pair of species can be considered dominant. Common shrubs and perennial plants in this series include black sage, while sage, California sagebrush, lemonade berry, laurel sumac, Mexican elderberry, etc. This series occurs on approximately 2.8 acres at the mouths of two canyons in the center of the mesa. (See Figure 1, "MSG.")

Black sage series has black sage as the dominant shrub, with other perennials including California buckwheat, California sagebrush, white sage, chaparral yucca, and others. A small patch (approximately 0.2 acres) of this plant community was identified in the eastern ridgeline of the mesa, where a large antenna has been installed. (See Figure 1, "BLS".)

The only native woodland habitat present on the facility is coast live oak woodland. This plant communitiy must be considered as severely degraded.

While the native species present are characteristic of the **coast live oak series** (Sawyer and Keeler-Wolf 1995) (i.e., coast live oak (*Quercus agrifolia*), scrub oak (*Quercus berberifolia*), California sagebrush, etc.), many landscaping plants have become naturalized in this plant community (e.g., pampas grass (*Cortaderia* spp.), carrotwood

(*Cupaniopsis anacordioides*), fountain grass (*Pennisetum setaceum*), Aleppo pine (*Pinus halepensis*), exotic acacias (*Acacia* spp.), edible fig (*Ficus carica*), etc.), and the understory has been invaded by many exotic weeds. Approximately 7.6 acres of this plant community is present, primarily at the bottom of the slope, along the top of the ridgeline, and in the wetter canyon bottoms. (See Figure 1, "CLO.")

Vegetation on the lowest parts of the slopes is a mix of exotic landscaping plants and coast live oak woodland, plus strips of mowed vegetation approximately 30 feet wide, established as a fuel-break between the brushy hillsides and the buildings at the bottom of the slope.

This mowed vegetation has probably "type-converted" from an original mix of coastal sage scrub and chaparral habitats to invasive, exotic annual grasses such as bromes (*Bromus* sp.), wild oats (*Avena barbata*), Mediterranean split-grass (*Schismus* spp.), and planted and naturalized landscape plants, such as slender-leaved iceplant (*Mesembryanthemum nodiflorum*), fountain grass) and disturbance-adapted native and exotic species (e.g., telegraph weed (*Heterotheca grandiflora*), Douglas groundsel (*Senecio douglasii*), tall stephanomeria (*Stephanomeria virgata*), tree tobacco (*Nicotiana glauca*), horehound (*Marrubrium vulgare*), star-thistle (*Centaurea melitensis*), and bull thistle (*Cirsium vulgare*). It is characterized as **"California annual grassland series,"** following the classification system established by Sawyer and Keeler-Wolf (1995). This series is equivalent to "non-native grassland" under Holland (1986). Approximately 9.6 acres of this plant community has been identified within the mesa area. (See Figure 1, "CAG.")

Within the mesa area, about 1.5 acres are dominated by **landscape and exotic plants,** especially along the ridgeline, and at the west end of the mesa around buildings 251 and 253. Fountain grass, and aleppo pine are the most common landscape plants in these areas, with many exotic weedy species (e.g. star-thistle) also present. (See Figure 1, "EXO.")

On the more developed portions of the facility, a mix of landscaping and native plants are found. Sites with mature trees, a mix of understory shrubs and forbs, and a significant native plant component have more value to wildlife than the more intensively landscaped areas with large expanses of lawn and few trees (i.e., the southeast corner of Mariner and Surveyor Boulevards, across from building 1720, vs. the area on the south side of Mariner Road, in front of building 183).

A significant number of mature coast live oak trees (approximately 70) are present, sometimes isolated in planters as specimen trees (for example, near buildings 302 and 183), or retained within a landscaped area (as along Explorer Boulevard). Some areas have over a dozen trees retained in groups, as near building 177, and as shade trees in the parking lots on the east part of the facility. While these trees have value to wildlife, and contribute genetic material to the regional population of coast live oaks (i.e., through wind-borne pollen, acorns dispersed to surrounding areas by wildlife, etc.), they are not considered a part of a functioning native plant community.

3.2.2. Common Wildlife Species. The Oak Grove facility supports a diverse amount of wildlife, some likely in greater numbers than adjacent areas developed as housing. (See Appendix B for a complete list of animal species detected.) Five mammal species were observed during field surveys. Mule deer are abundant and acclimated to human presence. These animals often bed and forage in areas immediately adjacent to roads and buildings. Mountain lions have been observed relatively frequently on the facility, although one that may have utilized the mesa area as a core area for its home range was destroyed by the California Department of Fish and Game the summer of 2001, after a number of incidents involving humans and their domestic animals in nearby communities. Raccoons, striped skunks, bobcats, gray foxes, wood rats, deer mice, pocket gophers, California ground squirrels, gray squirrels, and other mammals of the southern California foothills are all likely present at times on the facility.

A very diverse assemblage of birds utilize habitats on the facility, as year-round, summer, and some winter residents or migrants. Forty-nine bird species were noted during field surveys by CMBC staff, during general biological surveys, and by Michael San Miguel during focused surveys for California gnatcatcher, through 24 August 2001. Typical species observed in native habitats include western scrub jay, California towhee, spotted towhee, wrentit, red-tailed hawk, oak titmouse, acorn woodpecker, band-tailed pigeon, Bewick's wren, and others. A number of native and exotic species closely associated with human habitation were also observed, such as northern mockingbird, common raven, American crow, rock dove and European starling. Several nutmeg mannikins (an exotic finch that has recently established wild populations in southern California, presumably from escaped cage birds) were observed.

Three common reptile species typically associated with chaparral, oak, and coastal scrub habitats were observed during field studies of the facility: side-blotched lizard, western fence lizard, and California whipsnake. Other species are likely present, such as alligator lizard, western skink, gopher snake, western rattlesnake, etc.

3.2.3. Special-status Elements. No special-status plants were detected during surveys of the site. Only one special-status animal, the Cooper's hawk, a California Species of Special Concern was observed on the facility (by Michael San Miguel, on 26 July and 23 August 2001). No species listed as threatened or endangered under either federal or California laws were detected.

4.0. Discussion.

4.1. Biological Resource Values and Potential Impacts.

4.1.1. General Biological Resources. As described in previous sections, JPL's Oak Grove facility encompasses 176 acres of land, of which approximately 65 acres (approximately 37%) remain relatively undeveloped, primarily located on the slopes and canyons of the mesa area. Within these 65 acres, approximately 31 acres (± 48%) are vegetated by chaparral series, 13 acres (± 20%) by coastal scrub series, and about 8 acres (± 12%) by oak woodland. The remaining 12 acres (± 18%) consist of mowed firebreaks, type converted to disturbance-adapted native and exotic grasses and forbs, and areas with primarily non-native naturalized or landscape plants.

These remnant native habitats have considerable value to wildlife. Large mammals such as mule deer appear to be resident on the facility, or move on to and off the facility at will, utilizing the facility as part of a larger home range. Other animals, such as small mammals, birds, reptiles, and amphibians are entirely resident on the site, or come and go as seasonal residents, dispersing animals or migrants. With increasing development of the foothill area, the value of habitats on the facility increases for many of these species.

The developed portions of the facility also include some areas with biological value, including isolated stands of coast live oak, and areas of landscaping with mature native and exotic trees. These "islands" of vegetation may be utilized by nesting, roosting, and foraging birds, foraging mammals (e.g., deer), or may entirely support some small mammals (e.g., pocket gophers, chipmunks), reptiles (e.g., side-blotched lizards). Los Angeles County and the cities of Pasadena and La Cañada Flintridge have statutes that call for the protection of mature oaks and other "heritage trees" to the extent possible. (The County requires replacement of each mature oak lost with two 15-gallon seedlings.) Although these statutes are not applicable on federal land, retention of mature trees contributes to the biological resource values of the facility.

While a number of construction projects are planned at the Oak Grove facility in the next several years, these are primarily upgrades of infrastructure, or remodeling or replacement of existing buildings. Few areas with primarily native habitats are likely to be affected. Nonetheless, given the small amount of acreage in native habitats remaining on the site, loss of native vegetation and habitats may be anticipated as space available for new construction is severely limited. Coastal scrub and oak woodland habitats are the most limited in area, and may support special-status species. Impacts to these habitats are relatively more serious than impacts to chaparral habitats.

Landscaping activities have affected native plant communities and wildlife on the facility. Many exotic landscape plants and weeds have become established, not only on the fringes of native plant communities, but throughout. Some of the more invasive of the exotic plants currently used in site landscaping include fountain grass, slender-leaved iceplant, and pampas grass. (See Appendix D for a list of landscape plants known to invade native plant communities.) An exotic tree, carrotwood (*Cupaniopsis anacordioides*), appears to be naturalizing in the canyon bottoms, apparently a recent phenomenon in southern California (A. Sanders, pers. comm., 26 July 2001). Oleander, a landscaping shrub present on the edges of Mesa Road, is known to be toxic to browsing animals.

In addition, many invasive, exotic weeds are either well established or becoming established in many areas. One of the more difficult to control species, star-thistle, is in the early stages of establishment near the west end of the ridgeline of the mesa, along the fenceline and near an antenna. The practice of depositing landscaping waste at the edge of open space areas, and even composting heaps, if not carefully managed and contained, can be a source of invasive species.

Fire prevention efforts, while essential for the protection of buildings and other structures on the facility, have contributed to loss of native habitats. The mowed strip at the bottom of the hillsides has "type-converted" from coastal scrub and chaparral habitats to non-native annual grasses and other weedy species. Long-term fire suppression on the hillsides has also contributed to the prevalance of late successional conditions in the chaparral communities (i.e., very dense and woody, less productive shrubs). Such conditions may lead to hotter, more devastating fires in the long run, and the establishment of exotic annual grasses in the place of native chaparral and scrub species.

A current project at JPL involves the replacement and repair of perimeter fencing, which currently does not extend across the northern boundary of the facility at the center of the ridgeline. While it is understood that security ranks as a higher priority at the facility than wildife, changes in perimeter fencing may decrease the value of the facility as habitat for large mammals. If possible, consideration to wildlife should be given in planning such changes, especially to avoid trapping large mammals within an area of habitat too small to support their long-term needs and isolating them from a larger regional population.

Pesticide use may affect birds, reptiles, amphibians, and mammals feeding on insect species or insect predators. At highest risk are species who feed on insect predators,, due to the concentrating effects of toxins in prey species. All native breeding birds, and their nests and young, are protected under the Migratory Bird Treaty Act. Projects occurring during the nesting season that involve the removal of vegetation may have impacts to nesting birds. Nesting birds of prey are especially sensitive to disturbance, and may abandon nests and young when human activity is too persistent in the vicinity of a nest site.

4.1.2. Special-status Species.

4.1.2.1 Federally Listed, Proposed, and Candidate Species. As described in Section 3.1, Nevin's barberry and Braunton's milk-vetch, two federally endangered plants, and San Fernando spineflower, a candidate for both federal and state listing as threatened or endangered, have potential to occur on the facility. None of these species was detected during project surveys. If the species occur, they would be expected in undeveloped areas of the facility. Effects to these species, if present, could result from any reduction or loss of native plant communities, especially coastal scrubs and chaparral.

Although the Oak Grove facility falls within designated critical habitat for the arroyo toad, a federal endangered species and California species of special concern, the species was not detected during site surveys and is unlikely to occur on the facility, based on terrain and habitat requirements. (See discussion in Appendix C.)

Of the special-status bird species with potential to occur in the area, only the California condor and the California gnatcatcher are federally listed species. Although the facility is within the historic range for the California condor, a federal and California endangered species, given the very limited number of condors released back to the wild and the distance from the core area of their current range, it is extremely unlikely that this species will occur on or near the facility. Focused surveys for the California gnatcatcher, a federal threatened species and California species of special concern were conducted within areas of appropriate habitat at Oak Grove by Michael San Miguel, and completed in November of 2001. Although the species was absent from the facility during the period of surveys, dispersing individuals could pass through or emmigrate on to the facililty and establish territories in the future. About four acres of suitable habitat for the gnatcatcher is present on the facility. Any loss of these habitats (California sagebrush series without a chamise component, mixed sage series, black sage series) could affect this species, if present.

4.1.2.2. Other Special-status Species. Seven special-status plant species could occur on the facility, but were not detected during site surveys. These are Plummer's mariposa lily, Parry's spineflower, San Gabriel bedstraw, Robinson's peppergrass, Brand's phacelia, Davidson's bush mallow, and southern skullcap. Any reduction or degradation of chaparral, coastal scrub, or woodland habitat could affect these plants, if they occur.

The western spadefoot toad was not detected in surveys, but appropriate habitat is present on the facility, and the species could occur. Another special-status amphibian, the yellow-blotched ensatina has only a minor likelihood of occurrence, since only marginal habitat is present on the facility, and the subspecies is not typical for the area. Habitat loss for these species, if they occur, could be a concern if building in hillside areas is contemplated, or if native habitats continue to be degraded through landscaping and other vegetation management practices.

Six reptile species with special-status (the San Diego horned lizard, the coastal western whiptail, the coastal rosy boa, silvery legless lizard, the San Diego mountain kingsnake, and coast patch-nosed snake) may also occur. If these species are present, habitat loss and potential loss of individual animals could occur if construction projects are planned in native plant communities (i.e., hillside areas), or if native plant communities are lost or degraded through other management practices, as described in section 4.1.1.

Special-status birds that occur or may occur on the facility include the golden eagle, peregrine falcon, Cooper's hawk, sharp-shinned hawk, and Bell's sage sparrow. Loss of native habitats could affect these species, if they occur. Loss of mature trees in developed parts of the facility may also have deleterious effects on these species, through loss of potential perch, roosting, and nest sites. In addition, migratory birds and their nests and young, are protected under the Migratory Bird Treaty Act (16 C.S.C. Sections 703-712, July 3, 1918, as amended 1936, 1960, 1969, 1974, 1978, 1986, and 1989).

Six special-status bat species have potential to occur in the vicinity of the facility (pallid bat, fringed myotis, long-eared myotis, small-footed myotis, spotted bat, Townsend's big-eared bat). These species may forage or roost on the facility and nearby areas, especially the Arroyo Seco. If they occur, they could be affected by pesticide use on the facility (through their insect prey), or by loss of native habitats. The Los Angeles pocket mouse, a California species of concern, could be affected by loss or degradation of native plant communities.

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APPENDIX A.

Plants Observed at Jet Propulsion Laboratory's Oak Grove Facility

CONIFERAE	CONE-BEARING PLANTS
Pinaceae	**Pine family**
**Pinus halepensis*	Aleppo pine
Aizoaceae	**Fig-marigold Family**
**Mesembryanthemum nodiflorum*	Slender-leaved iceplant
ANGIOSPERMIAE: DICOTYLEDONEAE	DICOT FLOWERING PLANTS
Amaranthaceae	**Amaranth family**
**Amaranthus albus*	White tumbleweed
Anacardiaceae	**Sumac family**
Rhus integrifolia	Lemonade-berry
Rhus laurina	Laurel sumac
Toxicodendron diversilobum	Poison oak
Apocynaceae	**Dogbane family**
**Nerium oleander*	Oleander
Asteraceae	**Sunflower family**
**Ageratina adenophora*	Ageratina
Artemesia californica	California sagebrush
Artemesia tridentata	Great basin sagebrush
Baccharis glutinosa (syn. *salicifolia)*	Mulefat
Baccharis pilularis	Chaparral broom, coyote brush
Brickellia californica	California brickellbush
**Centaurea melitensis*	Star-thistle
**Cirsium vulgare*	Bull thistle
**Conyza bonariensis*	Flax-leaf fleabane
Gnaphalium californicum	California cudweed
Gnaphalium microcephalum	White everlasting
Heterotheca grandiflora	Telegraph weed
Malacothrix saxatilis	Cliff malacothrix
**Salsola tragus*	Russian thistle
Senecio douglasii	Douglas' groundsel
Stephanomeria virgata	Tall stephanomeria
**Xanthium strumarium*	Cocklebur
Boraginaceae	**Borage family**
Amsinckia intermedia	Rancher's fiddleneck

Brassicaceae	**Mustard family**
**Brassica geniculata*	Short-pod mustard
**Sisymbrium altissimum*	Tumble mustard
Caprifoliaceae	**Honeysuckle family**
Sambucus mexicana	Elderberry
Convolvulaceae	**Morning-glory family**
Cuscuta sp.	Dodder
Cucurbitaceae	**Gourd family**
Marah macrocarpus	Wild cucumber
Euphorbiaceae	**Spurge family**
Chamaesyce (Euphorbia) albomarginata	Rattlesnake weed
Fabaceae	**Pea family**
**Acacia baileyana*	Cootamundra wattle
**Acacia* sp.	Acacia
Lotus scoparius	Deerweed
Fagaceae	**Beech family**
Quercus agrifolia	Coast live oak
Quercus berberidifolia	Scrub oak
Hydrophyllaceae	**Waterleaf family**
Phacelia ramosissima	Phacelia
Lamiaceae	**Mint family**
**Marrubium vulgare*	Horehound
Salvia apiana	White sage
Salvia columbariae	Chia
Salvia mellifera	Black sage
Moraceae	**Mulberry family**
**Ficus carica*	Edible fig
Nyctaginaceae	**Four o'clock family**
Mirabilis californica (syn. laevis)	California wishbone bush
Oleaceae	**Olive family**
Fraxinus dipetala	Ash
**Olea europea*	European olive
Onagraceae	**Evening-primrose family**
Camissonia californica	False-mustard
Polemoniaceae	**Phlox family**
Gilia sp.	Gilia

Polygonaceae	**Buckwheat family**
Eriogonum fasciculatum	California buckwheat
Rhamnaceae	**Buckthorn family**
Ceanothus crassifolius	Thick-leaf wild lilac
Rhamnus crocea	Spiny redberry
Rosaceae	**Rose family**
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	Mountain mahogany
Heteromeles arbutifolia	Toyon
Prunus ilicifolia	Holly-leafed cherry
Sapindaceae	**Carrotwood family**
**Cupaniopsis anacordioides*	Carrotwood
Scrophulariaceae	**Figwort family**
Collinsia sp.	
Keckiella cordifolia	Climbing bush penstemon
Mimulus auranticus (syn. *longiflorus*)	Monkeyflower
Solanaceae	**Nightshade family**
Datura wrightii (meteloides)	Jimsonweed
**Nicotiana glauca*	Tree tobacco
Solanum douglasii	Douglas' nightshade
Verbenacaea	**Vervain family**
Lantana montevidensis	Lantana

ANGIOSPERMIAE: MONOCOTYLEDONES — MONOCOT FLOWERING PLANTS

Arecaceae	**Palm family**
Washingtonia filifera	California fan palm
Liliaceae	**Lily family**
**Agave* sp.	Agave
Yucca whipplei	Chaparral yucca
Poaceae	**Grass family**
**Avena barbata*	Slender wild oats
**Bromus diandrus*	Common ripgut-grass
**Bromus madritensis* ssp. *rubens*	Red brome
**Cortaderiac.f. selloana*	Selloa pampas-grass
**Cynodon dactylon*	Common Bermuda-grass
Melica imperfecta	Coast range melic
Muhlenbergia microsperma	Littleseed muhly
**Pennisetum setaceum*	Fountain grasss
**Schismus barbatus*	Mediterranean split grass
Stipa coronata	Giant needlegrass
Stipa lepida	Foothill needlegrass

* - denotes introduced (non-native) species.
c.f. - "compares favorably" to a known species when the observed species is not determinable.
sp. - species unknown.

This list reports only those plant species actually observed on the site by this study. Other plants may have been overlooked or undetectable due to the seasonal nature of their occurrence.

APPENDIX B:

Animals Detected at Jet Propulsion Laboratory's Oak Grove Facility

REPTILIA	REPTILES
Iguanidae	**Iguanids**
Sceloporus occidentalis	Western fence lizard
Uta stansburiana	Side-blotched lizard
Colubridae	**Colubrids**
Masticophis lateralis	California whipsnake
AVES	**BIRDS**
Cathartidae	**Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Hawks, eagles, harriers**
Accipiter cooperii	Cooper's hawk
Buteo lineatus	Red-shouldered hawk
Buteo jamaicensis	Red-tailed hawk
Phasianidae	**Grouse and quail**
Callipepla californica	California quail
Columbidae	**Pigeons and doves**
Columba livia	Rock dove
Columba fasciata	Band-tailed pigeon
Zenaida macroura	Mourning dove
Apodidae	**Swifts**
Aeronautes saxatalis	White-throated swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus sp.	Allen's or rufous hummingbird
Picidae	**Woodpeckers**
Melanerpes formicivorus	Acorn woodpecker
Picoides nuttallii	Nuttall's woodpecker
Colaptes auratus	Northern flicker
Tyrannidae	**Tyrant flycatchers**
Contopus sordidulus	Western wood-pewee
Contopus borealis	Olive-sided flycatcher
Sayornis nigricans	Black phoebe
Myiarchus cinerascens	Ash-throated flycatcher

Hirundinidae	**Swallows**
Tachycineta thalassina	Violet-green swallow
Stelgidopteryx serripennis	Northern rough-winged swallow
Corvidae	**Crows and jays**
Cyanocitta stellari	*Stellar's jay*
Aphelocoma coerulescens	Scrub jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Paridae	**Chickadees and titmice**
Parus gambeli	*Mountain chickadee*
Parus inornatus	Oak titmouse
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit
Troglodytidae	**Wrens**
Thryomanes bewickii	Bewick's wren
Muscicapidae	**Thrushes and allies**
Polioptila caerula	Blue-gray gnatcatcher
Turdus migratorius	American robin
Chamaea fasciata	Wrentit
Mimidae	**Mockingbirds and thrashers**
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
Bombycillidae	**Waxwings**
Bombycilla cedrorum	Cedar waxwing
Ptilogonatidae	**Silky flycatchers**
Phainopepla nitens	Phainopepla
Sturnidae	**Starlings**
Sturnus vulgaris	European starling
Emberizidae	**Sparrows, warblers, tanagers**
Vermivora celata	Orange-crowned warbler
Dendroica petechia	Yellow warbler
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Passerina amoena	Lazuli bunting
Pipilo erythrophthalmus	Spotted towhee
Pipilo crissalis	California towhee
Aimophila ruficeps	Rufous-crowned sparrow
Molothrus ater	Brown-headed cowbird
Icterus cucullatus	Hooded oriole

Fringillidae	**Finches**
Carpodacus mexicanus	House finch
Carduelis psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch
Carduelis tristis	American goldfinch
Passeridae	**Weavers**
Passer domesticus	House sparrow
Estrildidae	**Exotic finch**
Lonchura punctulata	Nutmeg mannikin

MAMMALIA — MAMMALS

Leporidae	**Hares and rabbits**
Sylvilagus audubonii	Audubon cottontail
Sciuridae	**Squirrels**
Otospermophilus beecheyi	California ground squirrel
Cricetidae	**Rats and mice**
Neotoma sp.	Wood rat
Canidae	**Foxes, wolves and coyotes**
Canis latrans	Coyote
Mustelidae	**Weasels and skunks**
Mephitis mephitis	Striped skunk
Cervidae	**Elks, moose, caribou, deer**
Odocoileus hemionus	Mule deer

Nomenclature follows Stebbins (1985), *A Field Guide to Western Reptiles and Amphibians*, second edition; Sibley (2000), *National Audubon Society, The Sibley Guide to Birds*, first edition; and Ingles, Mammals of the Pacific States (1965), second edition.

APPENDIX C.

Arroyo Toad Habitat Assessment

"Arroyo Toad *(Bufo californicus)* Field Assessment of Arroyo Seco Upland Habitat at the Jet Propulsion Laboratory, Pasadena, California." July 2001. Prepared by Nancy H. Sandberg, Biological Consultant, Santa Barbara, California. Prepared for Jacobs Engineering, JE Remediation Technologies, Inc., Pasadena, California.

Arroyo Toad (*Bufo californicus*) Field Assessment of Arroyo Seco Upland Habitat at the Jet Propulsion Laboratory, Pasadena, California

July 2001

Prepared for
Jacobs Engineering
JE Remediation Technologies, Inc.
4800 Oak Grove Drive, Mail Stop 200-108
Pasadena, California 91109-8099

Prepared by
Nancy H. Sandburg
Biological Consultant
811 Knapp Drive
Santa Barbara, Ca 93108

Introduction

A field habitat assessment was conducted for the arroyo toad (*Bufo californicas*) at the Jet Propulsion Laboratory (JPL) in Pasadena, California on the morning of July 11, 2001. The site visit consisted of driving through heavily developed areas via Arroyo, Mariner and Explorer Roads, and walking the riparian habitat of Arroyo Seco below the JPL boundary. Boundary lines of the site assessment were delineated by accompanying biologist Sharon Dougherty of Circle Mountain Biological Consultants, at a chain link fence line demarcating JPL property from Pasadena City and other properties.

The arroyo toad is federally listed by the USF&WS (1994) as endangered and occurs in river systems of cismontane southern and central California and northern Baja. It has been extirpated from an estimated 75% of historic range (Sweet 1992). Current presence or absence of arroyo toads within this lower section of Arroyo Seco by the JPL and City of Pasadena properties has not been confirmed (Sharon Dougherty, pers. com.). The purpose of this analysis is to qualitatively assess the potential use of upland habitat by the arroyo toad for inclusion into planning documents for JPL.

Review and Discussion

Arroyo Seco is situated on the southeast side of the JPL site, directly north of the City of Pasadena's Hahamongna Watershed Park. Suitable habitat characteristics as described by Sweet (1992), and Holland and Sisk (2001) for arroyo toad breeding are present within Arroyo Seco downstream of the East Exit Bridge. Topographical gradients are sufficiently low to permit arroyo toad movement into JPL property for a linear distance of approximately one half mile paralleling the Arroyo below the East Exit Bridge, but the majority of suitable arroyo toad breeding and upland habitat is under Pasadena City jurisdiction south of JPL property.

Human activities in upland habitats have been documented as a cause of mortality on arroyo toads (Sweet 1991, Griffin 1999, Holland (2001), Ramirez (2001). Arroyo toads use a variety of year-round upland habitats in addition to stream channel and riparian habitat and recent telemetry and pit trapping studies have provided more definitive data on habitat use. Pit trapping studies by Holland and Sisk (2001) and radio telemetry studies by Griffin (1999) documented upland habitat use on Camp Pendleton throughout the year. Arroyo toads were found to travel up to 1.2 km from the edge of riparian ecotone into upland habitats including chaparral, coastal sage scrub, oak woodland, agricultural, and grassland (Holland 2001). Male and female arroyo toads return to upland habitats after completion of individual breeding activities though data suggests that upland habitat is used less than channel or terrace habitat riparian habitats. Over a three-year study period,

Holland's and Sisk's Santa Margarita study area averaged 1.94 animals/ha/y for the riparian habitat and 0.31 animals/ha/y for the upland areas. Their Cristianitos study site averaged 8.8 animals for riparian areas and 0.19 animals/ha/y for upland sites (estimates likely significantly under-represent actual densities). Recaptures of subadult and adult toads in upland habitats were 11.2 % and 23.8 % respectively for these sites.

Griffin (1999) found that arroyo toads in broad floodplain sub-areas of his study site moved further into upland habitats than arroyo toads in narrow sub-canyon areas, and this behavior has been further documented by telemetry studies by Ramirez (2000) and pit tagging studies by Sweet (1992,1993). A lower preference for foraging habitat that supports dense vegetative cover has been supported by findings from Sweet (1991) Griffin (1999) and Holland (2001). Griffin found during an El Nino breeding season that females preferred terrace and channel habitat for burrowing significantly to upland habitat, while males preferred scoured channel habitat; both sexes preferred sand substrates for burrows. Least preference for burrows in vegetated microhabitats with a dense nonnative grass cover was also found by Ramirez (pers. com.). Ramirez (2000) discovered his population selects burrows sites with relatively higher soil saturation.

The Jet Propulsion Laboratory property lies within a 1.2 km distance of the riparian ecotone of Arroyo Seco, but it has been heavily developed with asphalt parking lots, concrete walkways, structural barriers, and multi-storied buildings above river terrace. Below the East Exit Bridge, this development is continuous as it parallels Arroyo Drive. Approximately 90% of the soil surface of what may have been suitable arroyo toad upland habitat on JPL property is developed. The possibility that arroyo toads currently use this area for upland burrowing is negated by habitat loss and heavily trafficked roadways. Amphibians utilizing open asphalt parking areas for feeding or traveling would incur high mortality.

An undeveloped section of JPL land paralleling the Arroyo, is situated upstream of the East Exit Bridge, on the uphill side of an existing chain link fence. The JPL fence boundary is situated approximately three hundred feet upslope on a steep gradient grassland from the north riparian edge of Arroyo Seco. Development has not occurred here on the steep slope rising up from the stream channel. Approximately fifty feet upslope of the fence boundary, grassland grades into southern chaparral including scattered coast live oak, though it appears this grassland strip resulted from fence construction clearing.

Property jurisdiction of the stream channel and upland habitat below the chain link fence was not identified. The stream channel and associated terrace and riparian habitat of Arroyo Seco (not within the JPL boundaries) changes conspicuously from a wide alluvial depositional terrace below the East Exit Bridge to a narrow constricted channel with steeply cut banks into fine alluvial deposits above the Bridge. Approximately one quarter mile north, this channel narrows further as it

cuts into solid bedrock with a sufficiently steep gradient to deter arroyo toad passage.

The riparian vegetation also changes in structure upstream of the East Exit Bridge. A dense riparian understory, with a 70 to 100 percent canopy cover of willow and sycamore entrenches the straight stream channel. At the time of survey, water was present in the channel with an approximate surface width of three feet and average water depth of one inch. Sharon Dougherty stated that the surface water was likely a result of recent thunderstorms. A steep alluvial bank with slope in excess of 45 percent rises out of the vegetated streambed.

The streambed north of the East Exit Bridge (downslope of JPL property boundaries) does not contain characteristics that constitute arroyo toad breeding habitat. Such a constrained channel lacks appropriate breeding pools, and incurs fast flows that exceed velocities required for successful cluster deposition and larvae habitat. In addition, the presence of dense overstory and understory vegetation precludes breeding and tadpole development by limiting water temperatures and sunlight. Arroyo toad travel via stream channel from upstream or downstream sites through this area is possible (summer thunderstorms often initiate emergence from burrows), and there is a potential attraction to the existing surface water in order to hydrate, but feeding and breeding habitat is marginal. Steep sloped alluvial deposits that form part of the channel here, however, may be attractive burrow sites for toads taking advantage of greater soil moisture through dry months. A more likely avenue for an arroyo toad to access the JPL habitat upstream of the East Exit Bridge would be to travel up from the gentler sloping river terrace downstream. However, additional passage poses a high mortality risk as the toads would need to cross a major vehicle thoroughfare to reach undeveloped uplands.

The potential for an arroyo toad to utilize upland habitat on JPL property for feeding or burrowing is unlikely due to additive factors:

1. A steep gradient rise directly out of the stream channel would require high energy consumptive locomotion, in combination with a difficult climbing effort via a circuitous route, which is prohibitive. Additional upland climbing would be required to reach the JPL boundary though the grassland slope is not an excessive gradient. Constrained channels and steep slopes appear to limit toad range.
2. Woody vegetation on the stream banks is dense at ground level, not easily passable, and could serve to channel toads downstream towards more open alluvial terraces.
3. Grassland and chaparral soil on the JPL site does not include loose fine, coarse or medium sands preferred by toads for burrows. Exhibited preferences for burrowing sites does not include compacted soils with a cover of dense annual grasses.
4. Dense annual grass cover and steep uplands do not provide preferred foraging habitat. Mortality/predation risks are high for an arroyo toad

climbing over an extended time period in exposed grassland and over highly trafficked roadways.

Though the presence of an arroyo toad is unlikely on JPL property, and could be considered a rare incident, it is possible for the following to occur:

1. An individual toad travels from low gradient Arroyo Seco alluvial terraces and survives vehicular traffic to forage on an asphalt parking lot or burrow in landscaped areas.
2. An individual arroyo toad travels in the stream channel upstream of the bridge to hydrate in receding Arroyo Seco surface flow, and succeeds in scaling the riverbank and grasslands to the JPL fence boundary to burrow in chaparral habitat.
3. An individual toad travels a path from lower gradient terraces downstream of the Exit Bridge, crosses roads and travels northward and upslope to the undisturbed chaparral and grassland habitat behind the chainlink fence boundary.

Barring such exceptions, the JPL land area currently does not provide suitable habitat for sustainable populations of arroyo toads. JPL boundaries exist outside breeding ponds and more suitable stream channel and alluvial terraces. Upland habitat has been converted by development to unsuitable characteristics providing a high risk factor to arroyo toads that leave upland terraces. Access to undeveloped grass and chaparral upland habitat provides high mortality risk and/or locomotive difficulties due to steep gradients.

Conclusion

In summary, it is my conclusion that:

Land development and uses within the JPL boundaries south of the East Entrance Bridge preclude significant use by arroyo toads, and can no longer be considered as viable arroyo toad habitat.

Arroyo toad use of the JPL property north of the East Entrance Bridge would not be significant due to access difficulties, mortality risk and sub-optimal characteristics of grassland.

Nancy H. Sandburg
Biological Consultant

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Note:

In viewing the Hahamongna Watershed Park Master Plan Map for the City of Pasadena, there is concern about the intensive land uses slated for potential arroyo toad habitat directly south and east of JPL boundaries. Consultation with Dr. Dan Holland is strongly recommended.

APPENDIX D.

Invasive, Exotic Plants Recommended to be Avoided and/or Removed in Landscaping at the Jet Propulsion Laboratory's Oak Grove Facility*

Scientific name	Common Name	CalEPPC List	Comments
Cortadera jubata	Andean pampas grass, jubata grass	A-1	
Cortadera selloana	Pampas grass	A-1	Present on site
Cytisus scoparius	Scotch broom	A-1	
Eucalyptus globulus	Tasmanian blue gum	A-1	
Genista monspessulana	French broom	A-1	
Pennisetum setaceum	fountain grass	A-1	Extensive areas on site, invading native habitats.
Rubus discolor	Himalayan blackberry	A-1	
Senecio mikanioides (= *Delairea odorata*)	Cape ivy, German ivy	A-1	
Ailanthus altissima	tree of heaven	A-2	
Conicosia pugioniormis	narrow-leaved iceplant	A-2	Present along Mesa Road.
Cytisus striatus	striated broom	A-2	
Elaeagnus angustifolia	Russian olive	A-2	
Ficus carica	edible fig	A-2	Present along Mesa Road
Myoporum laetum	myoporum	A-2	
Argeratina adenophora	eupatory	B	Present on site
Crataegus monogyna	hawthorn	B	
Festuca arundinacea	tall fescue	B	
Hedera helix	English ivy	B	
Ilex aquafolium	English holly	B	
Iris pseudacorus	yellow water iris, yellow flag	B	
Leucanthemum vulgare	ox-eye daisy	B	
Mesembryanthemum crystallinum	crystaline iceplant	B	
Olea europaea	European olive	B	Present on site
Robinia pseudoacacia	black locust	B	
Schinus molle	Peruvian pepper tree	B	
Schinus terebinthifolius	Brazilian pepper	B	
Spartium junceum	Spanish broom	B	
Vinca major	periwinkle	B	
Sapium sebiferum	Chinese tallow tree	Red Alert	
Sesbania punicea	scarlet wisteria tree	Red Alert	
Cotoneaster spp.	cotoneaster	NMI	
Gazania linearis	gazania	NMI	
Ligustrum lucidum	glossy privet	NMI	
Malephora crocea	ice plant	NMI	
Maytenus boaria	mayten	NMI	
Passiflora caerulea		NMI	
Pistacia chinensis	Chinese pistache	NMI	
Pyracantha angustifolia	pyracantha	NMI	
Verbena bonariensis, V. litoralis	tall vervain	NMI	

CalEPPC Lists are defined as follow:

List A: Most Invasive Wildland Pest Plants; documented as aggressive invaders that displace natives and disrupt natural habitats. Includes two sub-lists: List A-1: Widespread pests that are invasive in more than 3 Jepson regions, and List A-2: Regional pests invasive in 3 or fewer Jepson regions.

List B: Wildland Pest Plants of Lesser Invasiveness; invasive pest plants that spread less rapidly and cause a lesser degree of habitat disruption; may be wide-spread or regional.

Red Alert: Pest plants with potential to spread explosively; infestations currently small or localized. If found alert CalEPPC, County Agricultural Commissioner, or California Department of Food and Agriculture.

NMI - Need More Information: Plants for which current information does not adequately describe nature of threat to wildlands, distribution, or invasiveness. Further information is requested from knowledgeable observers.

*Based on the California Exotic Pest Plant Council's (1999) "The CalEPPC List: Exotic Pest Plants of Greatest Ecological Concern in California."

APPENDIX E.

Informal Consultation with U.S. Fish and Wildlife Service: Correspondence

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

APR 1 9 2001

In Reply Refer To:
FWS-LA-1659.1

Faustino R. Cherino
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91109-8099

Re: Informal Section 7 Consultation for Planned Projects at the Jet Propulsion Laboratory, Los Angeles County, California

Dear Mr. Cherino:

We have received your letter dated March 22, 2001, detailing certain planned projects at the Jet Propulsion Laboratory (JPL) within designated critical habitat for the arroyo toad (*Bufo californicus*) in Arroyo Seco, Los Angeles County, California. We offer the following comments based on our review of the documents provided, including aerial photographs of the property, a site visit conducted March 16, 2001, and our knowledge of declining habitat types and species within Los Angeles County. This determination is provided in accordance with the Endangered Species Act (Act) of 1973, as amended (87 Stat. 884, as amended;16 U.S.C. 1531 *et seq.*).

JPL is a federally funded research and development facility managed by the California Institute of Technology for the National Aeronautics and Space Administration. Portions of the JPL facility occur within designated critical habitat for the arroyo toad (66 FR 9414). The proposed projects that occur within this designation include an optical interferometery development laboratory, a flight project administration building, a gaseous nitrogen supply upgrade, and building extensions and additions.

During the site visit, it was noted that the proposed projects occur on previously developed portions of JPL and do not involve impacts to natural vegetation, topography, or other features that would be considered constituent elements for the arroyo toad. Furthermore, it was noted that constituent elements for the arroyo toad do not occur south of the naturally vegetated slopes at the northern portion of the property, which are to the north of Explorer Road and Pioneer Road.

We have determined that the proposed projects will not affect constituent elements within designated critical habitat for the arroyo toad. Therefore, no further coordination with our office

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regarding these projects is required. Additionally, future projects within the developed portions of JPL adjacent and south of Pioneer Road and Explorer Road, not affecting the vegetated slopes, will not affect constituent elements for the arroyo toad, as they do not occur in these areas.

We appreciate your concern for the protection of endangered and threatened species and your conscientious efforts to comply with the Act. If you should have any questions, please contact Kevin Clark of my staff at (760) 431-9440.

Sincerely,

Karen A. Evans
Acting Assistant Field Supervisor

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
CARLSBAD FISH AND WILDLIFE OFFICE
2730 LOKER AVENUE WEST
CARLSBAD, CALIFORNIA 92008

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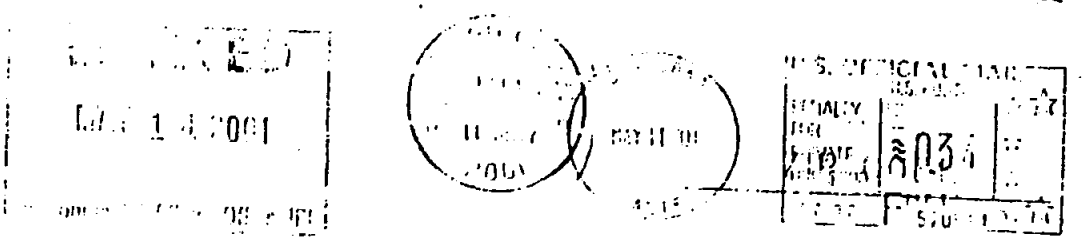


Tino Chirino
Jet Propulsion Lab
4800 Oak Grove Dr M/S 171-225
Pasadena, CA 91109

91105+8001

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

In Reply Refer To:
FWS-LA-1659.1

MAY 9 2001

Tino Chirino
Jet Propulsion Lab
4800 Oak Grove Dr. M/S 171-225
Pasadena, California 91109

Re: Informal Section 7 Consultation for the Jet Propulsion Lab Facility, City of Pasadena, Los Angeles County, California

Dear Mr. Chirino:

This letter responds to your e-mail request received April 11, 2001, for a list of federally threatened and endangered species potentially present at the Jet Propulsion Lab facility in Los Angeles County, California. To assist you in evaluating the potential occurrence of these species within the area described in your letter, we are providing the following list, which contains endangered and threatened species that occur in the general area. In assessing the actual potential for occurrence of species potentially affected by a particular project, we recommend that you seek assistance from a biologist familiar with the project site and with the species on the enclosed list. The information provided with this letter partially fulfills the requirements of the Fish and Wildlife Service (Service) under section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*).

We want to closely coordinate with you during the preparation of any biological assessment or evaluation that may be prepared for projects at the Jet Propulsion Lab facility. Our goal would be to provide technical assistance that identifies specific features that could be incorporated into the project to avoid and minimize adverse impacts to listed species. Should you have any questions regarding the species listed, or your responsibilities under the Act, please contact Kevin Clark of my staff at (760) 431-9440.

Sincerely,

Anne Hoecker

for Karen A. Evans
Acting Assistant Field Supervisor

Enclosure

LISTED, PROPOSED, AND CANDIDATE SPECIES
THAT MAY OCCUR ON THE JET PROPULSION LAB FACILITY,
LOS ANGELES COUNTY, CALIFORNIA

Plants		
Nevin's barberry	*Berberis nevinii*	E
Amphibians		
Arroyo toad	*Bufo californicus*	E, CH
Birds		
coastal California gnatcatcher	*Polioptila californica californica*	T
southwestern willow flycatcher	*Empidonax traillii extimus*	E
least Bell's vireo	*Vireo bellii pusillus*	E

Key:
E - Endangered
T - Threatened
CH - Critical Habitat

To: Kevin_Clark@r1.fws.gov
From: Faustino R Chirino <Faustino.R.Chirino@jpl.nasa.gov>
Subject:
Cc:
Bcc:

Kevin,

Welcome back. I would like a species list for our JPL facility. Please send it to me at your earliest convenience.

Tino Chirino
JPL
4800 Oak Grove Dr. M/S 171-225
Pasadena, CA 91109

Thanks.

Mike San Miguel
2132 Highland Oaks Drive
Arcadia California 91006

21 December 2001

Mr. Doug Krofta
Carlsbad Field Office
U.S. Fish and Wildlife Service
2730 Loker Avenue West
Carlsbad, CA 92008

SUBJECT: Results of Coastal California Gnatcatcher Survey areas of Coastal Sage Scrub at the Jet Propulsion Laboratory, Los Angeles County, California

Dear Mr. Krofta:

This report presents the results of focused surveys for the coastal California Gnatcatcher *(Polioptila californica californica)* at Jet Propulsion Laboratories (JPL) Pasadena, Los Angeles County, California (hereafter referred to as the project site) (see figure 1 & 2). The primary purpose of the surveys was to determine the presence or absence of the coastal California gnatcatcher on the site. The surveys were conducted according to guidelines established by the U.S. Fish and Wildlife Service (USFWS) by a biologist with the necessary federal Endangered Species Act (ESA) survey permit.

Survey Site Location and Description

The survey site consists of steep undeveloped slopes covered with native vegetation but interspersed with non-native pines, oleanders and other ornamental shrubs and trees. The industrial buildings, office complex and parking lots of JPL are adjacent to and south of the survey area. On the northwest side of the site is a residential development and to the north and northeast is a north-facing slope of chaparral draining north into the Arroyo Seco. Additional office buildings and large steel water tanks owned by the City of Pasadena for domestic water supply occupy portions on the east side of the site.

The survey area is situated on a south-facing slope of moderate to steep grade. The site supports native habitats including three types of coastal sage scrub (see figure 3.) The coastal scrubs found on the facility occur as intergrading series (S. Dougharty, pers. comm.). While these are subdivided here according to Sawyer and Keeler-Wolf's (1995) classification system, Holland (1986) considers them as variations of "Diegan Coastal Sage Scrub." These include the "California sagebrush series," "mixed sage series," and "black sage series." The California gnatcatcher, a federally threatened species and California species of special concern, utilizes several types of coastal scrub, but appears to avoid scrubs where chamise is present.

Background

The coastal California Gnatcatcher was designated a threatened species by the USFWS on March 25, 1993. A special rule was issued in conjunction with this designation that would allow incidental take of coastal California gnatcatcher under Section 9 of the ESA if the take results from activities conducted in accordance with the state's Natural Community Conservation Plan (NCCP) (USFWS 1993. Any activity that may result in the take of coastal California gnatcatcher, or its habitat, would require formal consultation with the USFWS either under Section 7 or Section 10 of the federal ESA. Focused surveys for the California Gnatcatcher, a federal threatened species and California species of special concern were conducted within areas of appropriate habitat at JPL and conducted during July through November of 2001.

The coastal California gnatcatcher is the northernmost of three subspecies currently recognized for the species (Atwood 1991). It is restricted to arid, lowland areas and has a range from southwestern California to northwestern Baja California. The remaining two subspecies occur within central and southern Baja California, Mexico. Within the U.S., the current range of the coastal California Gnatcatcher is generally within San Diego, Orange, Los Angeles, eastern Ventura and western Riverside counties. Habitat for this non-migratory species is generally limited to coastal and inland sage scrub plant communities. While it is an obligate, permanent resident of coastal sage scrub not all areas classified as coastal sage scrub are occupied (California Dept. of Fish and Game 2000). Shorter, less dense shrubs, without a chamise component are generally used. The coastal California gnatcatcher is typically found at elevations below 820 feet along the coast and below 1,640 feet inland (Atwood and Bolsinger 1992). The USFWS estimates that approximately 4,500 to 5,000 pairs remain in the U.S.

The California Natural Diversity Data Base lists 5 nearby records. The closest ± 10 mi. WSW, and ± 10 mi. ESE (1928, 1991). A significant population of Gnatcatchers is known to exist in the Montebello Hills approximately 20 miles south of JPL.

Survey Methodology

On 03 July 2001 Mike San Miguel met with Ed LaRue and Sharon Dougharty from Circle Mountain Consulting at JPL to conduct a preliminary assessment of the site. It was determined that sufficient Coastal Sage Scrub was present on the site that focused surveys for California Gnatcatcher were warranted. The surveys for the coastal California Gnatcatcher were conducted on 26 July, 08 and 23 August, 06 and 20 September, 04 and 19 October and 01 and 15 November 2001. The survey followed the protocol described in the guidelines issued by the USFWS (USFWS, February 28, 1997, and revised July 28, 1997). The guidelines stipulate a total of six surveys should be conducted during the breeding season from March 15 to June 30 and be conducted at intervals of at least seven days. However, those guidelines also allow for surveys to be conducted during the non-breeding season but during that time a total of nine surveys be conducted at intervals of at least two weeks. All surveys began and ended in the non-breeding season. These surveys were conducted entirely by independent biological consultant Mike San Miguel (USFWS permit number TE831910-1.)

Surveys were performed by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity. Taped recordings of gnatcatcher vocalizations were played in an attempt to elicit responses from any gnatcatchers present. The taped vocalizations failed to elicit a response. The weather conditions during the surveys met the requirements of the USFWS survey protocol designed to optimize gnatcatcher detection. Specifically, weather conditions that were too cold (less than 55 degrees Fahrenheit) or too windy (more than 15 miles per hour) were avoided.

Survey Results

No coastal California Gnatcatchers were observed during any of the nine days of the survey. Although the species was absent from the facility during the period of surveys, dispersing individuals, possibly from the Montebello population to the south, could pass through or emigrate on to the site and establish territories in the future. About four acres of suitable habitat for the gnatcatcher is present on the facility. Any loss of these habitats (California sagebrush series without a chamise component, mixed sage series, black sage series) could affect this species, if present. Appendix I lists the 62 bird species observed during the surveys.

Please feel free to contact me if you have any questions concerning this report.

Sincerely,

Mike San Miguel
Consulting Biologist
TE831910-1

CC: Mr. Hector Ortiz, JPL
Ms. Sharon Dougharty, Circle Mountain

References:

California Gnatcatcher, The Birds of North America, No 574, 2001; Jonathan L. Atwood and David R. Bontrager.

Monograph, Western Birds, 1998, Vol. 29, No 4: 237-500, Biology of the California Gnatcatcher.

U.S. Fish and Wildlife Service. 1993. Endangered and Threatened Wildlife and Plants; Threatened Coastal California Gnatcatcher *(Polioptila californica californica)*. Final Rule and Proposed Special Rule. Federal Register 50 CFR Part 17, Vol. 58, No.59: 16742-16759.

U.S. Fish and Wildlife Service. July 28, 1997. Coastal California Gnatcatcher *(Polioptila californica californica)*. Presence/Absence Survey Protocol.

Appendix I

Bird Species Observed at the J P L site, 26 July to 15 November 2001

Turkey Vulture *Cathartes aura*

Sharp-shinned Hawk *Accipiter striatus*

Cooper's Hawk *Accipiter cooperi*

Red-shouldered Hawk *Buteo lineatus*

Red-tailed Hawk *Buteo jamaicensis*

Merlin *Falco columbarius*

California Quail *Callipepla californica*

Rock Dove *Columba livia*

Band-tailed Pigeon *Columba fasciata*

Mourning Dove *Zenaida macroura*

White-throated Swift *Aeronautes saxatalis*

Black-chinned Hummingbird *Archilochus alexandri*

Anna's Hummingbird *Calypta anna*

Costs'a Hummingbird *Calypte costae*

Hummingbird Sp? *Selasphorus sp?*

Acorn Woodpecker *Melanerpes formicivorus*

Nuttall's Woodpecker *Picoides nuttalli*

Northern Flicker *Calaptes auratus*

Olive-sided Flycatcher *Cantopus cooperi*

Black Phoebe *Sayornis nigricans*

Say's Phoebe *Sayornis saya*

Ash-throated Flycatcher *Myiarchus cinerascens*

Cassin's Kingbird *Tyrannus vociferans*

Steller's Jay *Cyanocitta stelleri*

Western Scrub Jay *Aphelocoma californica*

American Crow *Corvus brachyrhynchos*

Common Raven *Corvus corax*

Violet-Green Swallow *Tachycineta thalassina*

Northern Rough-winged swallow *Stelgidopteryx serripennis*

Cliff Swallow *Petrochelidon pyrrhonota*

Barn Swallow *Hirundo rustica*

Mountain Chickadee *Poecile gambeli*

Oak Titmouse *Baeolophus inornatus*

Bushtit *Psaltriparus minimus*

Canyon Wren *Catherpes mexicanus*

Bewick's Wren *Thryomanes bewickii*

House Wren *Troglodytes aedon*

Ruby-crowned Kinglet *Regulus calendula*

Western Bluebird *Sialia mexicana*

Hermit Thrush *Catharus guttatus*

American Robin *Turdus migratorius*

Wrentit *Chamaea fasciata*

Northern Mockingbird *Mimus polyglottos*

California Thrasher *Toxostoma redivivum*

European Starling *Sturnus vulgaris*

Cedar Waxwing *Bombycilla cedrorum*

Phainopepla *Phainopepla nitens*

Orange-crowned Warbler *Vermivora celata*

Yellow Warbler *Dendroica petechia*

Yellow-rumped Warbler *Dendroica coronata*

Western Tanager *Piranga ludoviciana*

Spotted Towhee *Pipilo maculatus*

California Towhee *Pipilo crissalis*

Rufous-crowned Sparrow *Aemophila ruficeps*

Chipping Sparrow *Spizella passerina*

Lincoln's Sparrow *Melospiza lincolnii*

White-crowned Sparrow *Zonatrichia leucophrys*

Golden-crowned Sparrow *Zonotrichia atricapilla*

Dark-eyed Junco *Junco hyemalis*

Black-headed Grosbeak *Pheucticus melanocephalus*

Lazuli Bunting *Passerina amoena*

Brown-headed Cowbird *Molothrus ater*

Hooded Oriole *Icterus cucullatus*

Bullock's Oriole *Icterus bullockii*

House Finch *Carpodacus mexicanus*

Lesser Goldfinch *Carduelis psaltria*

Lawrence's Goldfinch *Carduelis lawrencei*

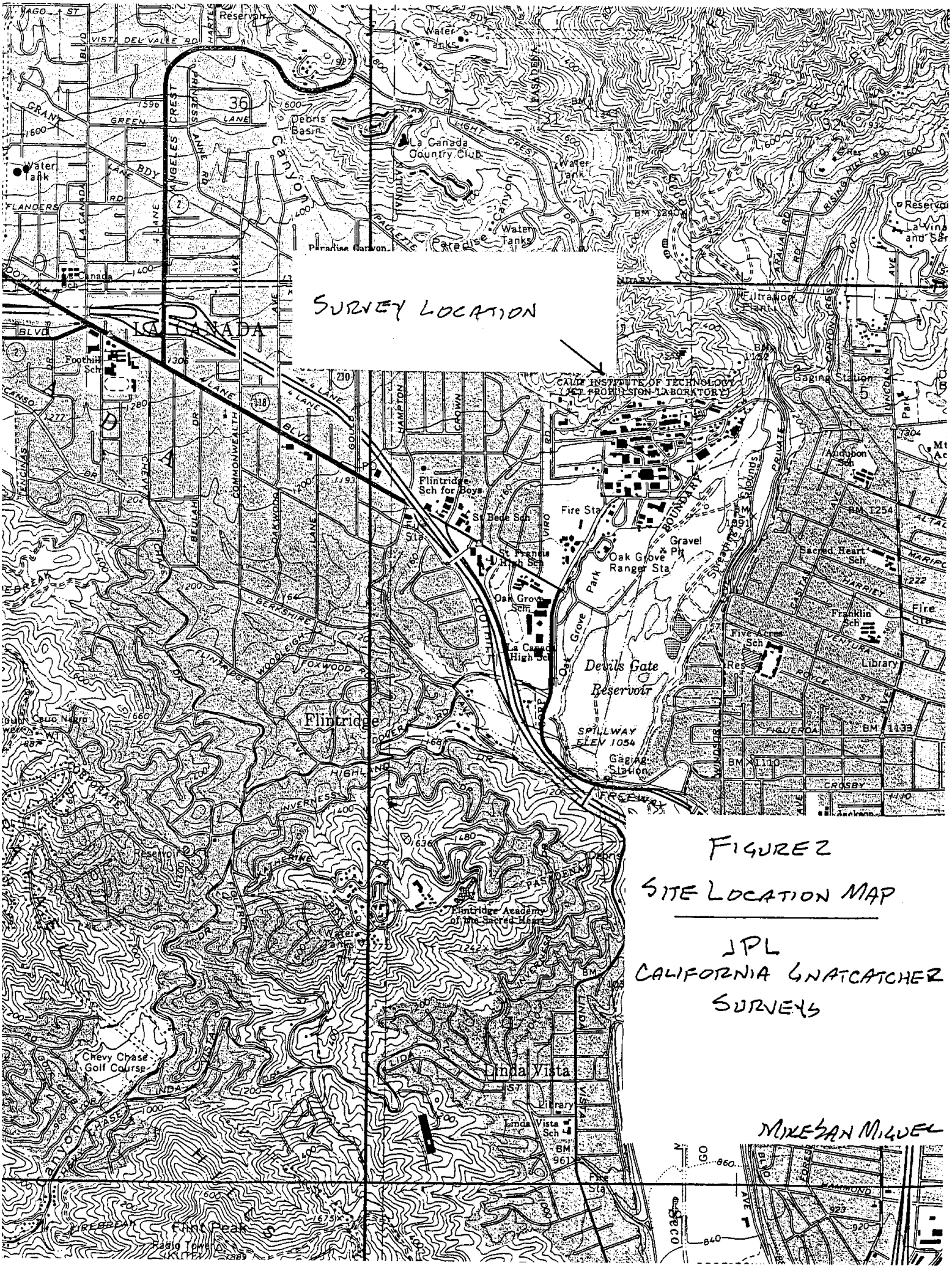
American Goldfinch *Carduelis tristis*

House Sparrow *Passer domestica*

Exotic Species

Nutmeg Mannikin *Lonchura punctulata*

68 species, plus 1 exotic



FIGUREZ

SITE LOCATION MAP

JPL

CALIFORNIA GNATCATCHER

SURVEYS

MIKE SAN MIGUEL

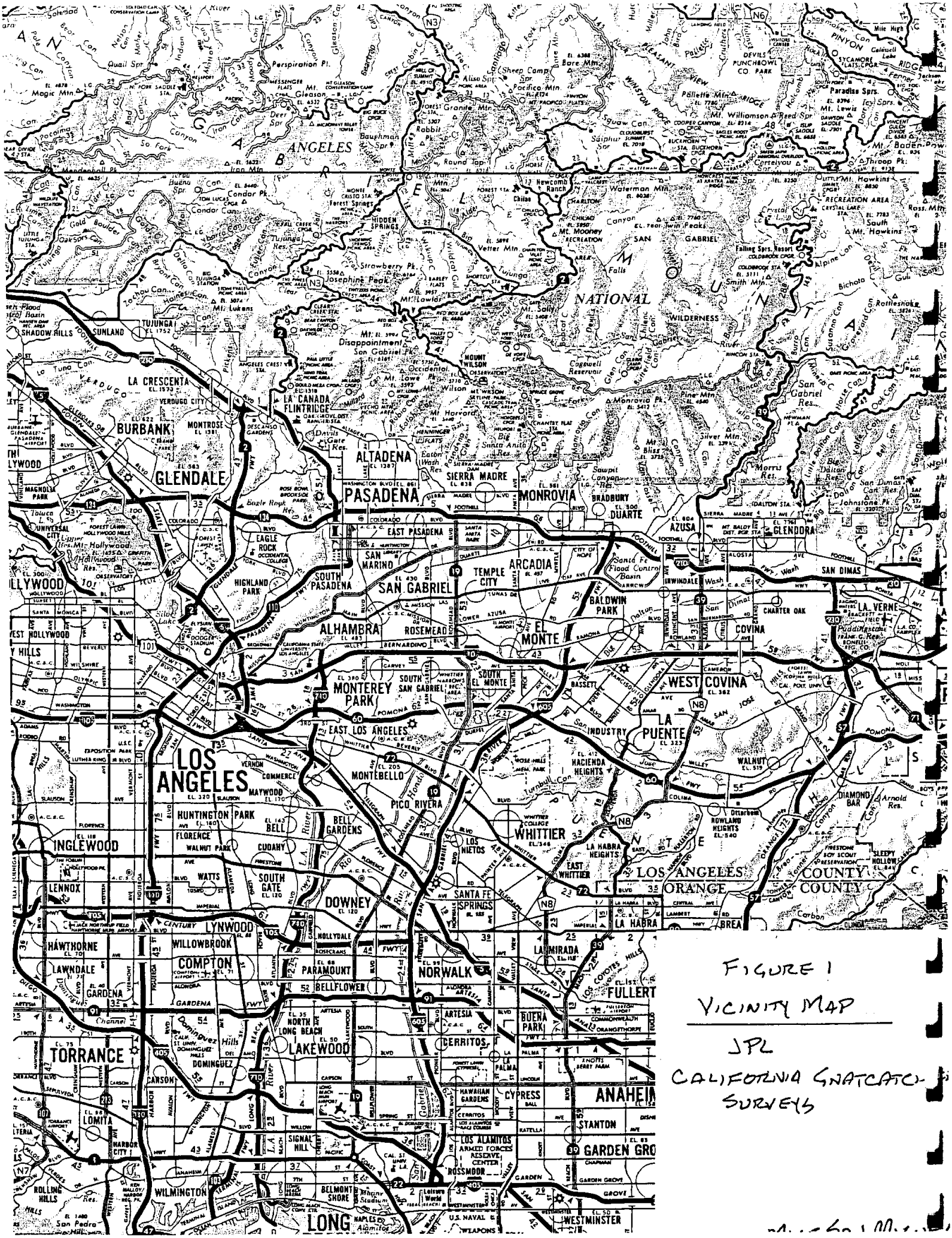


FIGURE 1

VICINITY MAP

JPL

CALIFORNIA GNATCATCHER SURVEYS

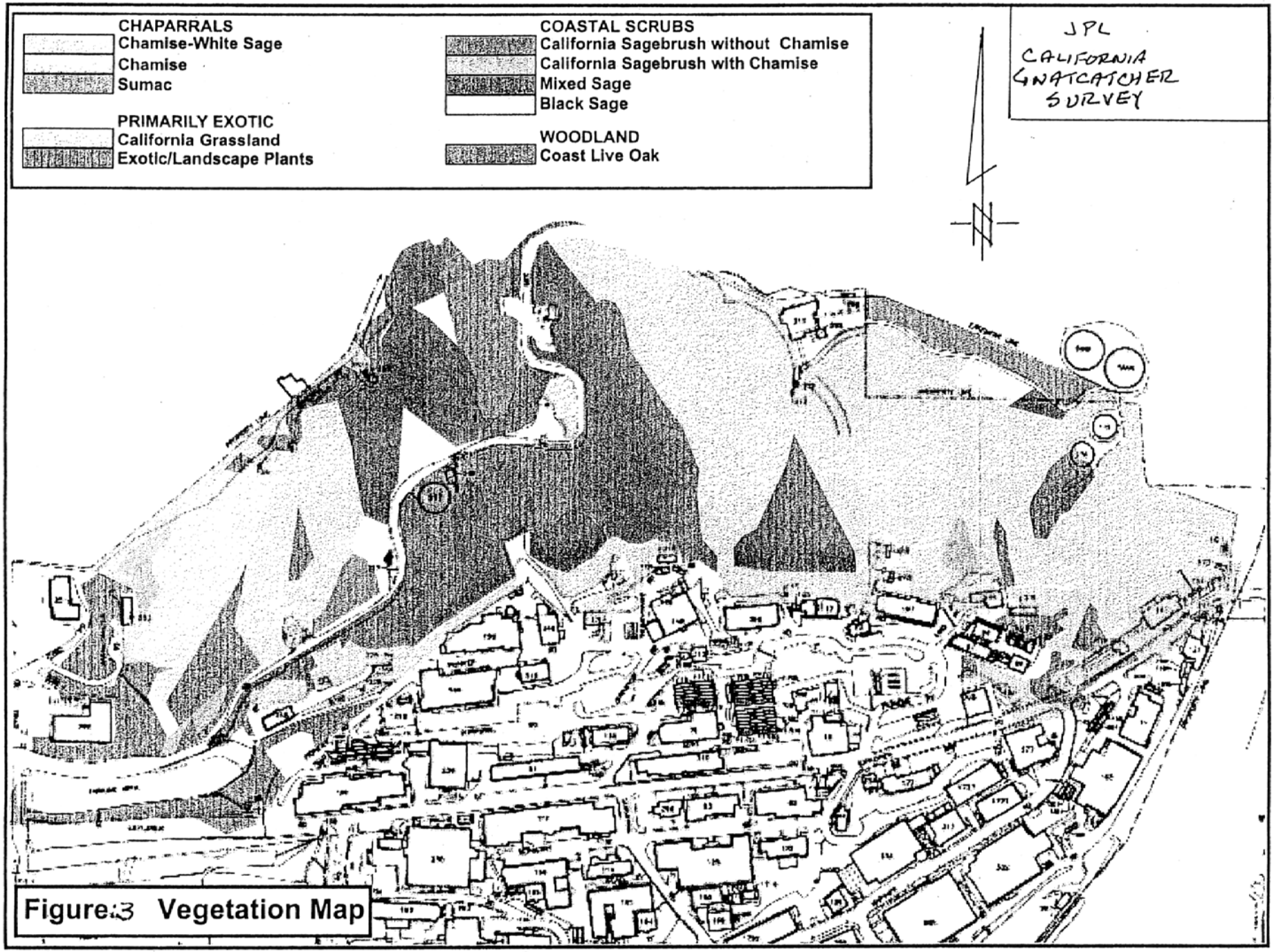


Figure 3 Vegetation Map

APPENDIX E

Interagency Correspondences

Interagency Correspondences

The following persons were contacted during the preparation of this EA:

Ms. Karen A. Evans
Acting Assistant Field Supervisor
United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

Mr. Kevin Clark
United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

Mr. Clarence Cesar
Department of Parks and Recreation
Office of Historic Preservation
1416 9th Street
Post Office Box 942896
Sacramento, California 94296-0001

Dr. Knox Mellon
State Historic Preservation Officer
Department of Parks and Recreation
Office of Historic Preservation
1416 9th Street
Post Office Box 942896
Sacramento, California 94296-0001

Mr. William Romo
Forester Assistant
Environmental Review Unit
Forestry Division
Prevention Bureau
Los Angeles County Fire Department
12605 Osborne Street
Pacioma, California 91331

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294

(323) 890-4330

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

January 28, 2002

Mr. Faustino R. Chirino
Jet Propulsion Laboratory
Senior Environmental Compliance Engineer
Environmental Affairs Office
4800 Oak Grove Drive
Pasadena, CA 91109-8099

Dear Mr. Chirino:

OAK TREE EVALUATION – PROPOSAL TO TRANSPLANT TREE LOCATED NORTH OF BUILDING #261

On Thursday January 17, 2002, a representative from the Forestry Division of the County of Los Angeles Fire Department conducted a field inspection at the above location to determine if it would be feasible to box and transplant one moderate sized Oak tree *(Quercus agrifolia)*. Upon inspection, Forestry Assistant Bill Romo noted that the tree has a natural lean to the south, has a multi-trunk of moderate size, and had moderate to severe exfoliating bark caused by an insect infestation.

Mr. Romo's experience while conducting a Boxing/Transplanting monitoring program in the early 1990's, discussion with Consulting Arborist's on other projects, and the physical condition of this tree leads us to recommend not to box and transplant the tree. There is a high probability that this specimen would not survive.

If you have any questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, ACTING CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

c: Dan J. Castleberry

STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@ohp.parks.ca.gov
www.ohp.parks.ca.gov

January 30, 2006

REPLY TO: NASA050721A

Christian Benitez
Environmental Affairs Program Office
Jet Propulsion Laboratory, CIT
4800 Oak Grove Drive
Pasadena, CA 91109-8099

Dear Mr. Benitez:

RE: PROPOSED FLIGHT PROJECTS CENTER PROJECT

Thank you for your July 19, 2005 letter initiating consultation with me on the National Aeronautics and Space Administration (NASA) efforts to comply with Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), as amended, and its implementing regulations found at 36 CFR Part 800. NASA is proposing to construct a six-story office building at the Jet Propulsion Laboratory in Pasadena (undertaking.)

NASA is seeking my concurrence that the above referenced undertaking will effect no historic properties. Based on the information you have provided, I concur with NASA's findings, pursuant to 36 CFR § 800.4(d)(1), that implementation of the undertaking, as presently proposed, will affect no historic properties.

Your consideration of historic properties in the project planning process is appreciated. If you have any questions or concerns, please contact John Thomas, State Historian II, at (916) 653-9125 or jthomas@parks.ca.gov.

Sincerely,

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

Jet Propulsion Laboratory
California Institute of Technology

4800 Oak Grove Drive
Pasadena, California 91109-8099

(818) 354-4321

Refer to: 2005-010CB.DOC

July 19, 2005

Mr. Milford Donaldson, FAIA
State Historic Preservation Office
P.O. Box 942896
Sacramento, CA 94296-0001

Re: The Proposed Flight Projects Center Project

Dear Mr. Donaldson:

The National Aeronautics and Space Administration ("NASA") is planning to construct a six-story plus basement office building at the Jet Propulsion Laboratory in Pasadena. In accordance with Section 106 of 36 CFR Part 800 – Protection of Historic Properties and the regulations promulgated there under, NASA is notifying the State Historical Preservation Office ("SHPO") of its undertaking and seeks concurrence from the SHPO that the proposed project will not have an effect on any structure on, or eligible for listing on, the National Register of Historic Places. The proposed Flight Projects Center, which will be approximately 17,000 square meters (180,000 square feet), will include offices, conference rooms, meeting rooms and modular furniture workstations. The intended site for the proposed Flight Projects Center is currently occupied by three (3) structures and landscaping (see Attachment 1). The three (3) structures, designated as Building 261, Building 278, and Building 311, will be demolished as part of the project. The following is a description of each of the structures. A photograph of each structure is provided in Attachment 2.

Building 261 was originally built in 1967 for storage purposes and has not changed in usage. It is a one-story structure with a total square footage of 2,215. Building 278 was originally built in 1970 as a robotics laboratory and has not changed in usage. It is a one-story structure with a total square footage of 3,279. Building 311 was originally built in 1994 for grounds maintenance storage and has not changed in usage. It is a one-story structure with a total square footage of 4,056.

NASA has determined that for purposes under Section 106, the proposed project is an "undertaking" and the Jet Propulsion Laboratory is the "Area of Potential Effect." Consistent with 36 CFR Part 800, NASA has evaluated the project and determined that it will not have any effect on any historic property, including any National Historic landmarks, within the Area of Potential Effect. The basis for these determinations is set forth below.

In 1984, an agency-wide evaluation was performed by the National Parks Service to identify historic properties located within the boundaries of NASA facilities. As a result of that evaluation, two (2) structures at the Jet Propulsion Laboratory were identified as historic properties and subsequently designated as National Historic Landmarks: Building 150 (Twenty-five Foot Space Simulator) and Building 230 (Space Flight Operations Facility). No other structures at the Jet Propulsion Laboratory have been designated as National Historic Landmarks.

In 1989, pursuant to regulations implementing the National Historic Preservation Act, NASA, the Advisory Council on Historic Preservation and The National Conference of State Historic Preservation Officers entered into a programmatic agreement regarding the structures designated as National Historic Landmarks. A copy of the agreement is included as Attachment 3. Pursuant to that agreement, since the proposed project does not involve

demolition, relocation, alteration, or change in use of Building 150 or Building 230, no further action by NASA under 36 C.F.R. Part 800 or the programmatic agreement is required. In addition, since neither the activities nor the external facade or internal elements of the buildings will be affected by the proposed project, NASA has determined that that the proposed project will not have an effect on either building.

For purposes of this undertaking, NASA has identified all other structures located at the Jet Propulsion Laboratory that are at least 45 years old (see Attachment 4). NASA has determined that even if any of the buildings listed on Attachment 4 are eligible for listing on the National Register of Historic Places, the proposed project will not affect any of those buildings. Given the activities at the Jet Propulsion Laboratory, each of the eligible buildings could satisfy the eligibility criteria based on the activities that occurred within each building. None of the structures would qualify based on construction method or architectural style. The proposed project will not result in the demolition, relocation, or alteration of any of the eligible buildings. Therefore, NASA has determined that the proposed project will not have an effect on any of the eligible buildings and, therefore, no further action under section 106 is required with respect to any of those buildings.

The proposed project will result in the demolition of Building 261, Building 278 and Building 311. As previously noted, none of these buildings is at least 45 years old. Moreover, neither the architecture nor activities of Building 261, Building 278, or Building 311 would qualify the structures for inclusion on the National Register of Historic Places. Building 261 was originally used for storage and its use has not changed. Similarly, Building 311 has been used for ground maintenance storage since it was built in 1994. Building 278 has always been used as a robotics laboratory. Given the age of Building 278 and the guidance issued by the Advisory Council on Historic Preservation and the National Park Service, the presumption is that the building is not historic. NASA has not identified any information that would rebut that presumption in this instance.

Although NASA has identified the Jet Propulsion Laboratory as the Area of Potential Effect, NASA also identified the historic properties listed on the National Register that are located within Pasadena and La Canada since the Jet Propulsion Laboratory is located within the jurisdictional limits of both municipalities. Those properties are listed in Attachment 5 and Attachment 6. Based on the proposed project activities, none of the listed historic properties will be affected by the proposed Flight Projects Center.

In compliance with the Section 106 Process of 36 CFR Part 800 – Protection of Historic Properties, notification is hereby given of the planned Flight Projects Center undertaking. JPL is requesting a letter of concurrence from the State Historical Preservation Office regarding the demolition and construction activities of the undertaking and the no impact evaluation to historic and eligible structures within and near the area of effect. Your timely response is greatly appreciated.

If you have any questions or concerns, please feel free to contact me at (818) 354-8633 or via email at Christian.E.Benitez@jpl.nasa.gov. Thank you for your time and consideration.

Sincerely,

Christian Benitez
Environmental Affairs Program Office
Jet Propulsion Laboratory

Programmatic Agreement

PROGRAMMATIC AGREEMENT
AMONG THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
THE NATIONAL CONFERENCE OF STATE HISTORIC PRESERVATION OFFICERS,
AND THE
ADVISORY COUNCIL ON HISTORIC PRESERVATION

WHEREAS, the National Aeronautics and Space Administration (NASA) undertakes research, development, space mission operations, and management use of its facilities which have been designated as National Historic Landmarks (Landmarks) (Attachment 1); and

WHEREAS, such facilities require frequent modification over the life of agency missions to adapt them to meet the requirements of ongoing NASA programs; and

WHEREAS, NASA has determined that such modifications may have an effect on those Landmarks, and has consulted with the National Conference of State Historic Preservation Officers (NCSHPO) and the Advisory Council on Historic Preservation (Council) pursuant to the regulations (36 CFR Part 800) implementing Sections 106 and 110(f) of the National Historic Preservation Act, as amended (16 U.S.C. 470f and 470h-2(f)); and

WHEREAS, the Department of the Interior, National Park Service (NPS) was invited and participated in the consultation;

NOW, THEREFORE, NASA, the NCSHPO, and the Council agree that the programs shall be implemented in accordance with the following stipulations in order to take into account the effect of the programs and specific undertakings on the Landmarks.

Stipulations

NASA will ensure that the following measures are carried out.

I. Categories of Activities

A. When the proposed undertaking involves any of the following activities, NASA shall consult with the appropriate SHPO and, as necessary, the Council in accordance with Stip. II:

1. Demolition, dismantling, or relocation of original engineering structures, or of buildings housing facilities;
2. Removal or excessing of significant elements of the Landmarks specifically named on the National Register nomination forms;
3. New construction not compatible with major portions of the original structure or which alter the characteristics of the

facility which were specified as the reason for its Landmark designation; or

4. Changes in function, purpose, or use of a facility.

B. When the proposed undertaking is limited to the following activities that will not alter the characteristics of the facility which were specified as the reason for its landmark designation, NASA shall develop and implement mitigation measures in accordance with Stipulation III:

1. Replacement of historic hardware or components;
2. Modification of the original structure or equipment used in engineering structures, or buildings housing facilities; or
3. New construction compatible with existing structure, purpose, and operation of the facility.

NASA shall include a description of such activities and mitigation measures in the annual summary of its activities prepared pursuant to Stipulation IV.A.

C. When the proposed undertaking involves none of the activities specified above, NASA may proceed without consultation or the implementation of mitigation measures.

II. Consultation Process

A. Consultation required under Stip. I.A. shall be conducted as follows:

1. NASA shall provide the following documentation to the SHPO for review:
a. a description of the undertaking, with photos, maps, and drawings;
b. a description of the affected Landmark;
c. a description of the effects of the undertaking on the affected Landmark;
d. a description of alternatives to the proposed action, which were considered if any, and reasons not chosen;
e. a description of any mitigation measures proposed;
f. a description of NASA's effort, if appropriate, to obtain and consider views of affected interested persons on the proposed undertaking, including a copy of any comments received; and
g. the planning and approval schedule for the proposed undertaking.

Whenever feasible, NASA shall give the SHPO advance notice that such documentation is under preparation, and advise the SHPO of a date certain that it intends to submit the documentation to the SHPO.

2. The SHPO shall respond to a written request for consultation (accompanied by the documentation specified in Stip. II.A.1) within 20 working days, and agree, conditionally agree, or disagree with NASA's proposal.

3. If NASA does not accept the SHPO's conditions, or if NASA and the SHPO disagree, NASA shall notify the Council and forward copies of the documentation specified in Stip.II.A.1, above, along with other information relevant to the dispute.

4. Within 20 working days, the Council shall either: (1) attempt to resolve the dispute; (2) provide NASA with recommendations to be taken into account in implementing the activity; or (3) decide to comment, and comment within 45 working days of that decision. At NASA's request, the time periods in Stips. II.A.2. and II.A.4. will run concurrently. In exceptional circumstances NASA may request accelerated consideration under Stip. II.A.4. and the Council will make a good faith effort to accommodate such requests. The Council may consult with the National Park Service of the Department of the Interior during its review period.

B. The Council and the NCSHPO recognize that operational emergency situations may arise where NASA must take immediate action without prior consultation with the appropriate SHPO or the Council. In such situations, NASA shall notify the Council and the SHPO of such actions as soon as practicable.

III. Mitigation

Mitigation measures shall be carried out prior to undertaking actions specified in Stips. I.A. and I.B.

A. Recordation

1. Recordation shall be done in accordance with the Secretary of the Interior's "Standards for Architectural and engineering Documentation" (Standards) (Federal Register, 48 FR 190, pp. 44730-44734, September 29, 1983).

2. Because original "as-built" drawings and other records are on file at the installations containing Landmark facilities, documentation will normally include the following: (1) reproduction of existing "as-built" drawings and site plans modified on standard size (19 x 24 or 24 x 36) mylar; and (2) provision of black and white archival quality photos with large format negatives of exterior and interior views, as appropriate, as well as special technological features or engineering details.

3. Original copies of all documentation shall be provided to the Secretary of the Interior in accordance with the Standards for incorporation into the National Architectural and Engineering Records in the Library of Congress as provided in Section 101 of the National Historic Preservation Act and implementing procedures. Copies of the documentation shall also be provided to the appropriate SHPO.

B. Salvage

NASA will apply its agreement with the Smithsonian Institution (NASA Management Instruction 4310.4) to determine appropriate retention and curation activities with respect to significant artifacts.

IV. Continuing Coordination

A. On or about December 1, 1990, and annually thereafter, NASA will provide a summary of its activities under this Agreement to the Council and to the NCSHPO.

B. In consultation with the appropriate SHPO, the Council may review and comment upon individual undertakings when it determines that historic preservation issues warrant such action.

C. NASA will provide appropriate public information about activities under Stip.I.A. to interested parties upon request.

D. Any party to this Agreement may terminate it by providing 60 days notice to the other parties, provided that the parties will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination.

Execution of this Programmatic Agreement and carrying out its terms evidences that NASA has afforded the Council and the NCSHPO a reasonable opportunity to comment on its programs affecting Landmarks under Sections 106 and 110(f) of the National Historic Preservation Act, and that NASA has taken into account the effects of its programs on these Landmarks.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

By: _____ 9/20/89
Associate Administrator for Management — Date

NATIONAL CONFERENCE OF STATE HISTORIC PRESERVATION OFFICERS

By: _____ 10/6/89
President — Date

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: _____ September 18, 1989
Chairman — Date

ATTACHMENT 1

NASA's NATIONAL HISTORIC LANDMARKS

(as of 2/24/89)

1. Variable Density Tunnel (Langley Research Center, Hampton, VA)
2. Full Scale Tunnel (Langley Research Center, Hampton, VA)
3. Eight-Foot High Speed Tunnel (Langley Research Center, Hampton, VA)
4. Unitary Plan Wind Tunnel (Ames Research Center, Moffett Field, CA)
5. Rocket Engine Test Facility (Lewis Research Center, Cleveland, OH)
6. Zero-Gravity Research Facility (Lewis Research Center, Cleveland, OH)
7. Spacecraft Propulsion Research Facility (Lewis Plum Brook Operations Facility)
8. Redstone Test Stand (George C. Marshall Space Flight Center, AL)
9. Propulsion and Structural Test Facility (George C. Marshall Space Flight Center, AL)
10. Rocket Propulsion Test Complex (Stennis Space Center, MS)
11. Saturn V Dynamic Test Stand (George C. Marshall Space Flight Center, AL)
12. Lunar Landing Research Facility (Langley Research Center, Hampton, VA)
13. Rendezvous Docking Simulator (Langley Research Center, Hapmton, VA)
14. Neutral Bouyancy Space Simulator (George C. Marshall Space Flight Center, AL)
15. Space Environment Simulation Laboratory (Lyndon B. Johnson Space Center, Houston, TX)
16. Spacecraft Magnetic Test Facility (Goddard Space Flight Center, Greenbelt, MD)
17. Twenty-Five-Foot Space Simulator (Jet Propulsion Laboratory, Pasadena, CA)
18. Pioneer Deep Space Station (Goldstone Deep Communications Complex, CA)
19. Space Flight Operations Facility (Jet Propulsion Laboratory, Pasadena, CA)
20. Apollo Mission Control Center (Lyndon B. Johnson Space Center, Houston, TX)

Neighboring Locations on the National Register of Historic Places

Index by State and City
National Register Information System

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
1	CA	Los Angeles	**Batchelder House**	626 S. Arroyo Blvd.	Pasadena	1978-12-14	
2	CA	Los Angeles	**Bekins Storage Co. Roof Sign**	511 S. Fair Oaks Ave.	Pasadena	1997-10-15	Early Automobile-Related Properties in Pasadena MPS
3	CA	Los Angeles	**Bentz, Louise C., House**	657 Prospect Blvd.	Pasadena	1977-12-02	
4	CA	Los Angeles	**Blacker, Robert R., House**	1177 Hillcrest Ave.	Pasadena	1986-02-06	
5	CA	Los Angeles	**Blinn, Edmund, House**	160 N. Oakland Ave.	Pasadena	2001-04-05	
6	CA	Los Angeles	**Bolton, Dr. W. T., House**	370 W. Del Mar Blvd.	Pasadena	1980-07-09	
7	CA	Los Angeles	**Bonnie Court**	140 S. Bonnie Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
8	CA	Los Angeles	**Bowen Court**	539 E. Villa St.	Pasadena	1982-06-17	
9	CA	Los Angeles	**Bryan Court**	427 S. Morengo Ave.	Pasadena	1986-04-16	Bungalow Courts of Pasadena TR
10	CA	Los Angeles	**Bullock's Pasadena**	401 S. Lake Ave.	Pasadena	1996-07-12	

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	BOUNDARY
11	CA	Los Angeles	**Civic Center Financial District**	E. Colorado Blvd. and Marengo Ave.	Pasadena	1982-10-29	
12	CA	Los Angeles	**Colonial Court**	291-301 N. Garfield Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
13	CA	Los Angeles	**Colorado Street Bridge**	Colorado Blvd.	Pasadena	1981-02-12	
14	CA	Los Angeles	**Cottage Court**	642-654 S. Margeno Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
15	CA	Los Angeles	**Court**	497-503 1/2 N. Madison Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
16	CA	Los Angeles	**Court**	744-756 1/2 S. Marengo Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
17	CA	Los Angeles	**Court**	732-744 Santa Barbara St.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
18	CA	Los Angeles	**Court at 1274--1282 North Raymond Avenue**	1274--1282 N. Raymond Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
19	CA	Los Angeles	**Court at 275 North Chester Avenue**	275 N. Chester Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
20	CA	Los Angeles	**Court at 533--549 North Lincoln Avenue**	533--549 N. Lincoln Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
21	CA	Los Angeles	**Court at 638--650 North Mar Vista Avenue**	638--650 N. Mar Vista Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
22	CA	Los Angeles	**Court at 940--948 North Raymond Avenue**	940--948 N. Raymond Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
23	CA	Los Angeles	**Culbertson, Cordelia A., House**	1188 Hillcrest Ave.	Pasadena	1985-09-12	
24	CA	Los Angeles	**Cypress Court**	623-641 N. Madison Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
25	CA	Los Angeles	**Don Carlos Court**	374-386 S. Marengo Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
26	CA	Los Angeles	**El Molino Viejo**	1120 Old Mill Rd.	Pasadena	1971-05-06	
27	CA	Los Angeles	**Euclid Court**	545 S. Euclid Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
28	CA	Los Angeles	**Evanston Inn**	385-395 S. Marengo Ave.	Pasadena	1984-09-13	
29	CA	Los Angeles	**Fenyes Estate**	470 W. Walnut St. & 160 N. Orange Grove Blvd.	Pasadena	1985-09-05	
30	CA	Los Angeles	**First Trust Building and Garage**	587--611 E. Colorado Blvd. and 30-44 N. Madison Ave.	Pasadena	1987-06-12	

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
32	CA	Los Angeles	**Foothill Boulevard Milestone (Mile 11)**	S side of E. Colorado Blvd., W of jct. with Holliston Ave.	Pasadena	1996-04-19	Early Automobile-Related Properties in Pasadena MPS
33	CA	Los Angeles	**Friendship Baptist Church**	80 W. Dayton St.	Pasadena	1978-11-20	
34	CA	Los Angeles	**Gamble House**	4 Westmoreland Pl.	Pasadena	1971-09-03	
35	CA	Los Angeles	**Gartz Court**	270 N. Madison	Pasadena	1983-08-25	Bungalow Courts of Pasadena TR
36	CA	Los Angeles	**Hale Solar Laboratory**	740 Holladay Rd.	Pasadena	1986-01-23	
37	CA	Los Angeles	**Harnetiaux Court**	48 N. Catalina Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
38	CA	Los Angeles	**Haskett Court**	824--834 E. California Blvd.	Pasadena	1982-02-25	
39	CA	Los Angeles	**Hermitage**	2121 Monte Vista St.	Pasadena	2001-04-05	
40	CA	Los Angeles	**Holly Street Livery Stable**	110 E. Holly St	Pasadena	1979-10-25	
	CA	Los Angeles	**Home Laundry**	432 S. Arroyo Pkwy.	Pasadena	1987-06-18	

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
41	CA	Los Angeles	**Hotel Green**	99 S. Raymond Ave.	Pasadena	1982-03-23	
42	CA	Los Angeles	**House at 1011 S. Madison Ave.**	1011 S. Madison Ave.	Pasadena	1998-08-06	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement
43	CA	Los Angeles	**House at 1050 S. Madison Ave.**	1050 S. Madison Ave.	Pasadena	1998-08-06	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement
44	CA	Los Angeles	**House at 1233 Wentworth Ave.**	1233 Wentworth Ave.	Pasadena	1998-08-06	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement MPS
45	CA	Los Angeles	**House at 380 W. Del Mar Blvd.**	380 W. Del Mar Blvd.	Pasadena	1998-08-06	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement
46	CA	Los Angeles	**House at 530 S. Marengo Avenue**	530 S. Marengo Ave.	Pasadena	1979-09-13	
47	CA	Los Angeles	**House at 574 Bellefontaine St.**	574 Bellefontaine St.	Pasadena	1998-08-06	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement
48	CA	Los Angeles	**Howard Motor Company Building**	1285 E. Colorado Blvd.	Pasadena	1996-04-18	Early Automobile-Related Properties in Pasadena MPS
49	CA	Los Angeles	**Kindel Building**	1095 E. Colorado Blvd.	Pasadena	1996-04-18	Early Automobile-Related Properties in Pasadena MPS
50	CA	Los Angeles	**Kosy Knook Court**	830 Brooks Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
51	CA	Los Angeles	**Las Casitas Court**	656 N. Summit Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
52	CA	Los Angeles	**Longfellow-Hastings House**	85 S. Allen Ave.	Pasadena	1982-03-02	
53	CA	Los Angeles	**Lukens, Theodore Parker, House**	267 N. El Molino Ave.	Pasadena	1984-03-29	
54	CA	Los Angeles	**Marengo Gardens**	982, 986, 990 S. Marengo Ave. and 221-241 Ohio St.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
55	CA	Los Angeles	**Mary Louise Court**	583--599 N. Mentor Ave.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
56	CA	Los Angeles	**Mentor Court**	937 E. California Blvd.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR
57	CA	Los Angeles	**Merrill, Samuel, House**	1285 N. Summit Ave.	Pasadena	2001-04-05	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement
58	CA	Los Angeles	**Millard House**	645 Prospect Crescent	Pasadena	1976-12-12	
59	CA	Los Angeles	**Miss Orton's Classical School for Girls (Dormitory)**	154 S. Euclid Ave.	Pasadena	1995-08-04	
60	CA	Los Angeles	**Mission Court**	567 N. Oakland Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
61	CA	Los Angeles	**Newcomb House**	675--677 N. El Molino Ave.	Pasadena	1982-09-02	
62	CA	Los Angeles	**Nicholson, Grace, Building**	46 N. Los Robles Ave.	Pasadena	1977-07-21	
63	CA	Los Angeles	**Odd Fellows Temple**	175 N. Los Robles Ave.	Pasadena	1985-08-01	
64	CA	Los Angeles	**Old Pasadena Historic District**	Roughly bounded by Pasadena, Fair Oaks, Raymond Aves., Arroyo Pkwy., Del Mar Blvd., and Corson St.	Pasadena	1983-09-15	
65	CA	Los Angeles	**Orange Grove Court**	745 E. Orange Grove Blvd.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
66	CA	Los Angeles	**Orange Heights--Barnhart Tracts Historic District**	Roughly bounded by N. Los Robles Ave. W, N. El Molino Ave. E., Jackson St. N., and E. Mountain St. S.	Pasadena	1995-09-29	
67	CA	Los Angeles	**Palmetto Court**	100 Palmetto Dr.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
68	CA	Los Angeles	**Pasadena Civic Center District**	Roughly bounded by Walnut and Green Sts., Raymond and Euclid Aves.	Pasadena	1980-07-28	
69	CA	Los Angeles	**Pasadena Playhouse**	39 S. El Molino Ave.	Pasadena	1975-11-11	
70	CA	Los Angeles	**Pasadena Playhouse Historic District**	464--611 E. Colorado Blvd., 550--655 E. Green St., 21--127 S. El	Pasadena	1994-05-19	

				Molino Ave., and 150 N.--101 S. Madison Ave.			

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Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
71	CA	Los Angeles	**Prospect Historic District**	Prospect Blvd., Square, Crescent, and Terrace, Rosemont Ave., Armada and Fremont Drs., and La Mesa Pl.	Pasadena	1983-04-07	
72	CA	Los Angeles	**Rose Bowl, The**	991 Rosemont Ave., Brookside Park	Pasadena	1987-02-27	
73	CA	Los Angeles	**Rose Court**	449-457 S. Hudson Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
74	CA	Los Angeles	**Sara-Thel Court**	618-630 S. Marengo Ave.	Pasadena	1983-07-11	Bungalow Courts of Pasadena TR
75	CA	Los Angeles	**Singer Building**	16 S. Oakland Ave. and 520 E. Colorado Blvd.	Pasadena	1985-05-16	
76	CA	Los Angeles	**Smith, Ernest W., House**	272 S. Los Robles Ave.	Pasadena	1988-01-14	
77	CA	Los Angeles	**South Marengo Historic District**	S. Marengo Ave.	Pasadena	1982-06-02	
78	CA	Los Angeles	**Space Flight Operations Facility**	Jet Propulsion Laboratory	Pasadena	1985-10-03	
79	CA	Los Angeles	**Stoutenburgh House**	255 S. Marengo Ave.	Pasadena	1980-11-25	
80	CA	Los Angeles	**Stuart Company Plant and Office Building**	3360 E. Foothill Blvd.	Pasadena	1998-10-20	

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ROW	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
81	CA	Los Angeles	**Twenty-Five Foot Space Simulator**	Jet Propulsion Laboratory	Pasadena	1985-10-03	
82	CA	Los Angeles	**Villa Verde**	800 S. San Rafael	Pasadena	1984-09-13	
83	CA	Los Angeles	**Vista del Arroyo Hotel and Bungalows**	125 S. Grand Ave.	Pasadena	1981-04-02	
84	CA	Los Angeles	**Ware, Henry A., House**	460 Bellefontaine St.	Pasadena	2004-06-15	Residential Architecture of Pasadena: Influence of the Arts and Crafts Movement MPS
85	CA	Los Angeles	**Washington Court**	475 E. Washington Blvd.	Pasadena	1994-11-15	Bungalow Courts of Pasadena TR

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JPL Eligible Structures

Jet Propulsion Laboratory

Eligible Structures for the National Register of Historic Places

(based on 2004 Information)

BUILDING NUMBER	BUILDING NAME / USE	YEAR BUILT	AGE OF BUILDING
11	Space Sciences Laboratory	1942	63
18	Structural Test Laboratory	1945	60
67	Material Reseacrch	1945	60
79	Low-Temperature Laboratory	1948	57
82	High Vacuum Laboratory	1948	57
83	Quality Assurance	1948	57
84	Chemical Materials Laboratory	1948	57
86	Solid Oxidizer Laboratory	1948	57
87	Propellant Conditioning Laboratory	1948	57
88	Bio-Chemical Cold Room	1948	57
89	Laser Laboratory	1948	57
90	Pyrotechnics Laboratory	1948	57
98	Solid Fuel Laboratory	1951	54
103	Electronic Fabrication Shop	1947	58
107	Laser Research Laboratory	1947	58
111	Library	1950	55
114	Administration	1951	54
117	Liquid and Solid Propellant Laboratory	1954	51
121	Analytical Instruments Laboratory	1956	49
122	Energy Conversion Systems	1951	54
125	Combined Engineering Support	1954	51
126	Information Systems Development	1953	52
129	Combustion Research Laboratory	1953	52
138	Mission Operations	1958	47
140	Propulsion Materials Storage	1954	51
141	Propulsion Materials Storage	1954	51
143	Soild Rocket Dock	1953	52
145	Magazine - Propellant	1953	52
148	Energy Conversion Laboratory	1956	49
149	Energy Conversion Development	1956	49
156	Computer Program Offices	1957	48
161	Telecommunications	1957	48
173	Test Shelter	1958	47
177	Transportation	1958	47
184	Telecommunications	1959	46
185	Programming Office	1959	46
189	Electronic Laboratory Annex	1959	46
190	Procurement Offices	1960	45
191	Materials Compatibility Laboratory	1960	45

NATIONAL HISTORIC LANDMARKS SURVEY

NATIONAL PARK SERVICE
1849 C Street, N.W. Room NC-400
Washington, DC 20240

LISTING OF NATIONAL HISTORIC LANDMARKS BY STATE

CALIFORNIA (131)

AHWAHNEE, THE 05/28/87
MARIPOSA COUNTY, CALIFORNIA

ALCATRAZ ISLAND 01/17/86
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

ALMA (Scow Schooner) 06/07/88
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

ANGELUS TEMPLE 04/27/92
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA

ANZA, JUAN DE, HOUSE 04/15/70
SAN JUAN BAUTISTA, SAN BENITO COUNTY, CALIFORNIA

AQUATIC PARK 05/28/87
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

ASILOMAR CONFERENCE GROUNDS 02/27/87
PACIFIC GROVE, MONTEREY COUNTY, CALIFORNIA

BALBOA PARK 12/22/77
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA

BALCLUTHA (Square-rigger) 02/04/85
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

BALDWIN HILLS VILLAGE 01/03/01
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA

BANCROFT, HUBERT H., RANCH HOUSE 12/29/62
SPRING VALLEY, SAN DIEGO COUNTY, CALIFORNIA

BANK OF ITALY BUILDING 06/02/78
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

BERKELEY (Ferry) 12/14/90
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA

BIG FOUR HOUSE 07/04/61
SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA

BODIE HISTORIC DISTRICT 07/04/61
BODIE, MONO COUNTY, CALIFORNIA

BRADBURY BUILDING 05/05/77
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA

BURBANK, LUTHER, HOUSE AND GARDEN 06/19/64
SANTA ROSA, SONOMA COUNTY, CALIFORNIA

C.A. THAYER (Schooner) 11/13/66
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA

CARMEL MISSION 10/09/60
CARMEL, MONTEREY COUNTY, CALIFORNIA

CASTRO, JOSE, HOUSE 05/15/70
SAN JAUN BAUTISTA, SAN BENITO COUNTY, CALIFORNIA

CITY OF OAKLAND (USS *Hoga*) (Tug) 06/30/89
SUISUN BAY, BENICIA, SOLANO COUNTY, CALIFORNIA

COLOMA 07/04/61
EL DORADO COUNTY, CALIFORNIA

COLUMBIA HISTORIC DISTRICT 07/04/61
TUOLUMNE COUNTY, CALIFORNIA

COMMANDER'S HOUSE, FORT ROSS 05/15/70
SONOMA COUNTY, CALIFORNIA

COSO ROCK ART DISTRICT 07/19/64
INYO COUNTY, CALIFORNIA

DONNER CAMP 01/20/61
NEVADA COUNTY, CALIFORNIA

ELMSHAVEN (Ellen White House) 11/04/93
ST. HELENA, NAPA COUNTY, CALIFORNIA

ESTUDILLO HOUSE 04/15/70
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA

EUREKA (Double-ended Ferry) 02/04/85
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
FIR (USCGC) 04/27/92
SUISON BAY,BENICIA, SOLANO COUNTY, CALIFORNIA
FIRST CHURCH OF CHRIST, SCIENTIST 12/22/77
BERKELEY, ALAMEDA COUNTY, CALIFORNIA
FIRST PACIFIC COAST SALMON CANNERY SITE **WITHDRAWAL OF DESIGNATION 07/14/2004** 04/06/64
BRODERICK, YOLO COUNTY, CALIFORNIA
FLOOD, JAMES C., MANSION 11/13/66
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
FOLSOM POWERHOUSE 05/29/81
FOLSOM, SACRAMENTO COUNTY, CALIFORNIA
FORT ROSS 11/05/61
SONOMA COUNTY, CALIFORNIA
FRESNO SANITARY LANDFILL 08/07/01
FRESNO, CALIFORNIA
GAMBLE, DAVID B., HOUSE 12/22/77
PASADENA, LOS ANGELES COUNTY, CALIFORNIA
GONZALEZ HOUSE 04/15/70
SANTA BARBARA, SANTA BARBARA COUNTY, CALIFORNIA
GUAJOME RANCH HOUSE 04/15/70
SAN DIEGO COUNTY, CALIFORNIA
GUNTHER ISLAND SITE 67 ..... 07/19/64
HUMBOLDT COUNTY, CALIFORNIA
HALE SOLAR OBSERVATORY 12/20/89
PASADENA, LOS ANGELES COUNTY, CALIFORNIA
HANNA-HONEYCOMB HOUSE 06/29/89
STANFORD, SANTA CLARA COUNTY, CALIFORNIA
HARADA HOUSE 12/14/90
RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA
HEARST SAN SIMEON ESTATE 05/11/76
SAN SIMEON, SAN LUIS OBSISPO COUNTY, CALIFORNIA
HERCULES (Tug) 01/17/86
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
HOOVER, LOU HENRY AND HERBERT, HOUSE 02/04/85
PALO ALTO, SANTA CLARA COUNTY, CALIFORNIA
HORNET (CVS-12) (USS) 12/04/91
ALAMEDA POINT, ALAMEDA COUNTY, CALIFORNIA
HOTEL DEL CORONADO 05/05/77
CORONADO, SAN DIEGO COUNTY, CALIFORNIA
HUBBLE, EDWIN, HOUSE 12/08/76
SAN MARINO, LOS ANGELES COUNTY, CALIFORNIA
JEREMIAH O'BRIEN (Liberty Ship) 01/14/86
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
LA PURISIMA MISSION 04/15/70
SANTA BARBARA COUNTY, CALIFORNIA
LAKE MERRITT WILD DUCK REFUGE 05/23/63
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
LANE VICTORY (Victory Ship) 12/14/90
SAN PEDRO, LOS ANGELES COUNTY, CALIFORNIA
LARKIN HOUSE 12/19/60
MONTEREY, MONTEREY COUNTY, CALIFORNIA
LAS FLORES ADOBE 11/24/68
SAN DIEGO COUNTY, CALIFORNIA
LECONTE MEMORIAL LODGE 05/28/87
YOSEMITE VALLEY, MARIPOSA COUNTY, CALIFORNIA
LIGHTSHIP *WAL-605*, "RELIEF" 12/20/89
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
LITTLE TOKYO HISTORIC DISTRICT 06/12/95
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA
LOCKE HISTORIC DISTRICT 12/14/90
LOCKE, SACRAMENTO COUNTY, CALIFORNIA
LONDON, JACK, RANCH 12/29/62
SONOMA COUNTY, CALIFORNIA
LOS ALAMOS RANCH HOUSE 04/15/70
SANTA BARBARA COUNTY, CALIFORNIA
LOS ANGELES MEMORIAL COLISEUM 07/27/84
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA

LOS CERRITOS RANCH HOUSE 04/15/70
LONG BEACH, LOS ANGELES COUNTY, CALIFORNIA
LOWER KLAMATH NATIONAL WILDLIFE REFUGE (*Also in Oregon*) 01/12/65
SISKIYOU COUNTY, CALIFORNIA and KLAMATH COUNTY, OREGON
MANZANAR WAR RELOCATION CENTER 02/04/85
INYO COUNTY, CALIFORNIA
MARE ISLAND NAVAL SHIPYARD 05/15/75
VALLEJO, SOLANA COUNTY, CALIFORNIA
MARIN COUNTY CIVIC CENTER 07/17/91
SAN RAPHAEL, MARIN COUNTY, CALIFORNIA
MENDOCINO WOODLANDS RECREATIONAL DEMOSTRATION AREA 09/25/97
MENDOCINO COUNTY, CALIFORNIA
MILLER, JOAQUIN, HOUSE 12/29/62
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
MISSION BEACH ROLLER COASTER 02/27/87
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA
MISSION INN 05/05/77
RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA
MISSION SANTA INES 01/20/99
SOLVANG, SANTA BARBARA COUNTY, CALIFORNIA
MODJESKA HOUSE 12/14/90
MODJESKA, ORANGE COUNTY, CALIFORNIA
MONTEREY OLD TOWN HISTORIC DISTRICT 04/15/70
MONTEREY, MONTEREY COUNTY, CALIFORNIA
MUIR, JOHN, HOUSE 12/29/62
MARTINEZ, CONTRA COSTA COUNTY, CALIFORNIA
NEW ALMADEN 07/04/61
SANTA CLARA COUNTY, CALIFORNIA
NIXON, RICHARD M., BIRTHPLACE 05/31/73
YORBA LINDA, ORANGE COUNTY, CALIFORNIA
NORRIS, FRANK, CABIN 12/29/62
SANTA CLARA COUNTY, CALIFORNIA
OAK GROVE BUTTERFIELD STAGE STATION 11/05/61
SAN DIEGO COUNTY, CALIFORNIA
OLD CUSTOMHOUSE 12/19/60
MONTEREY, MONTEREY COUNTY, CALIFORNIA
OLD MISSION DAM 05/21/63
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA
OLD SACRAMENTO HISTORIC DISTRICT 01/12/65
SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA
OLD SCRIPPS BUILDING 05/20/82
LA JOLLA, SAN DIEGO COUNTY, CALIFORNIA
OLD UNITED STATES MINT 07/04/61
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
PAMPANITO (USS) 01/14/86
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
PARAMOUNT THEATRE 05/05/77
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
PARSONS MEMORIAL LODGE 05/28/87
TUOLUMNE MEADOWS, TUOLUMNE COUNTY, CALIFORNIA
PETALUMA ADOBE 04/15/70
SONOMA COUNTY, CALIFORNIA
PIONEER DEEP SPACE STATION 10/03/85
FORT IRWIN, SAN BERNARDINO COUNTY, CALIFORNIA
POINT REYES LIFEBOAT STATION 12/20/89
POINT REYES, MARIN COUNTY, CALIFORNIA
PONY EXPRESS TERMINAL 07/04/61
SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA
POTOMAC (Presidential Yacht) 12/14/90
OAKLAND, ALAMEDA COUNTY, CALIFORNIA
PRESIDIO OF SAN FRANCISCO 06/13/62
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
RALPH J. SCOTT (Fireboat) 06/30/89
SAN PEDRO, LOS ANGELES COUNTY, CALIFORNIA
RALSTON, WILLIAM C., HOME 11/13/66
BELMONT, SAN MATEO COUNTY, CALIFORNIA
RANCHO CAMULOS 02/16/00
PIRU, VENTURA COUNTY, CALIFORNIA

RANGER'S CLUB 05/28/87
YOSEMITE VALLEY, MARIPOSA COUNTY, CALIFORNIA
ROGERS DRY LAKE 10/03/85
KERN AND SAN BERNARDINO COUNTIES, CALIFORNIA
ROOM 307, GILMAN HALL, UNIVERSITY OF CALIFORNIA 12/21/65
BERKELEY, ALAMEDA COUNTY, CALIFORNIA
ROSE BOWL 02/27/87
PASADENA, LOS ANGELES COUNTY, CALIFORNIA
ROYAL PRESIDIO CHAPEL 10/09/60
MONTEREY, MONTEREY COUNTY, CALIFORNIA
SAN DIEGO MISSION CHURCH 04/15/70
SAN DIEGO COUNTY, CALIFORNIA
SAN DIEGO PRESIDIO 10/09/60
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA
SAN FRANCISCO BAY DISCOVERY SITE 05/23/68
SAN MATEO COUNTY, CALIFORNIA
SAN FRANCISCO CABLE CARS 01/29/64
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO CIVIC CENTER 02/27/87
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO PORT OF EMBARKATION, U.S. ARMY 02/04/85
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
SAN JUAN BAUTISTA PLAZA HISTORIC DISTRICT 04/15/70
SAN JUAN BAUTISTA, SAN BENITO COUNTY, CALIFORNIA
SAN LUIS REY MISSION CHURCH 04/15/70
SAN DIEGO COUNTY, CALIFORNIA
SANTA BARBARA COUNTY COURTHOUSE 04/05/05
SANTA BARBARA, SANTA BARBARA COUNTY, CALIFORNIA
SANTA BARBARA MISSION 10/09/60
SANTA BARBARA, SANTA BARBARA COUNTY, CALIFORNIA
SANTA CRUZ LOOFF CAROUSEL & ROLLER COASTER 02/27/87
SANTA CRUZ, SANTA CRUZ COUNTY, CALIFORNIA
SANTA MONICA LOOFF HIPPODROME 02/27/87
SANTA MONICA, LOS ANGELES COUNTY, CALIFORNIA
SINCLAIR, UPTON, HOUSE 11/11/71
MONROVIA, LOS ANGELES COUNTY, CALIFORNIA
SONOMA PLAZA 12/19/60
SONOMA, SONOMA COUNTY, CALIFORNIA
SPACE FLIGHT OPERATIONS FACILITY 10/03/85
PASADENA, LOS ANGELES COUNTY, CALIFORNIA
SPACE LAUNCH COMPLEX 10 ..... 06/23/86
LOMPOC, SANTA BARBARA COUNTY, CALIFORNIA
STANFORD, LELAND, HOUSE 05/28/87
SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA
STAR OF INDIA (Bark) 11/13/66
SAN DIEGO, SAN DIEGO COUNTY, CALIFORNIA
SUTTER'S FORT 01/20/61
SACRAMENTO, SACRAMENTO COUNTY, CALIFORNIA
SWEDENBORGIAN CHURCH 08/18/04
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
TAO HOUSE 07/17/71
CONTRA COSTA COUNTY, CALIFORNIA
TWENTY-FIVE-FOOT SPACE SIMULATOR 10/03/85
PASADENA, LOS ANGELES COUNTY, CALIFORNIA
UNITARY PLAN WIND TUNNEL 10/03/85
MOFFETT FIELD, SANTA CLARA COUNTY, CALIFORNIA
UNITED STATES IMMIGRATION STATION, ANGEL ISLAND 12/09/97
TIBURON VICINITY, MARIN COUNTY, CALIFORNIA
WALKER PASS 07/04/61
KERN COUNTY, CALIFORNIA
WAPAMA (Steam Schooner) 04/20/84
SAN FRANCISCO, SAN FRANCISCO COUNTY, CALIFORNIA
WARNER'S RANCH 01/20/61
SAN DIEGO COUNTY, CALIFORNIA
WATTS TOWERS 12/14/90
LOS ANGELES, LOS ANGELES COUNTY, CALIFORNIA
WAWONA HOTEL AND THOMAS HILL STUDIO 05/28/87
WAWONA, MARIPOSA COUNTY, CALIFORNIA

WELL NO. 4, PICO CANYON OIL FIELD 11/13/66
LOS ANGELES COUNTY, CALIFORNIA
YUMA CROSSING AND ASSOCIATED SITES (*Also in Arizona*) 11/13/66
WINTERHAVEN, IMPERIAL COUNTY, CALIFORNIA, and YUMA, YUMA COUNTY, ARIZONA

APPENDIX A

PROPERTIES DETERMINED ELIGIBLE FOR NATIONAL HISTORIC LANDMARK DESIGNATION BY THE SECRETARY OF THE INTERIOR

CALIFORNIA

SADDLE ROCK RANCH PICTOGRAPH SITE 3/16/90
MALIBU, LOS ANGELES COUNTY, CALIFORNIA

APPENDIX B

The numerous designations within the National Park System sometime confuse visitors. The names are created in the Congressional legislation authorizing the sites or by the president, who proclaims "national monuments" under the Antiquities Act of 1906. Many names are descriptive -- lakeshores, seashores, battlefields --but others cannot be neatly categorized because of the diversity of resources within them. In 1970, Congress elaborated on the 1916 National Park Service Organic Act, saying all units of the system have equal legal standing in a national system.

National Park [NP]
These are generally large natural places having a wide variety of attributes, at times including significant historic assets. Hunting, mining and consumptive activities are not authorized.

National Monument [NM]
The Antiquities Act of 1906 authorized the President to declare by public proclamation landmarks, structures, and other objects of historic or scientific interest situated on lands owned or controlled by the government to be national monuments.

National Historic Site [NHS]
Usually, a national historic site contains a single historical feature that was directly associated with its subject. Derived from the Historic Sites Act of 1935, a number of historic sites were established by secretaries of the Interior, but most have been authorized by acts of Congress.

National Historic Park [NHP]
This designation generally applies to historic parks that extend beyond single properties or buildings.

National Memorial [NMem]
A national memorial is commemorative of a historic person or episode; it need not occupy a site historically connected with its subject.

National Battlefield [NB]
This general title includes national battlefield, national battlefield park, national battlefield site, and national military park. In 1958, an NPS committee recommended national battlefield as the single title for all such park lands.

Other Designations [OD]
Some units of the National Park System bear unique titles or combinations of titles, like the White House.

APPENDIX C

NATIONAL PARK SYSTEM UNITS AUTOMATICALLY LISTED IN THE NATIONAL REGISTER

INTERNATIONAL HISTORIC SITE	[IHS]
NATIONAL BATTLEFIELD	[NB]
NATIONAL BATTLEFIELD PARK	[NBP]
NATIONAL BATTLEFIELD SITE	[NBS]
NATIONAL HISTORIC SITES	[NHS]
NATIONAL HISTORICAL PARK	[NHP]
NATIONAL MEMORIAL	[NMEM]
NATIONAL MILITARY PARK	[NMP]
NATIONAL MONUMENT	[NM]

CALIFORNIA

CABRILLO NM
EUGENE O'NEILL NHS
FORT POINT NHS
JOHN MUIR NHS
MANZANAR NHS
ROSIE THE RIVETER- WORLD WAR II HOMEFRONT NHP
SAN FRANCISCO MARITIME NHP

APPENDIX F

Materials Information List

Site | Bldg. Gen I. | Spaces | Samples | A/E Systems | Projects

Materials Information List

Asbestos BZB3

Response
Assesment
Material Location(s)

Sort by Material Class (TSI, Surf., Misc.)

HM #	Site/Building/Floor	Material Description		Asbestos Present?	Remaining Quantity	Abate Status	Class
2	JPL 283 Floor(s): 1	3" Beige Baseboard Adhesive	THE BASE OF INTERIOR WALLS - ROOM 101 AND RESTROOM	No	80		Misc
1	JPL 283 Floor(s): 1	Beige Drywall And Joint Compound Painted	IN ROOM 101, REAR STORAGE AREA OF ROOM 101, AND RESTROOM	No	1,100		Misc
4	JPL 283 Floor(s): All	Brown Roof Patching Compound	CAULKING ON THE METAL ROOF, METAL WALLS, AROUND AIR CONDITIONER, AND OTHER CRACKS	No	200		Misc
3	JPL 283 Floor(s): 1	Dark Gray Roof Patching Compound	LOCATED OUTSIDE ROOM 102, WEST SIDE, AND BASE OF FOUNDATION OF BUILDING	Yes	40		Misc

Scroll to desired record. Click on Find symbol(magnifying glass) to see more details

Record: 4 of 4

New Material | Delete | Find | Cancel Find | Add Photo | Dwgs./Links | Help! | Bldg. Menu | Main Menu

Sites

Lead B283 Code Library

Lead Material List

Site ID	Building	Space ID	HM	LBP HUD/EPA	Any Lead Detected?	HUD Grouped Lead status	Description
JPL	283	Exterior	009	Negative	No		Door Roll Up - Metal
JPL	283	Exterior	010	Negative	No		Wall--metal
JPL	283	Exterior	011	Negative	No		Door - Metal
JPL	283	Exterior	012	Negative	Yes		Door-casing-metal
JPL	283	Exterior	013	Negative	Yes		Door - Metal
JPL	283	Exterior	014	Negative	Yes		Door-casing-metal
JPL	283	Floor 1	001	Negative	No		Floor Concrete
JPL	283	Floor 1	002	Negative	Yes		Door Roll Up-casing-me
JPL	283	Floor 1	003	Negative	No		Wall--drywall
JPL	283	Floor 1	004	Negative	No		Door - Wood
JPL	283	Floor 1	005	Negative	No		Door - Metal
JPL	283	Floor 1	006	Negative	Yes		Door-casing-metal
JPL	283	Floor 1	007	Negative	Yes		Wall--metal
JPL	283	Floor 1	008	Negative	No		Ceiling-beam-metal

This is a list of Lead Homogeneous materials.Scroll to find a HM # you are interested in and click on the magnifying glass to jump to details.

Record 14 of 14

New Matl. | Delete | Find | Cancel Find | List View | Link Photo | Help! | Bldg. Menu | Main Menu

Site | Bldg. Gen'l. | Spaces | Samples | A/E Systems | Projects

Materials Information List

Asbestos Z61

Response
Assesment
Material Location(s)

Sort by Material Class (TSI, Surf., Misc.)

HM #	Site/Building/Floor	Material Description		Asbestos Present?	Remaining Quantity	Abate Status	Class
1	JPL 261 Floor(s): 1	12" X12" Gray Floor Tile And Adhesive	IN THE OFFICE	No	210		Misc
2	JPL 261 Floor(s): 1	Brown Baseboard Adhesive	IN THE OFFICE	Yes	60		Misc
3	JPL 261 Floor(s): 1	Drywall And Joint Compound	IN THE OFFICE	Yes	500		Misc
4	JPL 261 Floor(s): 1	Brown Roof Patching Compound	CAULKING ON EXTERIOR WALLS AROUND AIR CONDITIONER UNIT, AND ON ROOF PATCHES	No	150		Misc

Scroll to desired record. Click on Find symbol(magnifying glass) to see more details

Record: 4 of 4

New Material | Delete | Find | Cancel Find | Add Photo | Dwgs./Links | Help! | Bldg. Menu | Main Menu

Sites

Code Library

Lead B261

Lead Material List

	Site ID	Building	Space ID	HM	LBP HUD/EPA	Any Lead Detected?	HUD Grouped Lead status	Description
	JPL	261	Exterior	004	Negative	Yes		Wall--metal
	JPL	261	Exterior	005	Negative	Yes		Door - Metal
	JPL	261	Exterior	006	Negative	No		Wall-railing-metal
	JPL	261	Floor 1	001	Negative	No		Wall--drywall
	JPL	261	Floor 1	002	Negative	Yes		Wall- I Beam-metal
	JPL	261	Floor 1	003	Negative	Yes		Door-casing-metal

This is a list of Lead Homogeneous materials.Scroll to find a HM # you are interested in and click on the magnifying glass to jump to details.

Record 6 of 6

New Matl. | Delete | Find | Cancel Find | List View | Link Photo | Help! | Bldg. Menu | Main Menu

Materials Information List

Asbestos B278

Response
Assesment
Material Location(s)

Sort by Material Class (TSI, Surf., Misc.)

HM #	Site/Building/Floor	Material Description		Asbestos Present?	Remaining Quantity	Abate Status	Class
1	JPL 278 Floor(s): 1	12" X 12" Brown Floor Tile And Adhesive With Multi Streaks	THROUGHOUT THE BUILDING	Yes	1,953	Partially Abated	Misc
3	JPL 278 Floor(s): 1	12" X 12" White Glue-on Ceiling Tile And Adhesive Brown Mastic	ON THE WALLS AND CEILINGS OF ROOM 102 AND 102A	No	1,000		Misc
9	JPL 278 Floor(s): 1	2' X 4' White Ceiling Tile	ON THE FIBERGLASS CEILNG PANELS WITH WHITE PAINTED COVERS THROUGHOUT THE BUILDING	No	1,600		Misc
2	JPL 278 Floor(s): 1	3" Brown Baseboard Adhesive	ON THE INTERIOR WALLS	Yes	1,200		Misc
4	JPL 278 Floor(s): 1	Beige Drywall And Joint Compound Painted	IN THE INTERIOR PERIMETER WALLS, AND PARTITION WALLS	Yes	4,800		Misc
6	JPL 278 Floor(s): Roof	Black Roofing Tar And Felt	ON THE ROOF OVER THE NORTH WING - SPLIT LEVEL - GRAVEL TOP - OVER ROOM 102 AND 103	Yes	1,100		Misc
8	JPL 278 Floor(s): Roof	Dark Gray Roof Patching Compound	ON THE ROOF AT THE BASE OF EQUIPMENT, PARAPET FLASHING, PATCHES, ETC.	Yes	180		Misc
7	JPL 278 Floor(s): Roof	Silver Roofing Tar And Felt	THE SILVER PARAPET FLASHING ON ALL ROOFS	Yes	620		Misc

Scroll to desired record. Click on Find symbol(magnifying glass) to see more details

Record: 8 of 9

New Material | Delete | Find | Cancel Find | Add Photo | Dwgs./Links | Help! | Bldg. Menu | Main Menu

Site | Bldg. Gen'l. | Spaces | Samples | A/E Systems | Projects

Materials Information List

Response
Assesment
Material Location(s)

Sort by Material Class (TSI, Surf., Misc.)

HM #	Site/Building/Floor	Material Description		Asbestos Present?	Remaining Quantity	Abate Status	Class
5	JPL 278 Floor(s): 1	White Roofing Tar And Felt	ON THE ROOF OVER THE SOUTH WING	Yes	1,600		Misc

Scroll to desired record. Click on Find symbol(magnifying glass) to see more details

Record: 9 of 9

New Material | Delete | Find | Cancel Find | Add Photo | Dwgs./Links | Help! | Bldg. Menu | Main Menu

Sites

Code Library

Lead Material List

Lead B278

Site ID	Building	Space ID	HM	LBP HUD/EPA	Any Lead Detected?	HUD Grouped Lead status	Description
JPL	278	Exterior	010	Negative	No		Wall--brick
JPL	278	Exterior	011	Negative	No		Window-apron-metal
JPL	278	Exterior	012	Negative	No		Wall--wood
JPL	278	Exterior	013	Negative	Yes		Door - Metal
JPL	278	Exterior	014	Negative	Yes		Door-casing-metal
JPL	278	Exterior	015	Positive	Yes		Wall Handrail - Metal
JPL	278	Exterior	016	Negative	Yes		Door-casing-metal
JPL	278	Exterior	017	Negative	No		Door - Metal
JPL	278	Floor 1	001	Negative	No		Wall--drywall
JPL	278	Floor 1	002	Negative	Yes		Door-casing-metal
JPL	278	Floor 1	003	Negative	No		Door - Wood
JPL	278	Floor 1	004	Negative	Yes		Door - Metal
JPL	278	Floor 1	005	Negative	Yes		Wall--drywall
JPL	278	Floor 1	006	Negative	No		Wall--brick
JPL	278	Floor 1	007	Negative	No		Door-casing-metal
JPL	278	Floor 1	008	Negative	Yes		Door - Metal

This is a list of Lead Homogeneous materials.Scroll to find a HM # you are interested in and click on the magnifying glass to jump to details.

Record 16 of 19

New Matl. | Delete | Find | Cancel Find | List View | Link Photo | Help! | Bldg. Menu | Main Menu

APPENDIX G

Public Comments on the EA

Appendix G describes the public comment process for the Draft Final Environmental Assessment (EA) for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory. A description of the public comment process that was followed, the test of the announcement of public availability of the document for comment, copies of the comments received and the response to those comments are contained in this appendix.

The National Aeronautics and Space Administration (NASA) published the Draft Final Environmental Assessment (EA) for the Construction and Operation of the Flight Projects Center at the Jet Propulsion Laboratory in February 2006. A public announcement (see text box below) was published in two local newspapers, The San Gabriel Valley Tribune and The Pasadena Star News, on March 8, 2006 to notify the public of the availability of the document for review and comment. The public comment period began on March 8, 2006 and ended on April 7, 2006.

PUBLIC ANNOUNCEMENT

Notice of Availability of
Draft Final Environmental Assessment

Construction of a Flight Projects Center Building at NASA's Jet Propulsion Laboratory in Pasadena, California

NASA Proposes to construct a new building that will allow the demolition of eight outdated buildings, remove six temporary office trailers, and house up to 620 JPL employees. The proposed building would support project development activities essential to flight projects and would be referred to as the Flight Projects Center. NASA proposes to build the Flight Projects Center building on government – owned property located at the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, California. The building would consist of a one –story Project Review Center attached to a multi-story office tower of approximately 17,000 square meters (180,000 square feet). The building would be constructed on the existing site of three buildings, which would be demolished. Construction and operation of this building would meet the need to streamline communications among multiple project support functions by locating flight project staff in a single building on the 176-acre site.

NASA has prepared a Draft Final Environmental Assessment Report (EA) for the proposed Flight Projects Center building at JPL pursuant to the requirements of the National Environmental Policy Act (NEPA). As the lead agency under NEPA for the proposed action, and in accordance with applicable NEPA regulations and guidance, NASA is presenting this Draft Final EA to the public for review and comment.

Comments from the Public

Members of the public are invited to submit written comments to NASA regarding this Draft Final Environmental Assessment. The Draft Final EA is available for the public's review at the locations noted below. Comments from the public are welcomed. All comments must be submitted to NASA no later than 30 days from the date of this announcement thus must be postmarked or emailed no later than April 7, 2006. Please submit all comments regarding the Draft Final EA of the proposed project to:

Mr. Peter Robles
NASA Management Office
Jet Propulsion Laboratory
4800 Oak Grove Drive, 180-801
Pasadena, CA 91109

Email comments may be submitted to: JPLNASA.Environmental@JPL.NASA.Gov

Draft Final EA Availability

The Draft Final EA is available for public and agency review at:

Pasadena Central Library
285 E. Walnut Street
Pasadena, CA 91101

Altadena Public Library
600 E. Mariposa Street
Altadena, CA 91001

La Cañada – Flintridge
Public Library
4545 W. Oakwood Ave.
La Cañada – Flintridge

NASA Headquarters
Library
300 E. St., SW,
Suite 1J20
Washington, DC 20546

For personnel on the JPL site only:
JPL Main Library

Copies of the Draft Final EA were available for public review at the Pasadena Central Library, the Altadena Public Library, the La Canada-Flintridge Public Library and the NASA Headquarters Library. A copy of the document was also available for review by personnel on the JPL site at the JPL Main Library. Copies were also provided to the following public officials:

- Michael D. Antonovich, Supervisor, Fifth District, County of Los Angeles;
- Ken Balder, Chairman, Altadena Town Council;
- Robert Stanley, Director of Community Development, City of La Canada Flintridge;
- Mayor Portantino, City of La Canada Flintridge; and,
- Richard Bruckner, Director, Planning and Development, City of Pasadena.

The public was encouraged to provide written comments via mail or electronic mail.

The comments received are reproduced in the following pages. Each comment is immediately followed with an individual response.

Comment on NASA's Draft Final Environmental Assessment

Submitted by: Jake West

Date: Thu, 09 Mar 2006 13:27:32 -0800
From: "J. West"
Subject: Building Announcement
To: JPLNASA.Environmental@jpl.nasa.gov

To: Peter Robles

Dear Mr. Robles:

In am writing in regard to the recently announced Space Flight Project building project at JPL. Given that this is projected to cost 78 million dollars of taxpayer money, I, as one of those taxpayers, am deeply concerned about apparent discrepancies in the proposal. For example, how can this figure be accurate, when I know that commercial office space is contracted at $110 per square foot. Does this mean that even more money will be appropriated once the commitment is made and the existing funds prove inadequate?

Please understand that I am an ardent support of NASA, JPL and the space program (probably one of the few these days). I believe that both our national dominance in science and technology and the long-term survival of our species depend on the continued exploration and development of space. Yet I see America faltering at a time when other nations are clearly poised to take the lead away from us, especially in claiming the Moon and other near-Earth resources. NASA projects are being cancelled, rather than expanded. Extravagant and apparently unnecessary spending for a building, then, looks like a waste of money that could otherwise be used to save jobs and fund the actual work of JPL's mission. In all respects--practical, scientific and public opinion--this sort of misdirection of resources damages the space program and further robs it of the credibility that it so sorely needs to survive. A

In addition, there appears to be an environmental issue regarding the trees and animal habitat that will be destroyed to make room for the Space Flight building. Certainly, it is illegal to cut down oak trees for construction purposes in the State of California. That alone makes me wonder how JPL, a facility doing federal work--and thus mandated to follow government regulations, especially in such a sensitive area--can possibly justify its actions.

This proposed project is wrong at every level. It should be halted now, before the damage is already done.

Thank you for your time.

Sincerely,

Jake West
Torrance, CA

Response to Comment from Jake West
March 9, 2006

Response to Comment A:

Your comments are respectfully noted.

Response to Comment B:

The process that was followed to check the site for impacts to animal habitat is discussed in Section 4.6.1 of the EA. There are no endangered or threatened species present in the area proposed for the new building. In addition, provisions have been made to remove trees during the non-breeding season or to survey the area for active nests and take steps to protect those nests so that removal of the trees will not have an adverse impact on nesting birds.

As explained in Section 4.6.1 of the EA, the vegetation on the site is composed of non-native landscaping plants and trees with the exception of one moderate-sized oak tree. Regulations regarding the protection of oak trees apply to heritage oaks, which are defined as having a trunk diameter of eight inches or greater or, in the case of multi-trunk trees, having a combined diameter for the two largest trunks of twelve inches or more.. The oak tree in the proposed project area does not qualify as a heritage oak. Nevertheless, JPL contacted the Los Angeles County Fire Department Forestry Division, the agency responsible for enforcement of oak tree regulations in Los Angeles County, for advice on the feasibility of relocating the tree. However, upon inspection, the oak tree was found to be damaged by an insect infestation. Expert advice was that the tree would likely not survive transplantation. The removal of this diseased tree may help to protect the many other oak trees in the area. In any event, it is not illegal to cut down oak trees for construction purposes in the State of California. California has specific procedures which must be followed in such cases and these procedures have been followed for the construction of this facility.

Comment on NASA's Draft Final Environmental Assessment

Submitted by: David Koert

Date: Sun, 12 Mar 2006 08:58:13 -0600
From: David Koert
Subject: Flight Projects Center Building at NASA's Jet Propulsion Laboratory
To: JPLNASA.Environmental@jpl.nasa.gov

TO: Mr. Peter Robles
NASA Management Office Jet Propulsion Laboratory
4800 Oak Grove Drive, 180-801
Pasadena, CA 91109

I'm writing to express my support of the construction of this new building.

David Koert
Wichita, KS

Response to Comment from David Koert
March 12, 2006

NASA appreciates your support of the JPL Flight Projects Center.

Comment on NASA's Draft Final Environmental Assessment

Submitted by: Nancy McGuire

From: Nancy McGuire
Sent: Sunday, March 12, 2006 10:38 AM
To: peter.robles@jpl.nasa.gov
Subject: Space Flight Projects Building

It is my understanding that you intend to spend 78 million of our tax dollars to build a Space Flight Projects Building in an area which would require you clear mature trees, including 100 foot tall pines. I am concerned since this area is also home to many birds, falcons, and other animals.

I wanted to write to voice my disapproval and demand you seek other territory to build this structure. This is not a good use of tax payer dollars, nor is it good for the environment long term.

Regards,
Nancy McGuire
Brick, NJ

Response to Comment from Nancy McGuire
March 12, 2006

Your comment regarding the cost of the building is respectfully noted.

The proposed project area has been surveyed for potential impact to animals. There are no endangered or threatened species located in the proposed project area. The trees that would be removed in order to construct the project would be removed during the non-breeding season, if possible, in order to ensure that no nestlings or fledglings were lost as a result of construction activities. If this timing is not possible, a breeding bird survey would be conducted immediately prior to the trees being cut. If active nests were present, JPL would coordinate with the U.S. Fish and Wildlife Service to protect the nests and to comply with applicable laws and regulations. In addition, the planting of replacement trees on a 5:1 ratio at various locations throughout the JPL, as discussed in Section 4.6.1, would provide new habitat for birds and animals.

Comment on NASA's Draft Final Environmental Assessment

Submitted by: Jennifer Paige-Saeki

RECEIVED

APR 12 2006

Environmental Affairs Office-JPL

PLANNING & DEVELOPMENT DEPARTMENT
PLANNING DIVISION

Post Marked 4/4/06

April 4, 2006

NASA Management Office- JPL
Peter Robles, Jr. GS-819-15
Environmental Health, Safety and Facility Manager
4800 Oak Grove Drive
Pasadena, CA 91109

Re: Comments Related to Draft Final EA for JPL: Flight Projects Center

Dear Mr. Robles,

Thank you for forwarding a copy of the Draft Final Environmental Assessment (EA) for the proposed JPL Flight Projects Center to the City of Pasadena for review and comment. It is our understanding that the proposed project consists of demolishing three existing JPL buildings and developing a new, six-story, 180,000-square feet building in their place. The project site is located on the JPL campus, at the southeast corner of Mariner and Surveyor Roads. It is our understanding that the proposed building is not intended to increase operations at the JPL; rather the proposed building is intended to relocate a variety of employees that are currently dispersed throughout the JPL campus into one building.

There is a portion of the JPL site that is located in the City of Pasadena. The site is zoned PD-16 (Planned Development 16- Jet Propulsion Laboratory Employee Parking). There are a number of development standards related to this area which are attached for your reference. The project does not propose any changes to the PD-16 area.

Based upon our understanding of the project and our review of the project's Draft Final EA, we are submitting the following comments:

- North-facing vistas from the City of Pasadena toward the JPL campus are valued for their view of the San Gabriel Mountains, natural vegetation, and the Arroyo Seco environs. Development that substantially detracts from these views or damages these scenic resources may be considered a significant adverse effect on the environment. However, given that the proposed project is consistent with the height and massing of the adjacent structures and that the project would not damage any visual resources, the City of Pasadena concurs with NASA's conclusion that the project's viewshed impacts are not significant.

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- Operation of the proposed project is not expected to generate any new vehicle trips since the project proposes only to relocate existing employees within the JPL campus. During construction, however, new trips would be generated by construction workers, deliveries, and equipment movement. To alleviate construction traffic impacts for projects within the City, the Pasadena Department of Transportation (PasDOT) requires project-specific Construction Management Plans to be development and implemented. Given the project's location and the likelihood that construction-related vehicles would utilize City streets, the City respectfully requests that NASA prepare and implement a Construction Management Plan or equivalent plan to the satisfaction of the Pasadena Department of Transportation (PasDOT). PasDOT representative Ms. Jolene Hayes, Senior Transportation Planner, can be reached at (626) 744-7424.

The City of Pasadena appreciates the opportunity to comment on the referenced document. Should you have any questions regarding this letter, please do not hesitate to contact me at (626) 744-7231.

Respectfully submitted,
City of Pasadena

Jennifer Paige-Saeki

Jennifer Paige-Saeki, AICP
Senior Planner

enc

cc: 2006 Read File, Jolene Hayes, Environmental Letters File

PD – 16 – JET PROPULSION LABORATORY (EMPLOYEE PARKING)

The following development standards shall apply to the property reclassified in Section 1 of Ordinance 6191:

A. Site B as shown on Exhibit 1 attached hereto and incorporated herein by this reference shall be restricted to the uses permitted or conditionally permitted within the open space zoning designation of the Pasadena Municipal Code (P.M.C. Chapter 17.36). The existing parking lot leased to the Jet Propulsion Laboratory ("JPL") for temporary employee parking located on Site A as shown in Exhibit 1 shall be permitted to continue as an employee parking lot. All regulations of the open space (OS) zoning district shall apply. In the event of a conflict, the provisions of this PD shall apply.

B. JPL shall restore and/or landscape the subject properties at the termination of the parking lease. Such restoration or landscape improvements shall be subject to a negotiated agreement between the city and JPL at that time. The cost of such landscaping improvements or restoration shall not exceed a reasonable determination of the cost to restore the property in a condition which existed on the effective date of the ordinance establishing this planned development. In addition, this agreement shall provide for the cost of appropriate landscaping on the immediate eastern and southern perimeter of the JPL property adjacent to the sites.

C. Aisle and parking stall dimensions shall be in conformance with city standards and shall be approved by the public works department.

D. Rerouting and surfacing of the equestrian trail shall be the responsibility of JPL and shall be agreed upon by a representative group of equestrian interests in the area and JPL. The temporary parking use shall be designed so as not to interfere with existing recreational activities, specifically the continuous access along the equestrian trail and safe and convenient crossing for horses where the trail meets the parking lot egress and ingress easement.

E. Mitigation measures shall be taken to ensure that erosion on and surrounding the site will not increase. Plans for such mitigation measures, including drainage facilities and landscaping, shall be submitted to the city for approval prior to the issuance of any grading permits on the site. Any erosion damage which may occur to the equestrian trail as a result of the proposed alteration to provide for parking shall be repaired by JPL.

F. The proposed improvements (landscaping, equestrian trail, maintenance and access) shall be reviewed and a status report prepared and presented to the planning commission by the planning staff 30 to 60 days after approval by the city council and again one year later.

G. JPL shall use these lots for employee parking only. If the lots are not being so utilized, their reversion back to open space use may be instituted as described in condition B above.

Response to Comment from Jennifer Paige-Saeki
April 4, 2006

Thank you for your comments and concurrence on the EA.

A Construction Management Plan will be developed and coordinated with the City, as requested.

AUTHORIZATION FOR THE EXTERNAL RELEASE OF INFORMATION

Submit web-site URL or two copies of document with this form to Document Review, 111-207, or email them to docrev@jpl.nasa.gov.

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Judith A. Novelly	171-225	4-8634

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1. FINAL Environmental Assessment for the Construction and Operation of the Flight Projects Center at Jet Propulsion Laboratory 2. Finding of No Significant Impact Statement	Charles L. Buril Faustino R. Chirino

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